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 - and demonstrate the importance of distinguishing capital flows by the sector of domestic borrowers and lenders. We document four new sets of facts. First, banks account for the largest part of the external debt (stocks and flows) in advanced economies, whereas in emerging markets, banks, corporates and sovereigns have roughly equal shares. Second, the high correlation between total capital inflows and outflows documented in the literature is driven by banking sector flows; that is, domestic banks' borrowing from foreigners is highly correlated with domestic banks' lending to foreigners. Third, sovereign flows behave very differently from and often act as a countervailing force to private sector (banking and corporate) flows, especially in emerging markets. Fourth, different shocks (global financial cycles vs. domestic business cycles; banking vs. currency vs. sovereign crises) generate very distinct patterns of capital inflows and outflows by sector. The stylized facts we document deepen our understanding of the dynamics and behavior of capital flows, and have important implications for open economy models. (JEL: F21,F41,O1)

Keywords: Quarterly Capital Flows, External Corporate and Bank Debt, Systemic Risk.

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1. Introduction

The history of international 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 debt crisis, while private sector debt financed by capital inflows was the key source of fragility in the Asian financial crisis. During the financial crisis of 2008, the culprit in the US was the domestic household debt held by internationally-active banks. By contrast, in the European debt crisis of 2010-12, the external borrowing of sovereigns and banks took 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 the residency principle for *gross* capital inflows and outflows at the *quarterly* frequency. Our dataset features a balanced panel of 85 countries for inflows and 31 countries for outflows, starting in 1996q1[1], with sectoral decompositions of 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 a country, etc.).[2]

Our approach is fundamentally different than standard decompositions of capital flows by instrument/asset class, such as portfolio equity, portfolio

1. The balanced sample for outflows starts in 2004q1 for quarterly data and 2002 for annual data, but outflow observations are available back to 1996 in some cases.

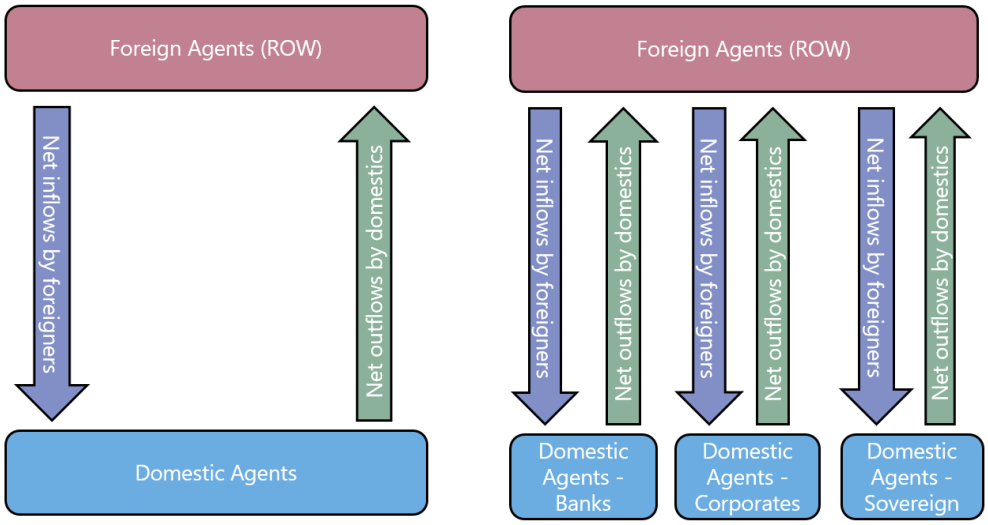
2. In our *gross* capital flows data (as in the standard residency principle based IMF-balance of payments (BOP) data), inflows and outflows are stated on a *net* basis, where inflows refer to the (changes in) positions of non-residents and outflows refer to the (changes in) positions of residents. Thus, negative inflows mean foreign investors are "leaving" the country by divesting and negative outflows mean domestic residents are "retrenching" by reducing their external assets.

debt and other investment flows.[3] Corporates can borrow using all these instruments (equity, bonds and loans), whereas sovereigns most typically issue bonds and banks mostly use loans. For our purposes, what matters is the *identity* of the borrower and the lender, rather than the instruments through which the borrowing and lending is done. Figure 1 below clarifies how our dataset (AHKS) is different than the existing standard data sets. Our data are always reported from the perspective of domestic agents. We measure the borrowing from and the lending to the rest of the world of a given country's banks, corporates and sovereigns. We intentionally use the standard balance of payments definitions and terminology on capital flows (e.g Forbes and Warnock (2012) and Broner, Didier, Erce, and Schmukler (2013)): "inflows" are defined as net inflows from foreign residents into the domestic economy and "outflows" are defined as net outflows from domestic residents to the rest of the world (ROW). Thus, our dataset captures (i) net inflows from the ROW to a given domestic sector (i.e. individual domestic sectors' borrowing from abroad) and (ii) net outflows by a given domestic sector to the ROW (i.e. individual domestic sectors' lending abroad).

Using our dataset, we document four new facts. First, banks account for the largest part of the external debt (stocks and flows) in advanced economies (AEs), whereas in emerging markets (EMs), banks, corporates and sovereigns have roughly equal shares. Second, the high correlation between total capital inflows and outflows documented in the literature is driven by banking sector flows. This result holds both for unconditional correlations and correlations conditional on global risk appetite (proxied by the VIX) and individual countries' business cycles (GDP growth). While the behavior of cross-border activities of banks has been extensively studied (e.g. Cetorelli

3. In theory, the IMF BOP data offer a similar sectoral decomposition to our data (government, central bank, bank, other sectors). In reality, however, this IMF BOP decomposition is either not reported publicly or, when reported, is available for limited years and countries, and hence cannot be used for empirical analysis as we document below.

FIGURE 1. Gross Capital Flows Data. Authors' elaboration. ROW=Rest of World



(A) Existing standard datasets (B) AHKS dataset

and Goldberg (2012) regarding internal capital markets of global banks), to our knowledge we are the first to show the importance of banking sector flows for the correlation between total capital inflows and outflows.

The third stylized fact is that sovereign flows behave very differently from and often act as a countervailing force to private sector (banking and corporate) flows, especially in EMs. We document this fact in several different contexts (e.g. the 2008 crisis, around banking crises, through business cycles, conditional correlations with other sectors' flows). There are a number of features that make this stylised fact distinct from similar results on net flows in the literature. First, it is examined in the context of *gross* flows rather than *net* and at a quarterly frequency instead of annual. Several papers show opposite behavior of net flows to public and private sectors (relative to GDP growth) at an annual frequency (Aguiar & Amador, 2011; Alfaro, Kalemli-Özcan, & Volosovych, 2014; Gourinchas & Jeanne, 2013; Ju & Wei, 2010).[4]

4. In addition to these papers, also using annual data in a historical context, Horn, Reinhart, and Trebesch (2020) show that when inflows to the private sector "leave" during wars, natural disasters and financial crises, official flows to sovereign borrowers "come in".

Second, we show that active *borrowing* by the public sector from abroad (external liability flows), as opposed to solely reserve accumulation (external asset flows), is an important countervailing force to private sector (banks and corporates) flows. Third, we establish that this relationship holds along a number of different dimensions - relative to cyclical movements (like GDP growth), around crisis events, and even in correlations conditional on GDP growth and global factors (like the VIX), all at a quarterly frequency.

The fourth stylized fact we document is that different types of shocks generate very distinct patterns of capital flows by sector. We document this around different types of financial crises (banking vs. currency vs. sovereign), around global crises (2008 crisis vs. taper tantrum vs. Covid-19), and around local and global cycles (domestic business cycle vs. global financial cycle).

To establish our stylized facts, we first document descriptive patterns in the data related to the composition and correlation of international capital flows. Then we run quarterly panel regressions of flows in and out of each sector on standard determinants. In the main text, we present results from regressions including countries' own lagged GDP growth (a summary pull factor) and global shocks/financial conditions proxied by the VIX index (a summary push factor). We include country fixed effects, so identification relies on the within variation. We present various alternative setups in the appendix. We focus on debt flows by sector as we document that this is the largest asset class in international capital flows, in spite of the rising shares of portfolio equity and FDI flows over the last decade. We also include flows of official reserves and *FDI debt* inflows.

To the best of our knowledge, there are no other existing papers and datasets examining capital flows by sector (for all sectors) at the quarterly frequency, with an extensive coverage both along the cross-sectional dimension (85 countries) and along the time series dimension (starting in 1996). Milesi-Ferretti and Tille (2011) and Cerutti, Claessens, and Puy (2015) separate out the banking sector within the other investment debt

category of the BOP to analyze it on its own, but they do not study other sectors, namely corporates and sovereigns. 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 private inflows, but do not study sectoral flows (e.g. Forbes and Warnock (2012), Bluedorn, Duttagupta, Guajardo, and Topalova (2013), and Milesi-Ferretti and Tille (2011)).[5] In addition, given that a substantial amount of public sector debt takes the form of portfolio securities, the data in the above studies will still include public flows, as they do not separate portfolio debt into the components due to the private and public sectors.

In terms of responses to global shocks, several papers document that gross flows respond systematically to changes in global conditions (Broner et al., 2013; Forbes & Warnock, 2012; Milesi-Ferretti & Tille, 2011; Rey, 2013).[6] There is an extensive literature studying push and pull factors driving capital flows in addition to these papers, such as Fratzscher (2012) and Ahmed and Zlate (2014) (see Koepke (2019) for an emerging markets review). We contribute to this literature by showing how the overall patterns documented therein for flows in and out of countries are driven by the different dynamics of flows in and out of banks, corporates, and sovereigns. For instance, the literature finds positive relationships with GDP growth and negative relationships with the VIX, which we show are driven mainly by banks, and to a lesser extent by corporates, but public flows tend to push against those relationships.

5. There is also a literature that studies the long-term movements in gross capital flows that culminate into long-term external asset and liability positions such as Gourinchas and Rey (2007); Lane and Milesi-Ferretti (2001); Obstfeld (2012) and using annual data, Davis and van Wincoop (2017). We focus on capital flow dynamics at the quarterly business cycle frequency.

6. See also Cerutti et al. (2015), 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), Nier, Sedik, and Mondino (2014).

The papers that are closest to our work in terms of our data construction exercise are Arslanalp and Tsuda (2014b) and Arslanalp and Tsuda (2014a). These authors 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 covers only the sovereign sector for a balanced sample starting in 2005, whereas we consider all three sectors – sovereigns, banks, corporates – and start in 1996.

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

2. A New Dataset for Capital Flows Research

We construct a new dataset that dis-aggregates international capital flows by sector in the domestic economy. To ensure clarity, we briefly review the basic definitions and structures for capital flows data, and what our dataset provides.

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:

$$NetInflows = GrossLiabilityFlows - Repayments \tag{1}$$

$$NetOutflows = GrossAssetFlows - Disinvestment \tag{2}$$

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 to the domestic economy from the rest of the world, and asset flows as outflows from the domestic economy to the rest of the world. This is the primary working definition of capital flows in the BOP framework, which we use across all our data sources for consistency.

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 national 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.[7]

Figure 2 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.[8] Each of these categories, except reserves, can be split into debt and equity components (though other investment equity tends to be negligible for most countries). Thus, inflows and outflows can be summarized as:

$$Inflows_t = DIE_t^{in} + DID_t^{in} + PE_t^{in} + PD_t^{in} + OID_t^{in} \tag{3}$$

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

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

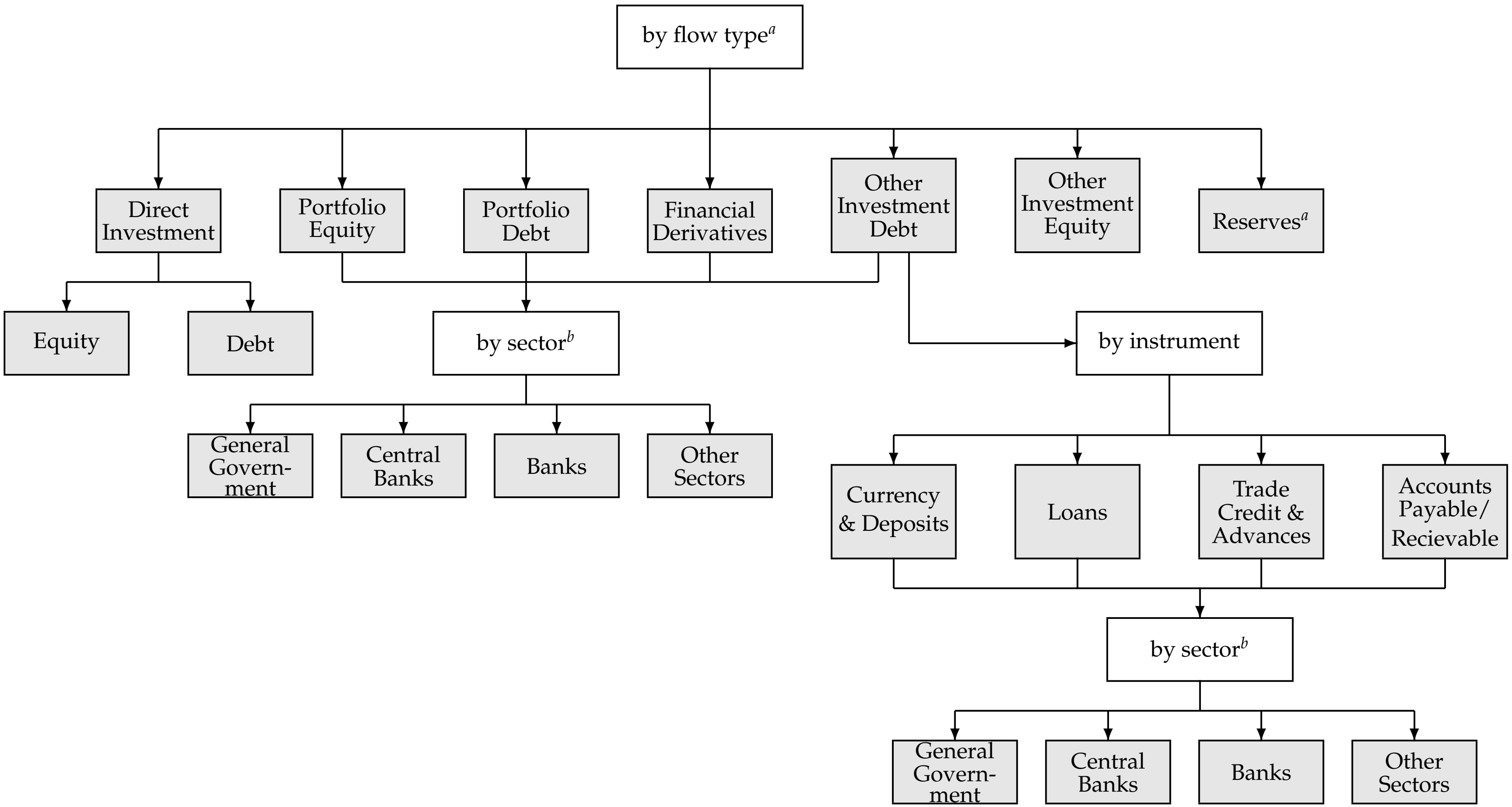
8. The remaining category is financial derivatives, which is small and sparsely reported, previously included as a part of portfolio investment.

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.

The focus of this paper is on the differentiation of capital flows by sector in the domestic economy. The domestic economy refers to all entities that are resident in that economy, regardless of the nationality of the entity. This rule is known as the "Residency Principle" and is the basis upon which the BOP data is compiled. We follow this principle when combining data sources in order to build our new dataset. 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").[9] Much of the discussion below will focus on the public or sovereign sector, defined as the sum of general government and central bank, though in some instances we will show government and central bank separately for illustration.

9. 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 significant overlap between the two categories. That is why, in the rest of this paper, we use the two terms interchangeably for presentational convenience.

FIGURE 2. BOP Data Structure. [a] This structure is the same for inflows and outflows. Reserves are only classified as outflows. [b] The breakdowns of these variables by sector exist in the BOP data but the coverage is sparse for many countries and quarters.



In principle, several of the instrument categories in the BOP can be decomposed by domestic sector, specifically portfolio investment debt, portfolio investment equity and other investment debt.[10] In theory, each type of capital flow can be disaggregated by domestic sector. In practice, however, the coverage of such disaggregated information in the BOP tends to be sparse, especially for EMs/developing countries (EMDEs) and for earlier time periods. To be absolutely clear, capital flow types (asset classes) are generally well reported in *aggregate* terms in the BOP data, and the reporting of the sectoral breakdowns has improved in recent years. Nevertheless, for most EMDEs and most years before 2005 the reporting of the data by sector is much less exhaustive. We document this sparsity in detail below.

To address these gaps, we take two approaches. First, we fill missing data internally by assigning the difference between the total and the sum of the reported sectors to the unreported sector. This is a fully internally consistent approach. Second, for capital inflow data, we combine and harmonize several publicly available data sources to address the remaining gaps: 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, and Quarterly External Debt Statistics (QEDS) of the IMF and World Bank

10. Other investment debt can also be decomposed by instrument and then by sector. 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, examine FDI debt inflows in our sector decomposition. Galstyan, Lane, Mehigan, and Mercado (2016) use data starting 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 at a quarterly frequency.

(WB).[11] See Appendix A for a detailed description of how we use the above data sources in order to construct our novel dataset. We make sure our second approach is also internally consistent as we describe in detail in Appendix.[12]

Our filling exercise has a very significant impact on the time and country coverage of the inflow data (see Table A5).[13] A balanced sample requires that portfolio debt and other investment debt be available for all 4 sectors in every period for each country. With 8 data components required to be available in each period, the probability that at least one is missing is high. If no adjustments are made to the BOP dataset, it would not yield a balanced sample for any countries at a quarterly frequency (and only for 12 countries at an annual frequency). After our internal fill, our balanced sample of countries increases to 10 in the quarterly data (16 in the annual data). After incorporating the external datasets, our balanced sample increases to 85 countries in the quarterly data (89 in the annual data). Given the significant advantages of a balanced country sample for cross-section and

11. In Appendix C.3, we also examine data from the Debtor Reporting System (DRS) data of the WB, which splits external debt inflows for EMDEs into public and publicly-guaranteed debt vs private non-guaranteed debt.

12. Our methodology is similar to that of the capital flight literature, which 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). 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. they 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).

13. Our external filling procedure makes a very big difference, especially for the quarterly data, where it fills 25%-40% of observations for EMs and 75%-90% of the observations for developing countries that were missing under portfolio debt. In the case of other investment debt, 11% of observations are filled for EM and 40%-50% for developing countries. Advanced economies have a sizable amount filled externally as well: 20%-30% for portfolio debt observations, and 15%-18% of other investment debt. Figures A1 and A2 compare the aggregate inflow series derived from our data vs those derived solely from the BOP data, and show that the missing observations can have a sizeable impact at times even for aggregate flows.

panel regression analysis, the impact of our data filling exercises on sample size is very consequential.[14]

A dataset that directly breaks down capital flows by sector can be very valuable, as it provides a better window into the behavior of flows than does proxying for sectors with the instrument breakdowns of the standard BOP data. For instance, other investment debt flows are often attributed solely to the banking sector, while portfolio debt flows are sometimes assumed to be dominated by corporates. Table 1 shows the correlation between debt inflows to banks and other investment debt inflows as well as the correlation between debt inflows to corporates and portfolio debt inflows for a number of countries. Corporate inflows generally don't track portfolio inflows well, largely because of two major wedges between those two series: (i) a large share of corporates' borrowing from abroad is done through loans, and (ii) sovereigns issue most of their debt in the form of debt securities. In a small number of cases (eg China, the US, and Japan), the OID series and the banks flow series track each other reasonably well. However, the correlation of those series drops off considerably after the global financial crisis (GFC) and even turns negative for certain countries.[15]

We divide our overall sample of countries into three groups by level of development: advanced, emerging, and developing.[16] In our sample of annual capital inflows, we have 89 countries (25 advanced, 34 emerging, 30 developing).[17] We exclude financial centers (e.g. Panama, Hong Kong,

14. Note that while our inflow sample and outflow sample are not the same, they are both balanced.

15. Figure C2 shows average flows relative to trend GDP across countries, along with the correlation of those series.

16. We rely on the 2000 IMF WEO classification to define the group of advanced economies. Since 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.

17. The outflow sample is not as large as the inflow sample because data on liabilities owed is more widely reported than data on assets owned, so there are not as 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.

TABLE 1. Country Correlations: AHKS vs BOP

		AHKS Bank vs BOP OID			AHKS Corp vs BOP PD		
		Corr	Pre-GFC	Post-GFC	Corr	Pre-GFC	Post-GFC
AEs	US	0.71	0.75	0.61	0.64	0.74	0.50
	Japan	0.72	0.76	0.65	0.09	-0.27	0.34
	Australia	0.30	0.39	0.22	0.28	0.49	-0.14
	Italy	0.51	0.94	0.24	-0.07	0.14	-0.21
	Spain	0.28	0.85	0.04	0.64	0.86	-0.01
	Sweden	0.74	0.90	0.55	0.08	0.20	0.12
EMs	Brazil	0.65	0.55	0.89	0.63	0.70	0.19
	Russia	0.45	0.29	0.86	0.10	0.09	0.11
	India	0.56	0.19	0.78	0.52	0.63	0.48
	China	0.96	0.95	0.97	0.29	0.44	-0.10
	South Africa	0.84	0.83	0.85	0.24	0.16	0.41
	Malaysia	0.86	0.94	0.64	0.50	0.43	0.60

OID = Other investment debt; PD = portfolio debt; Pre-GFC = 1996-2007; Post-GFC = 2008-2014; AEs: advanced economies, EMs: emerging markets.

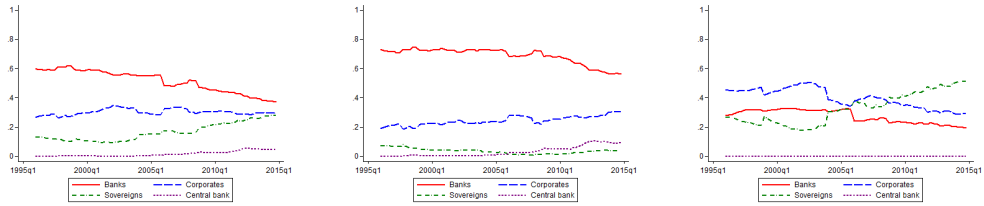
Bermuda) to avoid distorting the patterns in the data for the typical (non-financial center) economy. Nevertheless, capital flows between financial centers and other countries in our sample are still captured by the respective counterparty country's flows. At the quarterly frequency, our inflow sample consists of 85 countries (with El Salvador, Mongolia, Montenegro, and Serbia missing relative to the annual inflow sample, mainly due to missing quarterly GDP data, which is used to scale the capital flow series). The outflow sample consists of 31 countries (15 advanced, 16 emerging) at a quarterly frequency spanning 2004q1-2014q4. For the annual data, we have 31 countries (13 advanced and 18 emerging) spanning 2002-2014. Details on the samples are given in Appendix A.4.[18]

18. An updated version of our dataset is posted here.

3. Descriptive Patterns

In this section, we present key patterns and trends observed in our data across countries, sectors, and time. As shown in Figure C3, debt represents the majority of external liabilities and assets globally: the average share of debt liabilities in external liabilities during our sample period is 62% of AEs and 51% in EMs.

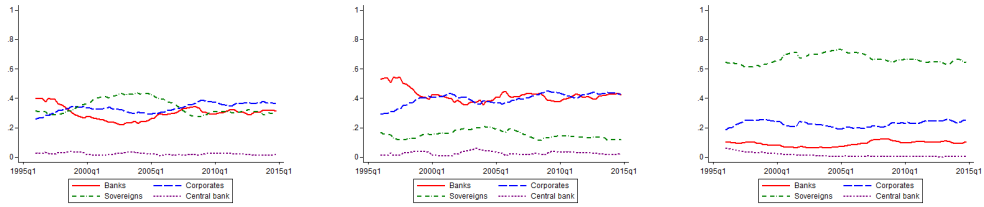
FIGURE 3. Composition of External Debt Liabilities by Debt Type and Sector. Source: AHKS data.



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

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

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



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

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

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

Employing our new dataset, Figure 3 plots the sectoral share of external debt stocks for each flow type and country group.[19] In AEs, banks account for the lion's share of external debt liabilities. In EMs, corporates, banks and sovereigns account for roughly equal shares. This first set of facts is interesting since it is generally thought that AE firms and governments are

19. The fact that our sample is fully balanced (i.e., each country has data for all sectors for each period) prevents the entry/exit of countries in the sample from distorting the time series patterns. The flow version of this figure delivers a similar, albeit noisier, picture (Figure C4 in Appendix C).

in a better position to access international capital markets directly than their EM counterparts. One possible explanation for this stylised fact is that, since AE banking systems are more developed, they do most of the intermediation of external funds in AEs, while AE corporates and sovereigns can source a larger share of their funding in domestic capital markets, which tend to be deeper in AEs. While the sectoral composition is largely stable over time, the global financial crisis (henceforth GFC) appears to have shifted some trends after 2008. Most notably, in its aftermath, there is a clear increase in the external debt share of AE sovereigns and a decline for banks, leading their shares to converge, albeit not yet fully as in EMs.

Perhaps more surprising, the conventional wisdom that other investment debt is primarily owed by banks and portfolio debt is primarily owed by corporates holds for AEs (especially before the GFC), but not for EMs, as shown in panels (b), (c), (e), (f). In the latter, most of the portfolio debt is attributable to sovereigns, while banks and corporates account for roughly equal shares of other investment debt.

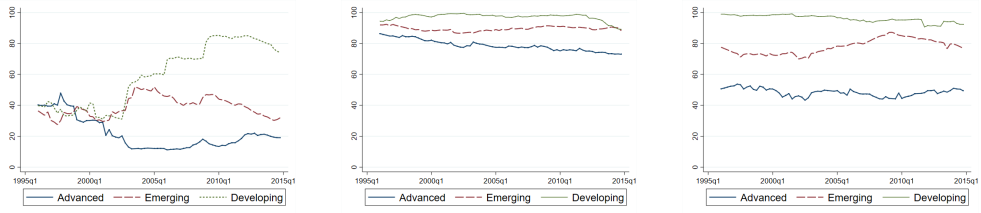
It is also interesting to note that the share of other investment debt in total debt for the sovereign sector has fluctuated considerably over time. Figure 4 shows this is the case for all three country groups we examine (panel (a)). By contrast, the respective shares for banks and corporates are relatively constant over time (panels (b) and (c), respectively).[20]

Figure 5 shows the counterpart of Figure 3 for the composition of external debt assets (as opposed to liabilities), including reserves.[21] In EMs, the public sector is overwhelmingly the main lender to other countries. This is primarily driven by the accumulation of reserve assets, which are included in the total

20. The dynamics of the underlying pieces of external debt can be seen in Figure C5, which plots the aggregate external liabilities by sector in billions of US dollars, with a split by instrument.

21. There are not enough developing countries in the outflows sample to calculate a meaningful average, so only lines for the advanced and emerging groups are included.

FIGURE 4. Share of Other Investment Debt Liabilities in Total Debt. Source: AHKS data, authors' calculations. For each sector, the lines plot other investment debt (outstanding stocks) as a percent of its total external debt stock (portfolio debt + other investment debt) for the given country group.



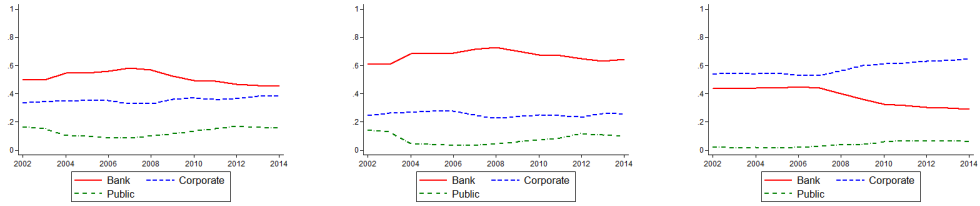
(A) Sovereigns (B) Banks (C) Corporates

debt figure. In AEs, banks do the lion's share of external lending in loans, while corporates account for the largest share of AEs lending in portfolio debt assets. Thus, the main AE external debt lending patterns mirror their counterparts on the AE borrowing side. For EMs, banks and corporates account for roughly equal shares of lending in other investment debt, while corporates account for the largest share of portfolio debt assets. The sectoral composition of external debt assets is also very stable over time, as in the case of debt liabilities.

As for the instrument composition, the share of AE foreign reserve holdings dipped around the GFC, but bounced back shortly afterwards and has remained largely stable since then (Figure 6). EM sovereigns' external assets consist almost exclusively of foreign reserves. The share of external assets held in the form of other investment debt has remained relatively stable, at about 80%, for banks (in both AEs and EMs) throughout our sample period. By contrast, the respective share has been declining for AE corporates, who have been increasing their holdings of portfolio debt assets.[22]

22. The evolution of the volumes by instrument for each sector are shown in Figure C6.

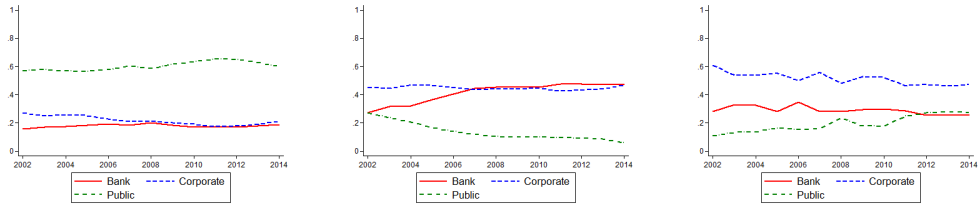
FIGURE 5. Composition of External Assets by Asset Type and Sector. Source: AHKS data, authors' calculations. Total Debt includes official reserves.



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

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

(C) Sector Shares of Portfolio Debt Assets - Advanced

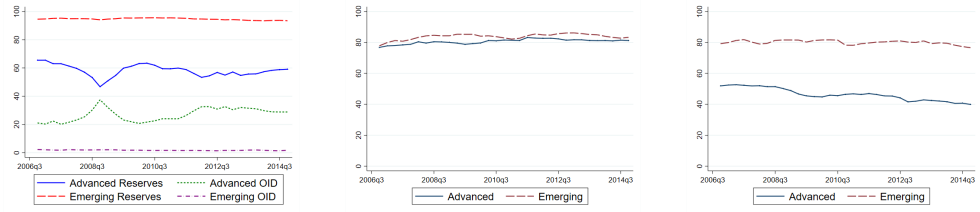


(D) Sector Shares of Total External Debt Assets - Emerging

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

(F) Sector Shares of Portfolio Debt Assets - Emerging

FIGURE 6. Share of Other Investment Debt and Reserve Assets in Total Debt Assets. Source: AHKS data, authors' calculations. Lines plot the aggregate other investment debt (outstanding stocks) for the given country group as a percent of the total external debt stocks (portfolio debt + other investment debt). Sample consists of 17 AEs and 12 EMs, balanced over 2006q4-2014q4. Only 3 developing countries have complete data over this period, so that aggregate is now shown.



(A) Sovereigns

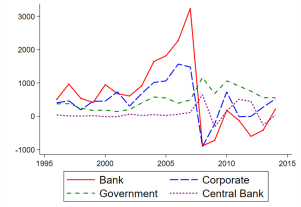
(B) Banks

(C) Corporates

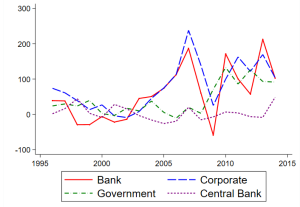
Figure 7 plots the aggregate debt inflows by sector for each country group.[23] The buildup in external debt flows ahead the 2008 GFC and subsequent collapse is the most striking feature in these plots. An interesting

23. We use the annual version of the dataset for clarity in the figure. See Figure C7 and C8 for plots of the median inflows and outflows relative to trend GDP. Figure C9 additionally shows the average of inflows to GDP.

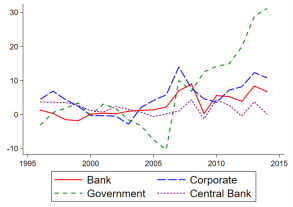
FIGURE 7. Aggregate External Debt Flows, Billions 1996 USD. Source: AHKS data, authors' calculations. Total debt is portfolio debt + other investment debt. For Public sector asset flows, this includes Reserves.



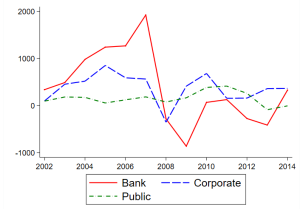
(A) Total Debt Liability Flows, Advanced



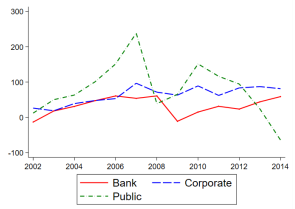
(B) Total Debt Liability Flows, Emerging



(C) Total Debt Liability Flows, Developing



(D) Total Debt Asset Flows, Advanced



(E) Total Debt Asset Flows, Emerging

distinction between AEs and EMs is the post-GFC dynamics of flows. While flows to advanced economies collapsed during the GFC and remained very subdued afterwards, flows to emerging and developing countries rebounded relatively quickly across all major sectors.

This figure also illustrates one aspect of our third fact, namely that public sector flows often move opposite private sector flows. In the aggregate, this is clear for AEs in panel (a), where inflows to general government and central bank both increase right as inflows to banks and corporates are collapsing during the GFC. The public sector is often able to borrow from abroad even as such funding dries up for the private sector, as illustrated in this case.[24]

24. 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 C12 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 role of sovereigns in smoothing out capital inflows, thus reducing the probability of sudden stops.

AE banks get the lion's share of capital inflows during the buildup to the GFC. However, they see consistent negative net inflows for several years after 2008, reflecting the post-GFC deleveraging of this sector. The dynamics of inflows to the AE corporates and public sectors are driven to a large extent by portfolio debt, as this is their primary vehicle for borrowing. Other investment debt plays a larger role for the EM corporate sector and for banks.[25]

Much of the increase in emerging-market private debt after 2008 is attributable to a few large EMs, such as China, India, and Brazil (Figure C11). Foremost among these is China, which has poor sector coverage in the BOP data, so much of the measured effect is made possible by our data filling exercise (i.e. it is derived from our data filling series). While both bank and corporate inflows to China increased substantially after the GFC, the increase in the former series has been much larger. In India, the corporate sector has been the dominant recipient of debt flows. Flows to banks in the country have also increased considerably after the GFC. In the meantime, Brazil saw a sustained rise in corporate debt inflows, accompanied by somewhat volatile increases in inflows to banks and the government.

Turning to outflows, panels (d) and (e) of Figure 7 plot the debt asset flows for our sample of 31 countries over 2002-2014. As in the case of inflows, the public sector is defined as the sum of the central bank and the general government sector. Total debt asset flows for the public sector also include the flow of reserves. For advanced countries, the pattern is similar to the one for inflows. More concretely, the dynamics of flows is dominated by the pre-GFC surge and the subsequent collapse of private sector outflows (led by

25. See Figure C10. The post-GFC increases in inflows to governments come primarily in the form of bonds, with the exception of 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. The majority of inflows to banks in all countries also takes the form of other investment debt.

the banking sector,). The public sector plays a relatively small role for AE outflows. By contrast, emerging market outflows are dominated by the public sector. These are mainly driven by the accumulation of reserves, which rose considerably before the GFC and briefly thereafter, but were drawn down after the 2013 taper tantrum .[26]

4. Empirical Analysis

In this section, we start by documenting the fact that the high correlation between total capital inflows and outflows is explained by within-sector flows, and in particular by the high correlation between banking sector inflows and outflows, especially for advanced-economy banks. Then we move on to characterize the behavior of the inflows and outflows of the various sectors in response to regular business cycle fluctuations and global risk aversion shocks/changes in global financial conditions, as well as in response to different types of crises. In doing so, we also assess if the responses of banking sector inflows and outflows to these factors might contribute to explain the high correlation between banks', and thereby aggregate, inflows and outflows.

4.1. Comovement of Inflows and Outflows

Capital inflows and outflows have been shown in the literature to be highly correlated. In our dataset, the inflow-outflow correlation for debt flows to all

26. Figure C13 shows these flows, broken down by instrument type. Portfolio debt outflows from AE bank contracted sharply during the global financial crisis. By contrast, external portfolio debt investment by the corporate sector remained stable during the GFC and rose in its immediate aftermath before experiencing a brief contraction shortly after the start of the Eurozone crisis. Other investment debt outflows from EM banks and corporates also dipped during the GFC, but had a much stronger subsequent rebound than their AE counterparts. Corporate portfolio debt outflows also rebounded strongly after the GFC. The EM public sector reduced both portfolio and other investment external assets around the crisis; portfolio debt assets recovered after the GFC, but other investment debt assets did not.

sectors is 0.78 for our full country sample, 0.87 for AEs, and 0.59 for EMs. We examine correlations of capital inflows and outflows at the sectoral level to better understand their comovement and what drives the high correlation in aggregate inflows and outflows. Table 2 presents correlations conditional on country fixed effects, lagged GDP growth, and lagged log VIX. The results are very similar for unconditional correlations, as shown in Table C2, although within-sector correlations tend to be somewhat larger.[27]

The strongest inflow-outflow correlations are found within-sector, rather than across sectors. This is the case not only in the full country sample, but also in the AE and EM sub-samples. In the full sample, banks exhibit the highest inflow-outflow correlation at 0.7, and thus represent the main driver of the strong correlation between aggregate inflows and outflows, our second main fact.[28] Closer inspection reveals that banks' inflow-outflow correlation is much larger among advanced economies than among EMs, tracking the pattern for all flows (where the correlation for AEs is also considerably higher than for EMs). There is also a relatively high correlation (at 0.5) between inflows into and outflows from the corporate sector in the full sample, mainly due to advanced economies. The public sector inflow-outflow correlations are similar in the two country groups (at 0.4).

Table 2 also provides additional evidence for our third fact, that public sector borrowing acts as a countervailing force to private sector borrowing. The conditional correlation between public and private inflows is negative

27. Tables C3 and C4 show heatmaps of conditional and unconditional correlations of flows split by both sector and instrument.

28. The aggregate inflow-outflow correlation can be expressed as a weighted sum of the correlations between the inflows and outflows of the different sectors, with the weights given by the product of the respective standard deviations divided by the product of the standard deviations of the aggregates. The standard deviations of bank inflows (10.2) and bank outflows (9.1) in the full sample are much larger than those of either public (5.6 and 6.9, respectively) or corporate (4.5 and 4.9, respectively) flows, in line with the fact noted earlier that banks account for the largest share of external debt stocks and flows. Hence not only is the inflow-outflow correlation of banks the largest of all sectors, it is also the one that carries the largest weight in the weighted sum.

and highly statistically significant for all pairs and all country groups (all countries, AEs and EMs). It is larger (in absolute terms) for banks than for corporates.

It is also interesting to note that EM public sector outflows (which, as noted above, include the accumulation of reserves) tend to be positively (and statistically significantly) correlated with inflows to all individual sectors. This finding likely reflects the fact that EM sovereigns tend to accumulate reserves when capital is flowing into their countries.[29]

4.2. The Impact of Push and Pull Factors on Sector-specific Capital Flows

How do the effects of the global financial cycle and the domestic business cycle on the behavior of capital flows vary across sectors? To answer this question, we examine the response of sectoral capital inflows and outflows to standard push and pull factors, and highlight the important differences in response by sector. We also asses how this differential behavior shapes each sector's contribution to the inflow-outflow comovement. The push factor we examine is a proxy for the global financial cycle/global risk appetite (the VIX); the pull factor on which we focus 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:

$$\frac{FLOW^{j}_{i,t}}{GDP_{i,t}} = \alpha_i + \beta^s \log(VIX_{t-1}) + \gamma^s GDPGrowth_{i,t-1} + \epsilon^{j}_{i,t} \qquad (5)$$

Our dependent variable is capital inflows or outflows as a percent of GDP to sector $j \in \{Public, Banks, Corp., All\}$ for country i in quarter t. The regressions are run separately by sector so that, for each sector, α_i

29. EMs that are more financially integrated internationally accumulate reserves primarily as insurance against capital flow reversals, beyond what is needed for exchange rate management (Ghosh, Ostry, & Tsangarides, 2017). This motivation is consistent with the correlation in the data, according to which public sector outflows increase when private sector inflows increase.

TABLE 2. Inflow and Outflow Conditional Correlations, by Sector

		Inflows			Outflows		
		Public	Banks	Corps.	Public	Banks	Corps.
Panel A: All countries							
Inflows	Public	1					
	Banks	-0.087***	1				
	Corps.	-0.068***	0.155***	1			
Outflows	Public	0.340***	0.087***	0.019	1		
	Banks	0.142***	0.686***	0.221***	-0.089***	1	
	Corps.	0.048**	0.199***	0.515***	0.036*	0.206***	1
Panel B: Advanced Economies							
Inflows	Public	1					
	Banks	-0.112***	1				
	Corps.	-0.077***	0.151***	1			
Outflows	Public	0.351***	0.103***	-0.014	1		
	Banks	0.133***	0.745***	0.258***	-0.037	1	
	Corps.	0.040	0.193***	0.588***	-0.023	0.216***	1
Panel C: Emerging Markets							
Inflows	Public	1					
	Banks	-0.121***	1				
	Corps.	-0.065**	0.115***	1			
Outflows	Public	0.405***	0.175***	0.124***	1		
	Banks	0.114***	0.306***	0.058**	-0.105***	1	
	Corps.	0.034	0.069**	0.215***	-0.031	0.033	1

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

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 logs. 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. When

we discuss results vis-a-vis GDP, we refer to "procyclical" as moving in the same direction with GDP growth, and "countercyclical" as moving opposite GDP growth. Our standard errors are clustered at the country level.

In order to highlight the differences in results based on our dataset versus the standard data sets and where these differences come from, we will adopt the following labeling. First, results based on our dataset will be labelled as 'AHKS'. If one takes the view that the missing sector in BOP data is not available because the data is less trustworthy (e.g. the total for that instrument in the BOP may not be accurate), we can stop short of doing an internal filling when we construct our data and we label those results using the version of our data with no internal fill as 'AHKS noIntFill'. Another alternative is to take our AHKS data 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 results using this version of the data as 'AHKS match'. Lastly, direct investment debt (DID) may be an important component of debt inflows, especially between corporates. Thus, we can also add DID to the all sectors total, as well as to the corporate sector, and use the label 'AHKS+DID'.

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 regression

sample covers 63 countries: 23 advanced, 31 emerging, and 9 developing over 1997q1-2014q4.[30]

As a comparative baseline, and to illustrate our data construction, Table C5 presents the results for inflows to all sectors (that is, the sum of the four sectors). Due to the missing data, column 1 (Raw BOP) has few observations and thus lacks statistical significance, illustrating the important gap in coverage for the sectoral analysis. 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 higher GDP growth in the domestic economy. This applies both to the full country sample as well as the AE and EM subsamples. Importantly, our results are robust and consistent across alternative ways of constructing our dataset.[31]

Turning to our main results, Table 3 examines the relationships for inflows by sector, still showing the different constructions of the data, and including for comparison the raw BOP results. Again, the results are largely similar across the different dataset constructions, but largely not significant in the limited BOP only sample.[32]

Capital inflows respond to these factors differently across sectors. Inflows to banks and corporates show similar behavior, but inflows to AE corporates don't respond to domestic GDP growth like inflows to AE banks do. The most notable difference is between the two private sectors and the public

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

31. 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 different constructions of the AHKS data, for both advanced economies (panel B) and emerging markets (panel C).

32. The coefficient on the VIX, when using the raw BOP sample, is significant for inflows to the public sector for all countries and especially emerging markets. We find this result in a few other specifications as well, which we note in our analysis below.

sector. There is no response to the VIX for total inflows to the public sector.[33] Inflows to sovereigns react differently to domestic GDP growth in advanced and emerging countries. The response is positive (procyclical) in advanced countries, similar to their bank inflows. By contrast, in emerging markets, it is negative (countercyclical), going in the opposite direction to the response of the private sector. This result is another manifestation (in a different setting) of the countervailing nature of public inflows (i.e. our third key stylised fact).

The negative relationship between public sector inflows and domestic GDP that we document is likely related to the counter-cyclical nature of fiscal policy. Governments often try to counteract growth slowdowns by implementing expansionary fiscal policies.[34] This increases their budget deficits, which tend to be at least partially financed by borrowing in international markets. As a consequence, capital inflows to the public sector tend to increase when the domestic economy slows down (and vice versa).

To further underscore the importance of using sectoral data, Table C1 illustrates the differences in our push-pull regression analysis when using our newly constructed sector breakdowns vs BOP proxies. The estimated impact of the VIX on the conventional measure of AE portfolio debt flows is not significant, but is significant for our AE corporate flow series. More importantly, while the estimated coefficient of GDP growth on inflows to EM corporates is positive and highly significant, its counterpart in the case of EM portfolio debt flows has the opposite (counterintuitive) sign. These differences arise because both sovereigns and corporates play a significant

33. Table C6 finds a positive coefficient in the period following the great financial crisis. Table C7 shows a positive response for inflows to emerging market sovereigns for a fully balanced panel over 2002q4-2014q4. Table C8 shows that other investment debt inflows to the public sector respond positively. These responses move opposite that of private inflows. Portfolio debt inflows to emerging market sovereigns respond negatively to the VIX, so emerging market sovereign bonds appear to be treated the same way as private sector borrowing when it comes to a tightening of global financial conditions.

34. This is the case for many advanced economies (Aghion & Marinescu, 2007), as well as more recently for emerging markets (Jha, Mallick, Park, & Quising, 2014; Takáts, 2012).

role in overall portfolio debt flows. In emerging markets, sovereign flows can be countercyclical, while corporate flows are procyclical. In advanced countries, sovereign flows are generally not responsive to the VIX, which dampens the response of portfolio debt flows in standard data, but not in our corporate flow series.

These differences by sector are robust across a number of alternative specifications. Table C6 shows that the results are not driven by the 2008-9 period of the great financial crisis. Table C7 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.[35] This last sample includes more countries than the previous fully balanced sample, and shows EM 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 C9).

35. Fully balanced means that every country in the sample has data for all sectors and both instruments over the whole time frame.

TABLE 3. Inflows by Sector

	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
Panel A: All Countries													
$\log(VIX_{t-1})$	1.337**	0.467	0.483	0.562	-2.708	-2.418***	-2.423***	-2.668***	-0.206	-1.045***	-1.043***	-0.987***	-1.280***
	(0.483)	(0.364)	(0.364)	(0.354)	(1.755)	(0.525)	(0.525)	(0.522)	(0.212)	(0.243)	(0.243)	(0.232)	(0.385)
GDP $Growth_{it-1}$	0.0179	-0.0124	-0.0144	-0.0128	0.0699	0.116***	0.116***	0.112***	0.00823	0.0359***	0.0362***	0.0379***	0.0442***
	(0.0289)	(0.0101)	(0.00991)	(0.0104)	(0.0441)	(0.0270)	(0.0270)	(0.0272)	(0.00791)	(0.00772)	(0.00772)	(0.00795)	(0.00844)
Observations	290	4020	4009	4020	290	4020	4009	4020	290	4020	4009	4020	3721
R^2	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													
$\log(VIX_{t-1})$	0.493	0.410	0.421	0.590	-0.919	-3.069***	-3.069***	-3.513***	-0.823	-1.160**	-1.157**	-0.997**	-1.446
	(0.962)	(0.791)	(0.793)	(0.760)	(2.050)	(1.074)	(1.074)	(1.031)	(0.847)	(0.476)	(0.476)	(0.445)	(0.803)
GDP $Growth_{it-1}$	0.0376	0.0563***	0.0496**	0.0535**	0.00642	0.209**	0.209**	0.201**	-0.0463	0.0225	0.0226	0.0280	0.0202
	(0.0393)	(0.0190)	(0.0194)	(0.0213)	(0.124)	(0.0784)	(0.0784)	(0.0798)	(0.0476)	(0.0170)	(0.0170)	(0.0179)	(0.0171)
Observations	60	1656	1656	1656	60	1656	1656	1656	60	1656	1656	1656	1548
R^2	0.016	0.008	0.006	0.007	0.002	0.032	0.032	0.029 R^2	0.020	0.009	0.009	0.009	0.008
Panel C: Emerging Markets													
$\log(VIX_{t-1})$	1.504**	0.438	0.460	0.481	-3.282	-2.199***	-2.200***	-2.340***	-0.284	-0.956***	-0.957***	-0.976***	-1.179***
	(0.545)	(0.263)	(0.266)	(0.268)	(2.241)	(0.535)	(0.535)	(0.567)	(0.211)	(0.291)	(0.291)	(0.286)	(0.392)
GDP $Growth_{it-1}$	0.0127	-0.0383***	-0.0383***	-0.0377***	0.0823	0.0842***	0.0842***	0.0827***	0.0165***	0.0334***	0.0334***	0.0337***	0.0486***
	(0.0336)	(0.00934)	(0.00925)	(0.00938)	(0.0503)	(0.0217)	(0.0217)	(0.0217)	(0.00344)	(0.00598)	(0.00598)	(0.00634)	(0.00814)
Observations	223	2036	2036	2036	223	2036	2036	2036	223	2036	2036	2036	1919
R^2	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. ** $p < 0.05$, *** $p < 0.01$

The above regressions omit many emerging and developing economies that lack quarterly GDP data, even though their quarterly sector-wise flows are available in our dataset. In order to include these countries and analyze their inflows, we utilize the annual version of our dataset and estimate the same regression specification. This adds 4 EMs and 20 developing countries back into our sample, enough that we can present results for developing countries on their own (in the previous set of results they were only in the "All countries" regressions). These are shown in Table 4.

For EMs, 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 becomes significant, perhaps because these flows respond to larger global shocks rather than more frequent fluctuations. This movement with the VIX further highlights how different capital inflows to the public sector are, especially for emerging markets.

For developing countries, inflows are largely not reactive to the push or pull factors we examine. 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 exhibit low R^2 when using quarterly data. When using annual data, however, R^2's tend to be considerably larger (0.2-0.3). This is actually an artifact of the time period, as illustrated in Table 5. Regressions that use mainly data 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. Post-GFC, the capital flow environment is quite different (Amiti, McGuire, and Weinstein (2018)). As a consequence, push-pull regressions estimated on a post-GFC sample tend to have much

TABLE 4. Annual Inflows - Emerging and Developing Economies

	(1) All	(2) Public	(3) Banks	(4) Corp.
Panel A: Emerging Markets				
$\log(VIX_{t-1})$	-3.515***	0.662***	-3.056***	-1.153***
	(0.882)	(0.228)	(0.793)	(0.228)
GDP $Growth_{it-1}$	0.0746***	-0.0320***	0.0706***	0.0365***
	(0.0222)	(0.00731)	(0.0180)	(0.00524)
Observations	628	628	628	628
R^2	0.115	0.043	0.138	0.134
Panel B: Developing Countries				
$\log(VIX_{t-1})$	-2.366	-0.407	-0.945**	0.0547
	(1.179)	(0.584)	(0.441)	(1.153)
GDP $Growth_{it-1}$	0.0602	-0.0142	-0.0100	0.0980
	(0.0564)	(0.00731)	(0.0188)	(0.0889)
Observations	516	516	516	516
R^2	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. ** $p < 0.05$, *** $p < 0.01$

lower explanatory power. Closer inspection reveals that inflows to AE banks and EM corporates are the two items showing the biggest decline in explanatory power of the push and pull factors we examine. Nevertheless, the factors still explain a considerable fraction of the variation in inflows to EM banks during the post-GFC period. Interestingly, the explained variation is quite low across the board for public inflows as well as flows to advanced economy corporates.

To dig deeper into the difference in flow environment pre- and post-GFC, we further split these regressions by sample period and by instrument (in addition to our benchmark sector splits). The instrument split is relevant, as the post-GFC environment has featured a reduced role for global banks and an more prominent role for bond financing (portfolio debt) in global financial

TABLE 5. 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.

intermediation (Shin, 2013). These results are presented in Table C10 for AEs and Table C11 for EMs.

For inflows to advanced economies, the VIX is a strong negative factor pre-crisis but not post-crisis, in line with Fratzscher (2012), Amiti et al. (2018), Barrot and Servén (2018), and Kalemli-Özcan (2019). In contrast, inflows to all AE sectors become more procyclical after the crisis. This change is driven by the higher post-GFC procyclicality of other investment debt flows to all sectors. On the other hand, portfolio debt flows for banks and corporates show procyclicality before the GFC, but not after.

The global financial cycle remained a relevant factor for EM flows even after the GFC. Similarly to AEs, EMs experienced reduced influence from the global financial cycle after the GFC, particularly for other investment debt flows to corporates. However, the impact of the VIX on inflows to EM banks remained significant even after the GFC, in line with the sustained R^2's discussed above. Inflows to the public sector respond differently depending on the instrument, with tighter global financial conditions having a negative impact on portfolio debt inflows (along with inflows to corporates), but

a positive impact on other investment debt flows (which includes official lending to sovereigns). Thus, like in AEs, portfolio debt inflows to EM banks and corporates became more procyclical after the global financial crisis. Other investment debt inflows to banks and corporates remained procyclical in both periods, though portfolio debt inflows to sovereigns turn significantly countercyclical after the GFC, driving a stronger countercyclical response of total debt inflows.

The differences pre and post-GFC highlight how structural changes in global markets can shift these relationships. The structural trends in flows could bear influence on the baseline relationships that we document. Table C12 shows results if we apply a Hamilton filter (Hamilton, 2018) to remove the structural component of capital flows to each sector, and examine the relationship of push and pull factors with just the cyclical component.[36] We find that our baseline results are largely the same: private sector flows in all countries respond negatively to the VIX, but positively to GDP growth, with public sector flows moving countercyclically in EMs. The only significant change relative to our baseline results is that AE corporate debt inflows do not react significantly to the VIX.

Turning now to outflows in Table 6, we find that total capital outflows (i.e. the sum of the outflows of all sectors) respond similarly to total capital inflows: negative response to the VIX and a positive (procyclical) response to GDP. Emerging market outflows, however, do not significantly respond to domestic GDP. These patterns hold both for portfolio and other investment debt (column (1)) and when additionally including reserve assets (column (5)). 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.

36. As noted in (Hamilton, 2018), the Hodrick-Prescott (HP) filter may not always be appropriate. Nevertheless, our results are largely the same if we use an HP filter.

Flows of official reserves are procyclical (Panel A, columns (5) and (7)). While there is no conclusive evidence, some of our results suggest that EMs may drive this relationship. The estimated relationship for AE sovereigns (Panel B, column (5)) is negative and small, the coefficient in the EM sample (Panel C, column (5)) is significant at the 6% level, and the result for all public sector flows (debt + reserves) is significant for the EM sample when results are normalized by trend GDP (Table C9). Overall, our results provide evidence that reserves tend to be accumulated when capital is flowing into the economy, as noted in our inflow-outflow correlations above (Table 2). Thus, the public sector's reserve management may be an important way in which it can serve as a countervailing force in terms of capital flows for some countries, building up reserves when times are good and capital is flowing into the private sector.

External factors like the VIX also have a significant impact on EM outflows. Outflows from EM banks and the public sector (including flows of reserves) respond negatively to the VIX. Outflows by corporates do not show a significant response.

Our results are again robust to a number of alternative specifications. Table C13 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 C9), 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 (as mentioned above), and corporate outflows are procyclical for all countries and especially EMs.[37]

37. Table C14 presents results for outflows split by sector and flow type, and shows that the negative response to the VIX for banks and corporates is driven primarily by other investment debt outflows.

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TABLE 6. Outflows by Sector

	(1) All	(2) Public	(3) Banks	(4) Corp.	(5) Reserves	(6) Total+ Reserves	(7) Public+ Reserves
Panel A: All Countries							
$\log(VIX_{t-1})$	-3.337***	-0.00978	-3.438***	-0.788***	-0.185	-3.582***	-0.266
	(0.775)	(0.358)	(0.788)	(0.277)	(0.342)	(0.859)	(0.581)
GDP Growth$_{it-1}$	0.0723***	0.0123**	0.0668**	0.00984	0.0213**	0.0926***	0.0341**
	(0.0261)	(0.00545)	(0.0266)	(0.00531)	(0.0106)	(0.0279)	(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							
$\log(VIX_{t-1})$	-5.669***	0.495	-6.100***	-1.451**	0.606	-5.148***	1.067
	(1.486)	(0.757)	(1.467)	(0.532)	(0.483)	(1.721)	(1.087)
GDP Growth$_{it-1}$	0.210***	0.0236	0.219***	0.0122	-0.000451	0.214**	0.0270
	(0.0742)	(0.0118)	(0.0750)	(0.0123)	(0.0114)	(0.0768)	(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							
$\log(VIX_{t-1})$	-1.648***	-0.560**	-1.355***	-0.282	-0.985**	-2.703***	-1.636***
	(0.389)	(0.215)	(0.339)	(0.242)	(0.456)	(0.580)	(0.502)
GDP Growth$_{it-1}$	0.0107	0.00268	0.00350	0.00877	0.0275	0.0347	0.0293
	(0.0118)	(0.00464)	(0.0109)	(0.00529)	(0.0137)	(0.0190)	(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. Columns (1)-(4) include only portfolio debt and other investment debt, columns (5)-(7) adds reserves. Errors are clustered at the country level. ** $p < 0.05$, *** $p < 0.01$

While we have examined push and pull relationships with a single factor for each, a number of additional (push and pull) factors could also play a significant role. Table 7 replaces the VIX and GDP growth with a set of alternative push factors (denoted with $t-1$ subscripts) and pull factors (denoted with $i,t-1$ subscripts), which have been explored in the existing literature (Koepke, 2019). In this additional set of regressions, as in our benchmark results, public sector flows tend to react to push and pull factors differently from private sector flows. Notably, global GDP growth is a strong driver of inflows to (AE and EM) banks and to the (AE) corporate sector, but has no significant impact on flows to the (AE and EM) public sector. These novel, sector-specific results shed new light on one of the more puzzling results in the existing literature, which has found that while global GDP growth has a positive and significant impact on portfolio debt inflows to EMs, its impact on other investment debt inflows to EMs is ambiguous (Koepke, 2019).

Our sector-specific results also provide new insights into the financial channel of exchange rates (Avdjiev, Koch, Shin, & Bruno, 2019; Avdjiev, Koch, Shin, & Du, 2019; Bruno & Shin, 2015a, 2015b). More concretely, our results demonstrate that while the previously-documented negative relationship between the exchange rate and capital inflows holds at the aggregate levels (for all sectors), there is significant heterogeneity across sectors in both AEs and EMs. In line with the predictions of the theoretical literature on the subject (Bruno & Shin, 2015b), we find that the impact of the exchange rate is strongest for inflows to banks, the only sector for which the estimated relationship is statistically significant for both AEs and EMs. Furthermore, we find that the negative relationship is spread across more sectors in EMs than in AEs, in line with the argument that EM borrowers tend to have larger currency mismatches on their balance sheets due to the more limited availability and the higher costs of hedging services in EMs (for International Settlements, 2019; Hofmann, Shim, & Shin, 2020). Last but not

least, we document that the public sector is the only one for which the relationship between exchange rates and capital inflows is insignificant for both AEs and EMs. This is yet another manifestation of one of the main stylised facts we document - namely, that flows to the public sector behave very differently than their private sector counterparts.

As in our benchmark regressions, we find fewer statistically significant results for capital outflows than for capital inflows. Nevertheless, these additional regressions provide further evidence that public sector inflows tend to dance to a different tune than private sector inflows.

In conclusion, our analysis helps shed light on which sectors drive the observed response of flows to push and pull factors, and the role of these sectors in a changing capital flow environment. The heterogeneous responses of the main capital flow components to domestic and global shocks highlights the significant variation in the responses of sector-specific capital flows to different shocks (our fourth main stylised fact). Additionally, the strong and significant responses (to the VIX and GDP growth) of inflows into and outflows from the banking sector, particularly in advanced economies, sheds some light on why banks drive the aggregate (all-sector) inflow-outflow correlations (our second main stylised fact). Bank inflows and outflows tend to respond similarly to the same stimuli, so the high correlation observed even after controlling for these factors likely reflects similar matching behavior of banks' activities to other circumstances. Last but not least, virtually all of the push-pull results presented in this sub-section provide strong evidence that public sector flows respond very differently from private sector flows to country-specific and global shocks (our third main stylised fact).

TABLE 7. Other Push and Pull Factors

	Advanced Economies					Emerging Markets				
	(1) All	(2) Public	(3) Banks	(4) Corps.	(5) Corps +DID	(6) All	(7) Public	(8) Banks	(9) Corps.	(10) Corps +DID
Panel A: Inflows										
Broad dollar index$_{t-1}$	0.0700	-0.0930**	0.151**	0.0163	0.0142	-0.0352	0.00972	-0.00907	-0.0359***	-0.0702***
	(0.0723)	(0.0411)	(0.0606)	(0.0275)	(0.0395)	(0.0199)	(0.0115)	(0.0145)	(0.0117)	(0.0227)
Yield Curve$_{t-1}$	-0.409	1.194**	-1.263	-0.357	-0.470	-0.322	0.135	-0.194	-0.264**	-0.406***
	(0.820)	(0.463)	(0.624)	(0.269)	(0.444)	(0.239)	(0.143)	(0.144)	(0.102)	(0.134)
Wu/Xia shadow rate$_{t-1}$	1.234**	0.560**	0.532	0.0527	0.200	-0.0127	-0.0734	-0.00805	0.0688	0.0505
	(0.493)	(0.258)	(0.273)	(0.146)	(0.212)	(0.223)	(0.0911)	(0.123)	(0.0639)	(0.109)
Global GDP growth$_{t-1}$	1.440**	0.212	0.693**	0.344**	0.452***	0.239**	0.0617	0.168***	0.00916	-0.0658
	(0.510)	(0.192)	(0.272)	(0.127)	(0.156)	(0.0979)	(0.0666)	(0.0514)	(0.0454)	(0.0909)
Domestic credit growth$_{it-1}$	0.453	-0.0352	0.507	0.146	0.193	0.226	0.0649	0.0992	0.0616***	0.0609**
	(0.441)	(0.165)	(0.283)	(0.111)	(0.139)	(0.106)	(0.0334)	(0.0608)	(0.0179)	(0.0272)
Exchange rate depreciation$_{it-1}$	-0.295***	-0.0206	-0.258***	-0.0133	-0.0173	-0.0998**	-0.00130	-0.0574**	-0.0411***	-0.0556***
	(0.0839)	(0.0238)	(0.0634)	(0.0185)	(0.0221)	(0.0458)	(0.0194)	(0.0243)	(0.00760)	(0.0175)
Current account$_{it-1}$	-0.0920**	-0.0271**	-0.0443	-0.0122	-0.0187	-0.0675	-0.000394	-0.0326	-0.0345**	-0.0418**
	(0.0430)	(0.0101)	(0.0250)	(0.0136)	(0.0163)	(0.0356)	(0.0144)	(0.0196)	(0.0146)	(0.0191)
Capital control (inflow)$_{it-1}$	-4.006	-2.044	-4.919	3.278	4.141	-0.561	-1.889**	0.403	0.925**	0.785
	(8.274)	(3.113)	(6.973)	(2.494)	(4.264)	(1.131)	(0.858)	(0.644)	(0.358)	(0.580)
Observations	1331	1331	1331	1331	1331	859	859	859	859	855
R^2	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$_{t-1}$	0.142**	0.0128	0.0688	0.0649***	-0.00462	0.0105	-0.0166**	-0.00240	0.0291	-0.0553
	(0.0529)	(0.0510)	(0.0597)	(0.0207)	(0.0579)	(0.0161)	(0.00679)	(0.0184)	(0.0132)	(0.0428)
Yield Curve$_{t-1}$	-0.435	0.287	-0.862**	-0.158	0.622	-0.405**	-0.0983	-0.285	-0.180	0.0475
	(0.639)	(0.495)	(0.323)	(0.252)	(0.516)	(0.129)	(0.0570)	(0.139)	(0.0946)	(0.305)
Wu/Xia shadow rate$_{t-1}$	0.688	0.101	0.651**	0.0612	0.245	-0.0365	0.0231	-0.0205	-0.0947	0.259
	(0.375)	(0.237)	(0.270)	(0.166)	(0.258)	(0.0815)	(0.0320)	(0.0810)	(0.0468)	(0.211)
Global GDP growth$_{t-1}$	1.596***	0.356	1.286**	0.329	0.0571	0.201**	0.0907	0.144	0.0243	-0.0440
	(0.529)	(0.206)	(0.557)	(0.215)	(0.321)	(0.0801)	(0.0901)	(0.0701)	(0.0345)	(0.135)
Domestic credit growth$_{it-1}$	0.261	-0.0291	0.530	0.00653	-0.0489	0.0658	0.00268	0.0465	0.0413	-0.00000713
	(0.393)	(0.0549)	(0.568)	(0.0769)	(0.0639)	(0.0425)	(0.0134)	(0.0294)	(0.0283)	(0.0189)
Exchange rate depreciation$_{it-1}$	-0.209***	0.00411	-0.250***	-0.0135	0.00107	-0.0285**	-0.00244	-0.0179	-0.0181	-0.0472
	(0.0669)	(0.0178)	(0.0791)	(0.0158)	(0.0218)	(0.0107)	(0.00487)	(0.00897)	(0.00828)	(0.0249)
Current account$_{it-1}$	-0.0400	0.000654	-0.0487	0.0204	0.0164	0.0343	0.0316**	0.0212	-0.00331	-0.00246
	(0.0671)	(0.0221)	(0.0535)	(0.0282)	(0.0178)	(0.0316)	(0.0108)	(0.0225)	(0.0197)	(0.0475)
Capital control (inflow)$_{it-1}$	3.075	1.076	8.821	-0.571	3.877	-0.276	-1.016	0.145	0.374	-0.275
	(10.66)	(2.975)	(13.15)	(2.545)	(3.279)	(0.816)	(0.798)	(0.638)	(0.641)	(1.094)
Observations	996	996	996	996	995	591	591	591	591	591
R^2	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. ** $p < 0.05$, *** $p < 0.01$

4.3. The Behavior of Capital Flows around Crises

The behavior of capital flows around crisis events has been the subject of much research. The dynamics of capital flows around crises have usually been characterized by sharp retrenchments, "sudden stops", and reversals. The existing literature has shown that, during such episodes, when foreigners tend to "leave" (inflows fall) domestic residents tend to "return" (outflows fall), helping partly to smooth out the external shock. Such volatile gyrations in capital flows can have important macroeconomic and financial consequences. However, little is known about how these flow swings depend on the sector of the domestic agents involved, which has important implications for macro-financial stability and for the policies that can be used to manage it.

In this subsection, we shed more light on the above questions by examining the behaviour of each sector's inflows and outflows around crisis events. This helps illuminate the contribution of different sectors to the capital flow response to crises and deepen our knowledge of capital flow dynamics around these episodes. Behavior around crisis events may also shed light on the high inflow-outflow correlations discussed previously.

We compare average flows relative to trend GDP across all countries around three different types of crisis events: banking crises, currency crises, and sovereign debt crises, as defined by Laeven and Valencia (2018). Since the timing of each episode is not exact, we use annual flows combined with the year indicator for the start of each crisis, centering each crisis date at t=0. Figure 8 plots the results.[38] As expected, banking crises are associated with strong declines in inflows to banks. In addition, we see a smaller decline in inflows to corporates, but increases in inflows to the public sector. Thus, public borrowing from abroad during a banking crisis appears to serve as an

38. Based on a sample of 43, 27, and 12 countries for banking, currency, and sovereign debt crises, respectively. By design, only countries experiencing a crisis are captured in the figures.

important backstop for financial stability. During currency crises, the main decline is in inflows to corporates, while inflows to sovereigns tend to rise. Sovereign crises see a run up in inflows to sovereigns up to the year of the crisis, followed by a large collapse. Inflows to banks take a dip when the crisis hits, but otherwise the private sector is less affected during sovereign crises.

Figure 9 shows summary plots for outflows from EMs around banking and currency crisis events. Due to a more constrained sample with outflows, there were not enough EM sovereign debt crisis events to construct average outflows around them. The graph illustrates that the average EM experiencing a banking crisis sees an immediate decline in corporate outflows and a sustained decline in bank outflows, with no significant response from the public sector. For currency crises, the public sector tends to increase their outflows (driven by reserve holdings), while banks see a decline in outflows in the year of the crisis.

These patterns for inflows are largely confirmed by regression analysis with a broader set of countries, shown in Table 8. These regressions are specified by the following equation:[39]

$$\frac{Flow^{j}_{i,t}}{GDP_{i,t}} = \alpha_i + \alpha_t + \sum_{k=0,1,2} (\beta_k BankCrisis_{i,t-k} + \delta_k CurrCrisis_{i,t-k} + \gamma_k BankCrisis_{i,t-k}) + \epsilon^{j}_{i,t} \tag{6}$$

where i is country, j indicates the sector, t indicates the year, and the independent variables are country and time fixed effects, and dummy variables for each crisis type (and their lags).

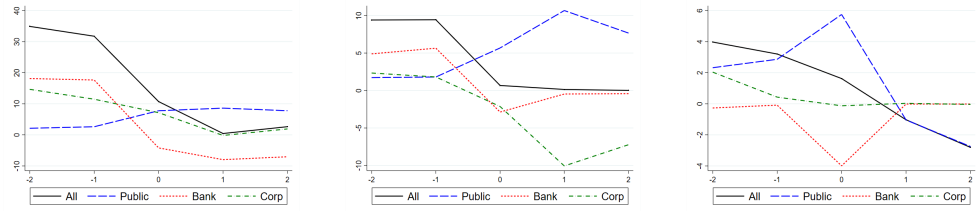
Banking crises are associated with sustained declines in debt inflows in the following two years. Separating by sector, inflows to the public sector increase immediately, while bank and corporate inflows drive the sustained decline. These dynamics again reinforce our third fact of the public sector

39. The dependent variable is multiplied by 100.

countervailing the private sector. In the case of currency crises, there is limited evidence for an increase in inflows to the sovereign and a decrease to corporates, but only when including solely contemporaneous effects (columns 1 and 5). Sovereign debt crises have a large but delayed negative impact on inflows to the sovereign, as the year of the crisis often features large borrowing in the period leading up to the default. Inflows to the private sector are not affected significantly by sovereign debt crises. Hence, capital inflow behavior around crisis events differs markedly both across sectors and across types of crisis.

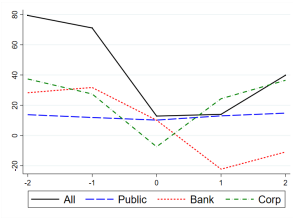
Table 9 displays the respective results for outflows. In this exercise, we allow the panel to be unbalanced across years in order to gain sufficient observations around crisis events, but ensure that we have data for flows from all three sectors for each country-year observation. There is a significant decline in total debt outflows following banking crises, largely driven by banks and, to a smaller extent, by corporates. Outflows from banks tend to increase following a currency crisis. Although there are only a few sovereign debt crisis events, the results provide some evidence that public outflows decline following a sovereign debt crisis while corporate outflows increase, the latter perhaps due to a portfolio reallocation away from the domestic economy.

FIGURE 8. Crisis Types and Debt Inflows to Emerging Markets. Source: AHKS data, Laeven and Valencia (2018), authors' calculations. Data is annual. Each line shows the average debt inflows to GDP around crisis events, where t=0 is the year (or first year) of the crisis. Based on a sample of 46 banking crises in 43 countries, 36 currency crises in 27 countries, and 15 sovereign debt crises in 12 countries.

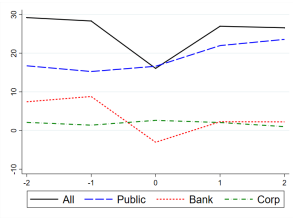


(A) Banking Crises (B) Currency Crises (C) Sovereign Debt Crises

FIGURE 9. Crisis Types and Debt Outflows out of Emerging Markets. Source: AHKS data, Laeven and Valencia (2018), authors' calculations. Data is annual. Each line shows the average debt outflows to GDP around crisis events, where t=0 is the year (or first year) of the crisis. Based on a sample of 20 banking crises in 20 countries and 10 currency crises in 9 countries.



(A) Banking Crises



(B) Currency Crises

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TABLE 8. Capital inflows around crises

	All		Public		Bank		Corporate	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Bank Crisis$_t$	0.147	-1.448	3.705***	4.972***	-4.189*	-5.654**	0.630	-0.766
	(2.683)	(2.851)	(1.193)	(1.620)	(2.413)	(2.614)	(0.873)	(1.158)
Bank Crisis$_{t-1}$		-10.65***		5.944		-7.658***		-8.940*
		(2.982)		(3.789)		(1.904)		(4.918)
Bank Crisis$_{t-2}$		-9.630***		3.756		-8.579***		-4.808
		(2.922)		(2.384)		(2.959)		(2.963)
Currency Crisis$_t$	-1.084	2.067	2.044*	2.684	-0.818	1.114	-2.310**	-1.732
	(1.979)	(2.230)	(1.113)	(1.795)	(1.535)	(2.032)	(0.907)	(1.061)
Currency Crisis$_{t-1}$		3.348		9.167		2.765		-8.583
		(2.900)		(7.156)		(2.335)		(8.194)
Currency Crisis$_{t-2}$		-0.749		7.459		-0.595		-7.613
		(2.114)		(6.589)		(1.300)		(7.405)
Sovereign Debt Crisis$_t$	-5.268	-5.834	3.619	0.806	-9.310	-8.942	0.423	2.302
	(6.793)	(6.310)	(2.430)	(2.978)	(8.660)	(8.396)	(1.242)	(2.135)
Sovereign Debt Crisis$_{t-1}$		-2.897		-10.20**		0.379		6.920
		(4.417)		(4.751)		(2.789)		(5.174)
Sovereign Debt Crisis$_{t-2}$		-2.382		-9.110**		1.697		5.031
		(3.005)		(3.860)		(1.292)		(4.536)
Observations	1653	1566	1653	1566	1653	1566	1653	1566
R^2	0.132	0.155	0.121	0.158	0.160	0.222	0.117	0.108
CountryFE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
YearFE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
NetBank		0.00209		0.0437		0.000469		0.0873
NetCurr		0.397		0.210		0.521		0.271
NetSov		0.285		0.0550		0.541		0.213

Annual data, 87 countries, 1996-2014. 45 banking crisis episodes (in 42 countries), 33 currency crisis episodes (in 25 countries), and 15 sovereign debt episodes (in 12 countries). NetBank, NetCurr, and NetSov display the p-values for the joint test that the sum of the coefficients for the crisis dummy and its two lags is different from 0. Crisis dates from Laeven and Valencia (2018). Errors are clustered at the country level. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

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TABLE 9. Capital outflows around crises

	All		Public		Bank		Corporate	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Bank Crisis$_t$	-3.124	-5.286	-3.764	-4.447	1.963	0.689	-1.324	-1.528
	(4.964)	(5.410)	(3.243)	(3.941)	(2.841)	(2.630)	(1.242)	(1.292)
Bank Crisis$_{t-1}$		-14.74**		-4.595		-7.180**		-2.968*
		(6.509)		(5.069)		(3.535)		(1.681)
Bank Crisis$_{t-2}$		-10.31**		-2.127		-8.872**		0.684
		(4.890)		(3.287)		(3.546)		(1.058)
Currency Crisis$_t$	-2.342	0.786	0.499	1.350	-2.146	-0.498	-0.695	-0.0662
	(4.801)	(5.987)	(3.228)	(4.141)	(4.048)	(4.517)	(0.685)	(0.949)
Currency Crisis$_{t-1}$		10.83		2.922		7.523*		0.385
		(7.352)		(3.983)		(4.383)		(1.375)
Currency Crisis$_{t-2}$		2.608		0.745		2.957		-1.095
		(4.917)		(4.956)		(2.070)		(0.876)
Sovereign Debt Crisis$_t$	-35.59	-35.16	-21.38	-21.99	-22.86	-21.18	8.661*	8.013*
	(27.86)	(26.52)	(16.69)	(16.37)	(15.92)	(14.82)	(4.483)	(4.383)
Sovereign Debt Crisis$_{t-1}$		-20.91		-8.953***		-7.724		-4.237
		(15.04)		(2.762)		(10.58)		(2.991)
Sovereign Debt Crisis$_{t-2}$		-3.646		-5.532		2.435		-0.549
		(4.286)		(3.692)		(3.650)		(2.200)
Observations	803	781	803	781	803	781	803	781
R^2	0.469	0.491	0.688	0.692	0.205	0.228	0.681	0.692
CountryFE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
YearFE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
NetBank		0.0393		0.353		0.0198		0.171
NetCurr		0.308		0.665		0.266		0.744
NetSov		0.133		0.0784		0.269		0.590

Annual data, unbalanced panel of 66 countries over 1996-2014. Only country-year observations with flows for all 3 sectors are kept. 24 banking crisis episodes (in 24 countries), 8 currency crisis episodes (in 7 countries), and 4 sovereign debt episodes (in 4 countries). NetBank, NetCurr, and NetSov display the p-values for the joint test that the sum of the coefficients for the crisis dummy and its two lags is different from 0. Crisis dates from Laeven and Valencia (2018). Errors are clustered at the country level. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

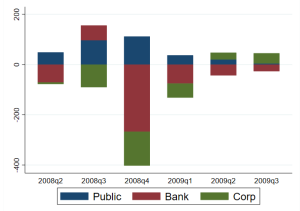
4.4. The COVID-19 Crisis

The recent COVID-19 crisis clearly illustrated the importance of separating capital flows by sector, especially because of the heterogeneous impact it had on different sectors in the economy. We briefly compare flows around this crisis event to the two other most recent large, global shocks affecting flows to EMs: the 2008 GFC and the 2013 Taper Tantrum. For 34 emerging markets, Figure 10 plots capital inflows to corporate, bank, and sovereign sectors during the GFC, the Taper Tantrum and the COVID-19 crisis. For the first two episodes, we use inflows from our newly-constructed (AHKS) data. For the COVID-19 crisis, we augment the BOP data by applying the internal fill described in the data section and in the Appendix. This allows us to obtain a sample of 26 emerging markets for which the recent BOP is sufficiently reported and use this sample across all the panels.

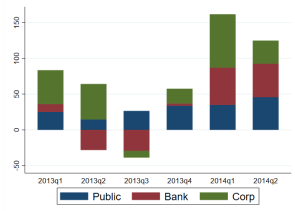
All of those crises teach the same lesson: at times of external shocks, the behaviour of capital flows out of EMs varies significantly across borrowing sectors. During the GFC and the Taper Tantrum, foreign investors primarily pulled out of the banking sectors and, to a somewhat lesser extent, the corporate sectors. However, the initial shock from Covid came with a sharp increase in flows to banks and corporates, and a large decline in flows to sovereigns. This reflects the initial dash-for-cash phase of the Covid episode and large inflows from January 2020 driving the private sector flows, and nervousness by investors holding local currency EM sovereign bonds driving the public sector flows. Nevertheless, these patterns reversed in the following quarters, with EM public sectors increasing their borrowing (in part to help fund Covid relief packages) and flows to EM banks declining (in line with previous crises). Since COVID was a global health shock affecting primarily the real economy, it propagated differently than previous stress episodes that were triggered by financial shocks. Foreign investors may also expect higher sovereign defaults given the limited fiscal space of

many EM governments, and hence they may again exit the sovereign bond markets. The bottom line is that capital inflows show different patterns across borrowing sectors depending on the type of shock, which is important for detecting vulnerabilities related to capital flows.[40]

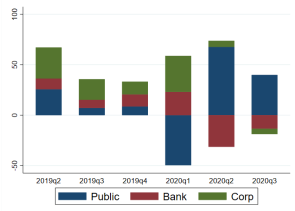
FIGURE 10. Crises and Debt Inflows to Emerging Markets. Source: AHKS data, BOP, authors' calculations. Each bar shows debt (portfolio + other investment) inflows in the given quarter for 26 emerging markets (excluding China), expressed in billions USD. Figures 10a and 10b use the AHKS data constructed in this paper. Figure 10c uses BOP data with an internal fill applied, as described in the data section and appendix of this paper.



(A) Global Financial Crisis



(B) Taper Tantrum



(C) COVID-19 Crisis

5. Discussion and Conclusion

Our novel dataset for gross capital flows allows us to demonstrate a number of important facts and features of gross capital flows that are important for future research, both empirical and theoretical. First, we use our dataset to document the composition of gross capital flows and external debt positions by sector of the domestic agents involved. This is important for any analysis of capital flows, as the interpretation of any empirical patterns of capital flows crucially depends on which sectors of the economy are more heavily involved. Quantitatively, we find that the banking sector plays the leading role in the flows of advanced economies, while in emerging markets banks, corporates and sovereigns all play roughly similar roles.

40. For reference, we also plot portfolio debt flows from IIF and EPFR data up through Q1 2020 in appendix Figure C1. These data do not include loan flows, cover a smaller number of EMs, and are not necessarily collected on a residence basis, as is the BOP data.

We establish a second fact showing that the high correlation of capital inflows and outflows is driven primarily by banks. Standard models feature capital flows in only one direction (or a single internationally-traded financial instrument) and hence they cannot account for the co-movement of inflows and outflows. There is a certain class of models that try to account for the co-movement as summarized by Bai (2013). In general, models with financial shocks and frictions, such as 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, as in R. Caballero and Simsek (2018).

Our third fact establishes the countervailing nature of public capital flows relative to private flows, for gross flows at a quarterly frequency. This implies that when modeling capital flow behavior, the incentives and constrains of private agents and governments need to be specified separately. This includes the borrowing behavior of governments as well as the management of reserves. Our fact informs that literature by documenting the general relationship with respect to private inflows, potentially driven by the sovereign's decision to issue more debt in response to the private contraction. It is also highly relevant for the theoretical literature on sovereign debt, which will need to account for these patterns.

Our fourth fact points to the more general observation that the dynamics of capital flows around different crises or events, or even around different economic cycles, differs by sector. This is broadly valuable when evaluating the potential economic impact of future shocks, but is especially useful for future theoretical and empirical work on sudden stops, capital flow dynamics around crises, the impact of the global financial cycle, and the literature on capital flow drivers generally. For instance, banking crises drag down inflows to corporates as well as banks, while currency crises tend to have a stronger impact on inflows to corporates. And while the VIX has lost some

explanatory power over capital flows in the recent decade, we show that it is still a strong driver for inflows to EM banks, and even for portfolio debt inflows to EM sovereigns and corporates.

The stylised facts we document have important implications for (existing and future) research on the drivers of international capital flows. Virtually all papers in the existing literature on the drivers of capital flows analyse aggregate flows without distinguishing among the main sectors involved (Koepke, 2019). Our paper documents that the existing results on the key drivers of aggregate (all-sector) capital flows conceal a considerable degree of heterogeneity across sectors. More concretely, our novel dataset allows us to demonstrate that the strong negative relationship between the VIX (as a proxy for global risk aversion) and capital flows (to all sectors) documented in a number of papers in the existing literature (e.g. Broner et al. (2013); Fratzscher (2012); Milesi-Ferretti and Tille (2011); Rey (2013), Barrot and Servén (2018)) is exclusively due to the private sector (bank and corporate) flows. By contrast, the impact of the VIX on flows to the public sector is not statistically significant. Similarly, flows to banks and corporates are also the exclusive drivers of the positive (procyclical) relationship between domestic output growth and capital flows (to all sectors), such as documented in Broner et al. (2013) and Jeanneau and Micu (2002). By contrast, the relationship between public sector flows and domestic output growth is not significant for AEs and even negative (countercyclical) for EMs, which can help explain ambiguous results found in several papers (Ahmed & Zlate, 2014; Fratzscher, 2012; Milesi-Ferretti & Tille, 2011).

The relationships we document in our paper also provide novel insights into the financial channel of exchange rates (Avdjiev, Koch, Shin, & Bruno, 2019; Avdjiev, Koch, Shin, & Du, 2019; Bruno & Shin, 2015a, 2015b). Most importantly, our sector-specific results reveal that there is significant heterogeneity across sectors behind the previously-documented negative relationship between the exchange rate and capital inflows. Appreciations of

local currency with increased capital inflows is strongest for banking sector inflows as modeled by Bruno and Shin (2015b).

The stylized facts and empirical relationships we document using our novel dataset cannot be established using raw BOP data and hence provide important new insights into the dynamics of capital flows. Many of these insights stand in contrast to the majority of the existing theoretical international macroeconomic models, which treat domestic and foreign investors symmetrically and assume a single type of agent who borrows from and lends to the rest of the world (without accounting for the sector of the agent). As international capital inflows and outflows of different sectors in a given country exhibit different dynamics and respond differently to local and global factors, future theoretical work should model the behavior of agents in different sectors in a manner which accounts for the differences in their behaviour that we document empirically in this paper. Our new dataset, which will be updated regularly and shared with the research community, should prove useful for future research on capital flows along these and other lines.

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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").[41] There are other ways to define the sectors of the economy, but this breakdown is the most common in the data.[42] 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 (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

41. 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.

42. 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.

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.[43] 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.

There are several presentations of the BOP data.[44] The standard presentation disaggregates the data by flow type and instrument. Figure 2 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

43. 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)).

44. See Chapter 14 Section C of the 6th edition BOP manual for a description of the various presentations.

presentation.[45] 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.[46] 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.[47] 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.

45. Exceptional Financing is usually classified under the other investment category.

46. 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.

47. 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.

Direct Investment: Direct investment, commonly called FDI, captures investment involving at least 10% ownership. It is meant to reflect investment relationships based on control 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).[48] 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. 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.

Portfolio Equity: Portfolio equity captures investment in equity securities not included in direct investment.[49] 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.[50]

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.

48. This is one of the main differences between the BPM5 and BPM6 versions of the data.

49. Equity not in the form of securities is not captured here.

50. 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.

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. [51] 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[52] and other investment debt. Other investment debt is then disaggregated as follows: currency and deposits, loans (including use of IMF credit and loans), insurance and pensions,[53] trade credit and advances, other accounts payable/receivable, and SDR allocations.[54]

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.

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51. Some countries may report financial derivatives on a net basis only. See 6th edition BOP manual paragraphs 6.60 and 8.34.

52. 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.

53. 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.

54. 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.

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.[55] Table A1 highlights the coverage by flow type and sector in the quarterly BOP data.[56] 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

55. 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. 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.

56. 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.

data. However, the data is skewed towards recent years, and few countries show coverage over the full 1996q1-2014q4 period.

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.).[57]

57. 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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Table A1 – *Continued from previous page*

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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Table A1 – *Continued from previous page*

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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Table A1 – *Continued from previous page*

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
Currency and Deposits	Assets	Central Banks	60 (32%)	137 (95%)	2212 (8%)	0 (0%)
		General Gov	80 (42%)	143 (99%)	2913 (11%)	4 (2%)
		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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Table A2 – *Continued from previous page*

Instrument	A/L	Sector	Country	Quarter	Country-Quarter	Panel
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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Table A2 – *Continued from previous page*

Instrument	**A/L**	**Sector**	**Country**	**Quarter**	**Country-Quarter**	**Panel**
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*

Instrument	A/L	Sector	Country	Quarter	Country-Quarter	Panel
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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Table A2 – *Continued from previous page*

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

Flow Type	**A/L**	**Sector**	**New BP6**	**New IIP**
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 + BFPAEMA_BP6_USD)	(IAPECB_BP6_USD + IAPEMA_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 + BFPADMA_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 + BFPLDMA_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 Government	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 Government	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 + BFFAMA_BP6_USD	IADFCB_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.[58] 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 for inflows. Due to a comparative lack of complementary external datasets, we do very little external filling of data for outflows, and hence describe them in less detail. 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.[59]

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

58. 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.

59. 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

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.[60] 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.[61] When

60. 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.

61. 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. This is because the

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.[62]

sectors being filled, sovereign and AE corporate, are more likely to issue debt in local currency. While this is not always the case, changing the assumption to denominated in USD does not appreciably change our filling accuracy. Note that this process fills very few observations: roughly 6% for public sector other investment debt; 6.5% for general government portfolio debt; 23% for central bank portfolio debt, though nearly all of these observations are 0 or very small; and 1.5% of observations for corporate portfolio debt.

62. 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 Investment Debt	BOP	OID to DC	OID to OS	OID to GG	OID to CB
	BIS	BIS Filled Loans plus any other non-missing other investment debt instruments from BOP, by sector			

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

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.[63] 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.[64] The BIS data captures cross-border lending from banks in BIS reporting countries.[65,66] 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.[67] Since the BIS data will not capture

63. As discussed above, the assumption does not hold well for sovereign debt, particularly in advanced economies, but is otherwise appropriate for many economies.

64. 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.

65. This captures about 95% of all cross-border interbank business (BIS, 2015).

66. There have been some discrepancies noted in the past between the BOP ad BIS data due for 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.

67. 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.

official lending, we add IMF Credit to these series to capture that component of loans.[68] 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 with any remaining non-missing instruments within other investment debt. This sum becomes our estimate for other investment debt from BIS data.[69]

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.[70]

The BIS banking statistics only have a limited number of EMEs that report data, so some banking flows between EMEs will be missed.[71] However, the

68. 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. 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. Figure C4 shows that this is the case during the global financial crisis.

69. 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.

70. 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.

71. Up to 12 EMEs during our sample period do contribute data.

bias that this introduces in our dataset is relatively small because flows between emerging markets represent a relatively low share of global flows. This is especially true in the earlier (pre-GFC) part of our sample (Broner, Didier, Schmukler, & von Peter, 2020). As the Balance of Payments data (which include flows from all lenders) are much better reported by sector after 2005, we do not need to rely much on the BIS data for our filling exercise in the latter part of our sample, when the importance of EME-to-EME flows starts to increase. Thus, we only effectively rely on the BIS IBS for the part of our sample in which flows between emerging markets are not large enough to affect the overall data patterns.

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

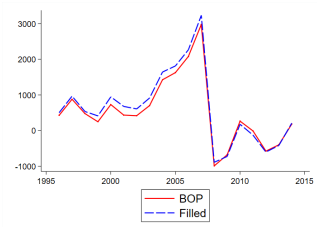
TABLE A5. Data Filling Summary

			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

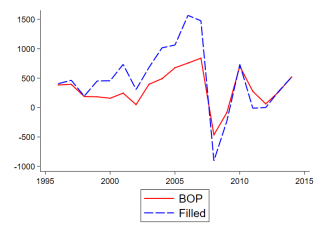
This table displays the percentage of total observations in our final sample of Advanced (Adv.), Emerging (Em.) and Developing (Dev.) countries (89 for annual, 85 for quarterly) that is derived from each step of our data construction. BOP = Percent coverage of sample from raw BOP data; Int. Fill = Percent 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.

the 2008 collapse, driven primarily by filling data for other investment debt inflows for China.

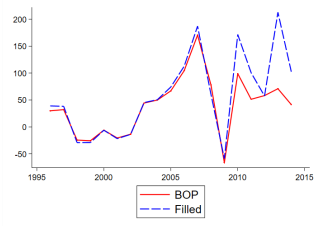
FIGURE A1. Aggregate External Debt Inflows for Banks and Corporates, Billions 1996 USD. Source: BOP, IIP, QEDS, and BIS, authors' calculations. Debt is portfolio debt + other investment debt. BOP series is only BOP data, Filled is BOP data filled by other data sources when missing.



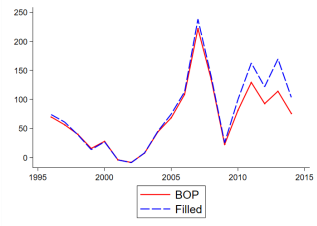
(A) Advanced Bank



(B) Advanced Corporate

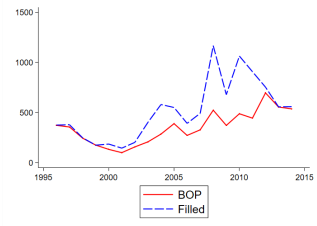


(C) Emerging Bank

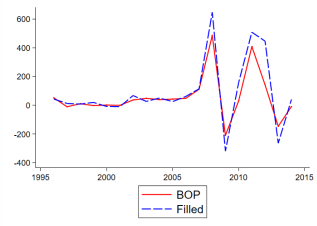


(D) Emerging Corporate

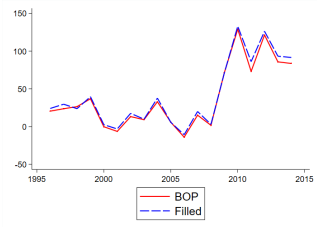
FIGURE A2. Aggregate External Debt Inflows for Governments and Central Banks, Billions 1996 USD. Source: BOP, IIP, QEDS, and BIS, authors' calculations. Debt is portfolio debt + other investment debt. BOP series is only BOP data, Filled is BOP data filled by other data sources when missing.



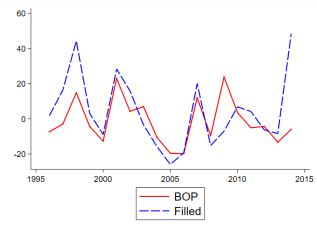
(A) Advanced Government



(B) Advanced Central Bank



(C) Emerging Government



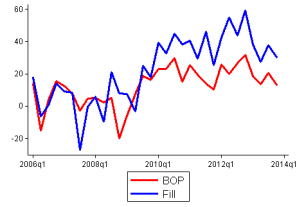
(D) Emerging Central Bank

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 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. 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.

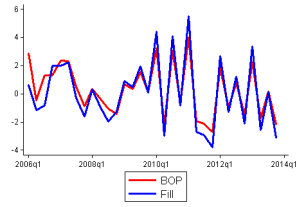
FIGURE A3. Aggregate Portfolio Debt, Billions USD

(A) Advanced Government

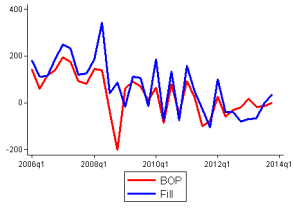


(B) Emerging Government

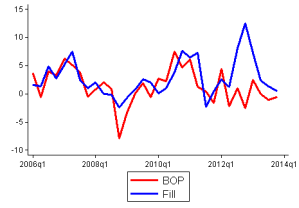
(C) Advanced Central Bank



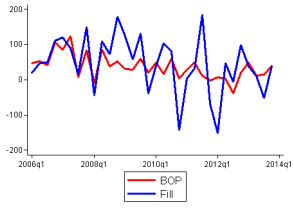
(D) Emerging Central Bank



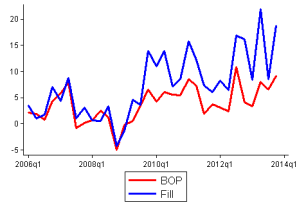
(E) Advanced Banks



(F) Emerging Banks

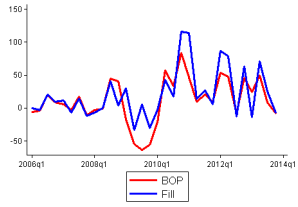


(G) Advanced Corporates

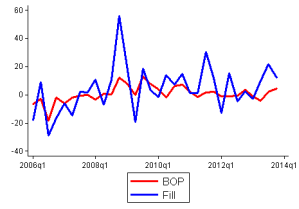


(H) Emerging Corporates

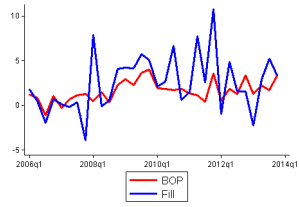
FIGURE A4. Aggregate Other Investment Debt , Billions USD



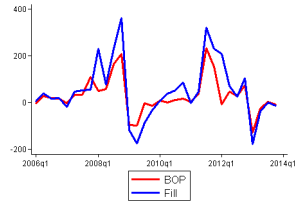
(A) Advanced Government



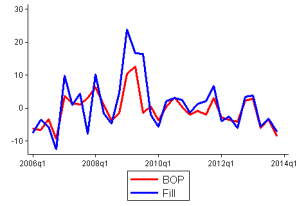
(B) Emerging Government



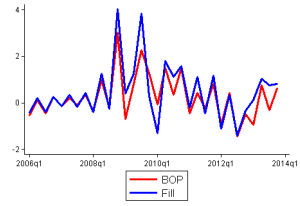
(C) Developing Government



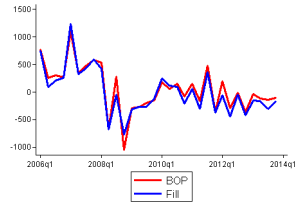
(D) Advanced Central Bank



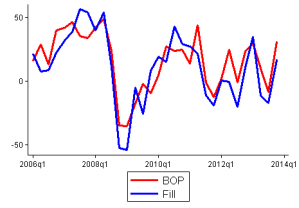
(E) Emerging Central Bank



(F) Developing Central Bank

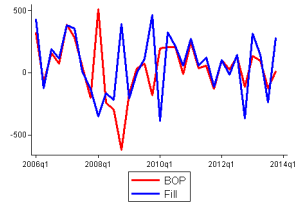


(G) Advanced Banks

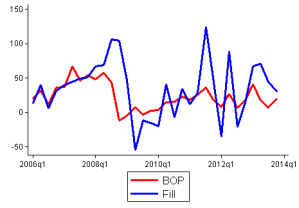


(H) Emerging Banks

(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:[72]

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,

72. If we use quarterly data for these figures our sample drops to 85, leaving off El Salvador, Mongolia, Montenegro, and Serbia.

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 Republic, 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):[73]

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

73. The outflow figures are based on a balanced sample using annual data for 31 countries.

Appendix 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.[74] Since the IDS data are compiled on a security-by-security basis, granular sectoral splits are easy to obtain, unlike the data on debt from international bank creditors which requires some construction to obtain the split. In addition to outstanding amounts and gross bond issuance, the data also include net bond issuance (i.e. gross issuance net of repayments and redemptions), consistent with the BOP definition of net inflows.

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.

74. 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.

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.[75] The historical

75. Due to the fact that not all counties 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: 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

LBS data breaks down counterparties in each country into banks (banks and central bank sectors) and non-banks (corporate and government sectors).[76] The LBS reports outstanding stocks, and based on them BIS calculates exchange rate- and break-adjusted flows.[77]

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.[78] Currently, banking groups from 31 countries report to the CBS. We use the CBS on an immediate counterparty basis (CBS/IC).[79] 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),

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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%.

76. 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).

77. 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.

78. 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.

79. 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)

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 captures both the non-bank private and the public sector).[80] 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).[81]

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.[82] We calculate that as follows:

80. 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.

81. 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.

82. This estimation is also used in Arslanalp and Tsuda (2014a) and Arslanalp and Tsuda (2014b).

$$\widehat{XBS}_{nbp,j,t} = XBC_{nb,j,t} \frac{INTC_{nbp,j,t}}{INTC_{nbp,j,t} + INTC_{pub,j,t}} \tag{B.1}$$

$$\widehat{XBS}_{pub,j,t} = XBC_{nb,j,t} \frac{INTC_{pub,j,t}}{INTC_{nbp,j,t} + INTC_{pub,j,t}} \tag{B.2}$$

where npb 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 for most countries, LCFC tends to be small relative to XBC.[83] 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

83. 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.

shares to Public and Private into a quarterly series for EM. For advanced economies, we assume constant shares from 2000 backwards.[84]

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)[85], 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.[86]

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 sector, we rely on the estimated stocks for those sectors obtained in the previous section.[87] 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.

84. The assumption of constant shares for advanced economies before 2000 is not too concerning when we are only extending back 4 years.

85. The QEDS data starts in 2004, and provides data on stocks of external debt by institutional sector for a wide range of countries.

86. 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.

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

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:

$$\widehat{XBS}_{i,t}^{j,nbp} = \widehat{XBS}_{i,t}^{all,nbp} \left(\frac{XBS_{i,t}^{j,nb}}{XBS_{i,t}^{all,nb}} \right) \tag{B.3}$$

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:

$$\widehat{XBF}_{i,t}^{j,nbp} = \frac{\widehat{XBS}_{i,t}^{j,nbp} FX_t^{j,usd} - \widehat{XBS}_{i,t-1}^{j,nbp} FX_{t-1}^{j,usd}}{\widetilde{FX}_t^{j,usd}} \tag{B.4}$$

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:

$$\widehat{XBF}_{i,t}^{all,nbp} = \sum_j \widehat{XBF}_{i,t}^{j,nbp} \tag{B.5}$$

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

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

$$\widehat{XBS}_{i,t}^{j,pub} = \widehat{XBS}_{i,t}^{all,pub} \left(\frac{XBS_{i,t}^{j,nb}}{XBS_{i,t}^{all,nb}} \right) \tag{B.6}$$

$$\widehat{XBF}_{i,t}^{j,pub} = \frac{\widehat{XBS}_{i,t}^{j,pub} FX_t^{j,usd} - \widehat{XBS}_{i,t-1}^{j,pub} FX_{t-1}^{j,usd}}{\widetilde{FX}_t^{j,usd}} \tag{B.7}$$

$$\widehat{XBF}_{i,t}^{all,pub} = \sum_j \widehat{XBF}_{i,t}^{j,pub} \tag{B.8}$$

where *pub* denotes the Public Sector.

Appendix C: Additional Results

TABLE C1. Inflows: Banks vs Other Investment Debt, Corporates vs Portfolio debt

	Advanced		Emerging		Advanced		Emerging	
	(1) Bank AHKS	(2) OID BOP	(3) Bank AHKS	(4) OID BOP	(5) Corp AHKS	(6) PD BOP	(7) Corp AHKS	(8) PD BOP
$\log(VIX_{t-1})$	-5.803***	-5.963***	-2.639***	-2.327***	-2.085*	-1.782	-1.243***	-0.961***
	(1.605)	(1.962)	(0.680)	(0.787)	(1.083)	(1.190)	(0.306)	(0.211)
GDP Growth_{it-1}	0.232**	0.244**	0.0928***	0.119***	0.0524	0.127*	0.0365***	-0.0184**
	(0.0975)	(0.102)	(0.0251)	(0.0299)	(0.0340)	(0.0624)	(0.00688)	(0.00811)
Observations	1748	1748	2030	2030	1748	1748	2030	2030
R^2	0.0304	0.0314	0.0978	0.0856	0.0162	0.0243	0.0677	0.00869

Sample spans 1996q1-2014q4. Dependent variables, indicated by the column headings are expressed as a percent of trend GDP. Errors are clustered at the country level. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

TABLE C2. Inflow and Outflow Unconditional Correlations, by Sector

		Inflows			Outflows		
		Public	Banks	Corps.	Public	Banks	Corps.
Panel A: All countries							
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	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	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

TABLE C3. Inflow and Outflow Conditional Correlations, by Sector and Instrument

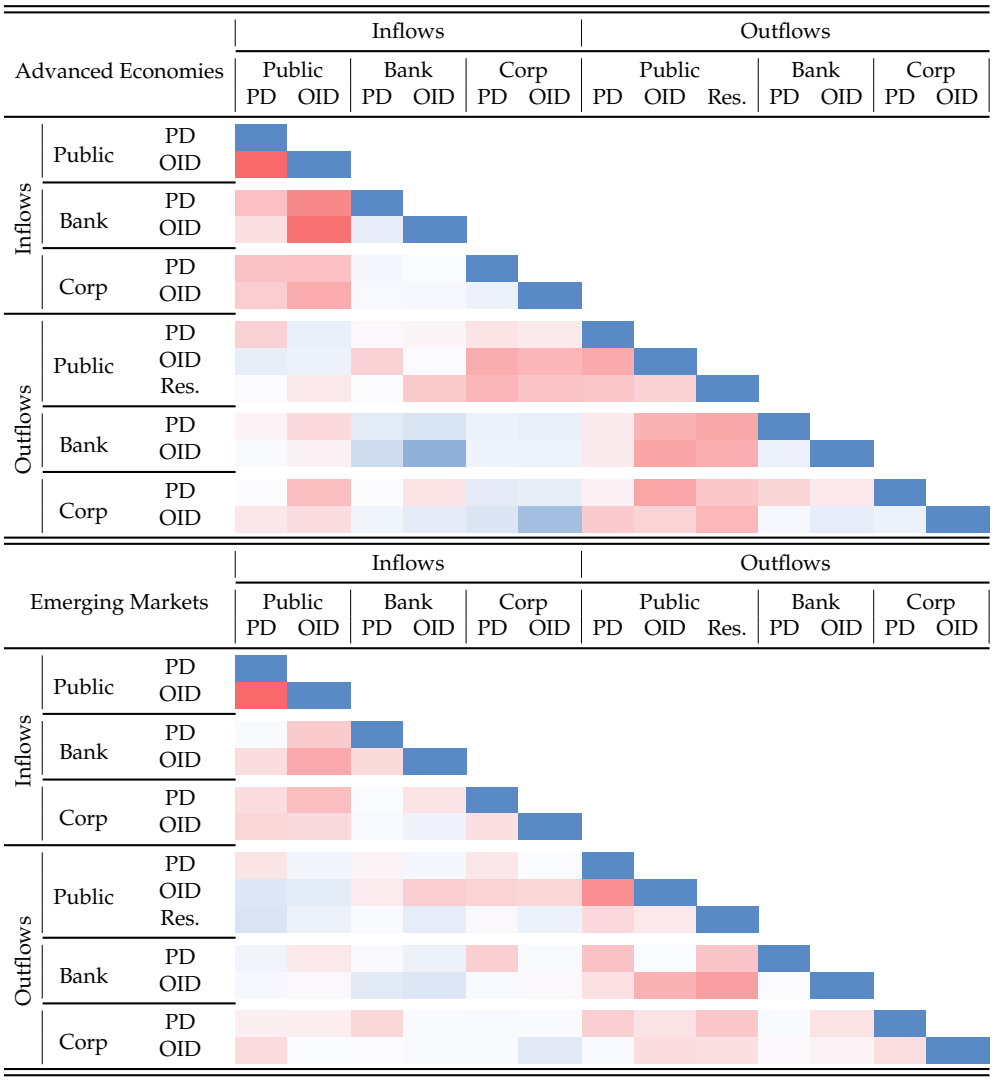

TABLE C4. Inflow and Outflow Unconditional Correlations, by Sector and Instrument

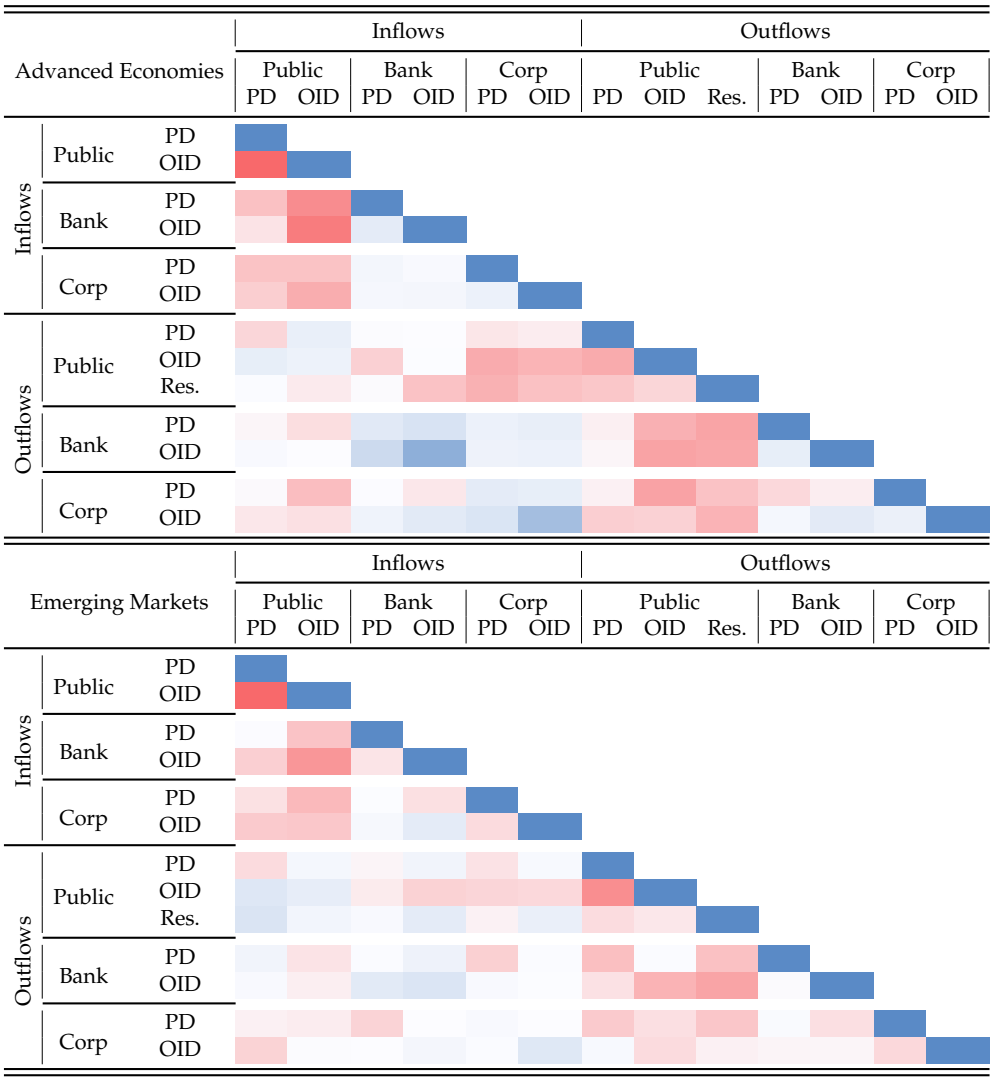

TABLE C5. Capital Inflows - All Sectors

Panel A: All Countries					
	(1) Raw BOP	(2) AHKS	(3) AHKS noIntFill	(4) AHKS match	(5) AHKS +DID
$\log(VIX_{t-1})$	-1.316	-3.260***	-3.249***	-3.309***	-3.927***
	(2.021)	(0.737)	(0.733)	(0.707)	(0.933)
GDP $Growth_{it-1}$	0.0915	0.142***	0.138***	0.140***	0.142***
	(0.0703)	(0.0357)	(0.0342)	(0.0353)	(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
$\log(VIX_{t-1})$	-1.787	-4.517***	-4.502***	-4.543***	-5.526***
	(1.509)	(1.507)	(1.499)	(1.424)	(1.956)
GDP $Growth_{it-1}$	-0.0429	0.294**	0.283***	0.285**	0.271***
	(0.166)	(0.105)	(0.0990)	(0.105)	(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
$\log(VIX_{t-1})$	-1.678	-2.733***	-2.709***	-2.811***	-2.928***
	(2.556)	(0.663)	(0.666)	(0.656)	(0.753)
GDP $Growth_{it-1}$	0.113	0.0813***	0.0810***	0.0816***	0.0963***
	(0.0804)	(0.0256)	(0.0255)	(0.0252)	(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. ** $p < 0.05$, *** $p < 0.01$

TABLE C6. Inflows excluding 2008-2009

	(1) All	(2) Public	(3) Banks	(4) Corps.
Panel A: All Countries				
$\log(VIX_{t-1})$	-2.777***	0.538	-2.028***	-1.110***
	(0.647)	(0.275)	(0.531)	(0.264)
GDP $Growth_{it-1}$	0.136***	-0.00856	0.116***	0.0304***
	(0.0345)	(0.0107)	(0.0276)	(0.00732)
Observations	3548	3548	3548	3548
R^2	0.026	0.002	0.028	0.019
Panel B: Advanced Economies				
$\log(VIX_{t-1})$	-3.627***	0.352	-2.652**	-0.981**
	(1.237)	(0.527)	(1.131)	(0.447)
GDP $Growth_{it-1}$	0.266***	0.0537***	0.212**	0.0135
	(0.0924)	(0.0173)	(0.0783)	(0.0183)
Observations	1472	1472	1472	1472
R^2	0.030	0.007	0.027	0.005
Panel C: Emerging Markets				
$\log(VIX_{t-1})$	-2.832***	0.420	-2.024***	-1.139***
	(0.697)	(0.256)	(0.427)	(0.369)
GDP $Growth_{it-1}$	0.0838***	-0.0328***	0.0820***	0.0312***
	(0.0287)	(0.0105)	(0.0222)	(0.00621)
Observations	1796	1796	1796	1796
R^2	0.057	0.017	0.084	0.054

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

TABLE C7. Inflows 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.	Corps. +DID	All	Public	Banks	Corps.	Corps. +DID	All	Public	Banks	Corps.	Corps. +DID
Panel A: All Countries															
$\log(VIX_{t-1})$	-3.260***	0.467	-2.422***	-1.045***	-1.280***	-3.819***	0.427	-2.757***	-1.116***	-1.369***	-4.115***	0.706	-3.200***	-1.262***	-1.536***
	(0.737)	(0.364)	(0.523)	(0.243)	(0.385)	(0.858)	(0.434)	(0.612)	(0.287)	(0.444)	(0.936)	(0.432)	(0.650)	(0.266)	(0.429)
GDP $Growth_{it-1}$	0.142***	-0.0124	0.115***	0.0359***	0.0442***	0.149***	-0.00772	0.126***	0.0282***	0.0359***	0.219***	-0.00798	0.184***	0.0391***	0.0544***
	(0.0357)	(0.0101)	(0.0269)	(0.00772)	(0.00844)	(0.0426)	(0.0121)	(0.0324)	(0.00668)	(0.00774)	(0.0531)	(0.0118)	(0.0415)	(0.00936)	(0.0111)
Observations	4020	4020	4037	4020	3721	3312	3312	3312	3312	3120	2695	2695	2695	2695	2615
R^2	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															
$\log(VIX_{t-1})$	-4.517***	0.410	-3.069***	-1.160**	-1.446	-4.517***	0.410	-3.069***	-1.160**	-1.446	-6.788***	0.661	-5.011***	-1.531**	-2.060**
	(1.507)	(0.791)	(1.074)	(0.476)	(0.803)	(1.507)	(0.791)	(1.074)	(0.476)	(0.803)	(1.956)	(0.970)	(1.258)	(0.566)	(0.919)
GDP $Growth_{it-1}$	0.294**	0.0563***	0.209**	0.0225	0.0202	0.294**	0.0563***	0.209**	0.0225	0.0202	0.455***	0.0547**	0.338***	0.0454	0.0514**
	(0.105)	(0.0190)	(0.0784)	(0.0170)	(0.0171)	(0.105)	(0.0190)	(0.0784)	(0.0170)	(0.0171)	(0.138)	(0.0233)	(0.103)	(0.0230)	(0.0213)
Observations	1656	1656	1656	1656	1548	1656	1656	1656	1656	1548	1127	1127	1127	1127	1109
R^2	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															
$\log(VIX_{t-1})$	-2.733***	0.438	-2.199***	-0.956***	-1.179***	-3.093***	0.445	-2.433***	-1.070***	-1.297***	-2.442***	0.786**	-2.140***	-1.067***	-1.143***
	(0.663)	(0.263)	(0.535)	(0.291)	(0.392)	(0.728)	(0.327)	(0.547)	(0.323)	(0.391)	(0.751)	(0.321)	(0.667)	(0.251)	(0.358)
GDP $Growth_{it-1}$	0.0813***	-0.0383***	0.0842***	0.0334***	0.0486***	0.0791**	-0.0396***	0.0858***	0.0312***	0.0435***	0.119***	-0.0360***	0.117***	0.0380***	0.0575***
	(0.0256)	(0.00934)	(0.0217)	(0.00598)	(0.00814)	(0.0296)	(0.0111)	(0.0257)	(0.00595)	(0.00823)	(0.0358)	(0.0109)	(0.0345)	(0.00928)	(0.0134)
Observations	2036	2036	2036	2036	1919	1656	1656	1656	1656	1572	1372	1372	1372	1372	1310
R^2	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. ** $p < 0.05$, *** $p < 0.01$

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TABLE C8. Inflows by Instrument

	Other Investment Debt				Portfolio Debt			
	(1) All	(2) Public	(3) Banks	(4) Corps.	(5) All	(6) Public	(7) Banks	(8) Corps.
Panel A: All Countries								
$\log(VIX_{t-1})$	-2.119***	0.620**	-1.844***	-0.792***	-0.936**	-0.188	-0.434**	-0.269
	(0.661)	(0.286)	(0.519)	(0.195)	(0.364)	(0.213)	(0.173)	(0.140)
GDP Growth_{it-1}	0.132***	-0.00451	0.102***	0.0329***	0.00669	-0.00528	0.00986	0.00262
	(0.0279)	(0.00807)	(0.0223)	(0.00626)	(0.0130)	(0.00790)	(0.00509)	(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								
$\log(VIX_{t-1})$	-3.294**	0.0102	-1.983	-0.866**	-0.732	0.385	-0.757	-0.368
	(1.325)	(0.589)	(1.072)	(0.369)	(0.828)	(0.405)	(0.404)	(0.333)
GDP Growth_{it-1}	0.207**	0.0345	0.166**	0.00591	0.0736	0.0259	0.0297	0.0163
	(0.0772)	(0.0199)	(0.0605)	(0.00701)	(0.0375)	(0.0222)	(0.0164)	(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								
$\log(VIX_{t-1})$	-1.642**	0.973***	-2.010***	-0.727***	-1.084***	-0.619***	-0.183**	-0.211***
	(0.688)	(0.272)	(0.538)	(0.247)	(0.234)	(0.199)	(0.0796)	(0.0607)
GDP Growth_{it-1}	0.102***	-0.0181**	0.0799***	0.0377***	-0.0196**	-0.0183***	0.00351	-0.00369**
	(0.0254)	(0.00747)	(0.0208)	(0.00593)	(0.00765)	(0.00570)	(0.00279)	(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 C9. Inflows and Outflows - Trend GDP Normalization

	Inflows					Outflows				
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
	All	Public	Banks	Corps.	Corps +DID	All	Public	Banks	Corps.	Public +Res
Panel A: All countries										
$\log(VIX_{t-1})$	-3.685***	0.421	-2.761***	-1.112***	-1.376***	-3.613***	-0.0468	-3.592***	-0.909***	-0.313
	(0.781)	(0.358)	(0.557)	(0.259)	(0.400)	(0.833)	(0.385)	(0.840)	(0.280)	(0.605)
GDP $Growth_{it-1}$	0.163***	-0.00709	0.126***	0.0424***	0.0547***	0.0884***	0.0153**	0.0786***	0.0163***	0.0446***
	(0.0374)	(0.00925)	(0.0283)	(0.00882)	(0.0103)	(0.0285)	(0.00594)	(0.0289)	(0.00591)	(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										
$\log(VIX_{t-1})$	-5.253***	0.279	-3.660***	-1.336**	-1.678	-6.193***	0.395	-6.369***	-1.636***	0.917
	(1.539)	(0.783)	(1.075)	(0.520)	(0.844)	(1.582)	(0.825)	(1.571)	(0.517)	(1.159)
GDP $Growth_{it-1}$	0.326***	0.0616***	0.227***	0.0293	0.0306	0.237***	0.0264**	0.244***	0.0200	0.0317
	(0.105)	(0.0189)	(0.0785)	(0.0180)	(0.0183)	(0.0791)	(0.0120)	(0.0804)	(0.0134)	(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										
$\log(VIX_{t-1})$	-3.010***	0.460	-2.418***	-0.983***	-1.209***	-1.747***	-0.551**	-1.416***	-0.372	-1.659***
	(0.757)	(0.251)	(0.628)	(0.288)	(0.391)	(0.407)	(0.220)	(0.341)	(0.263)	(0.505)
GDP $Growth_{it-1}$	0.0983***	-0.0327***	0.0922***	0.0387***	0.0577***	0.0220	0.00559	0.00977	0.0142**	0.0418**
	(0.0295)	(0.00769)	(0.0248)	(0.00728)	(0.0104)	(0.0152)	(0.00539)	(0.0133)	(0.00595)	(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 C10. Inflows, Pre- vs Post-GFC, Advanced Economies

	Pre-GFC				Post-GFC			
	(1) All	(2) Public	(3) Banks	(4) Corporates	(5) All	(6) Public	(7) Banks	(8) Corporates
Panel A: Total Debt								
$\log(VIX_{t-1})$	-9.333***	-0.398	-6.759***	-2.219***	2.161	1.751	1.692	0.360
	(1.456)	(0.424)	(1.324)	(0.749)	(2.837)	(1.632)	(1.624)	(0.545)
GDP Growth$_{it-1}$	0.0847	0.0380**	0.0601	-0.0133	0.408***	0.106***	0.235***	0.0521
	(0.0470)	(0.0174)	(0.0349)	(0.0154)	(0.110)	(0.0299)	(0.0732)	(0.0259)
Observations	1012	1012	1012	1012	644	644	644	644
R^2	0.057	0.007	0.041	0.024	0.053	0.020	0.027	0.009
Panel B: Other Investment Debt								
$\log(VIX_{t-1})$	-5.516***	-0.00858	-4.024***	-1.320**	0.506	0.405	0.796	-0.0414
	(1.268)	(0.304)	(1.198)	(0.579)	(2.250)	(1.178)	(1.412)	(0.495)
GDP Growth$_{it-1}$	0.0231	0.00742	0.0295	-0.0182	0.398***	0.101***	0.224***	0.0468**
	(0.0391)	(0.00982)	(0.0329)	(0.0125)	(0.104)	(0.0268)	(0.0664)	(0.0198)
Observations	1012	1012	1012	1012	644	644	644	644
R^2	0.025	0.000	0.017	0.014	0.065	0.022	0.034	0.010
Panel C: Portfolio Debt								
$\log(VIX_{t-1})$	-3.694***	-0.400	-2.362***	-1.045	2.694	1.303	1.174	0.416
	(0.892)	(0.294)	(0.461)	(0.527)	(1.423)	(0.869)	(0.762)	(0.355)
GDP Growth$_{it-1}$	0.0582***	0.0315**	0.0260***	0.00359	0.00105	0.00759	-0.00619	0.00452
	(0.0157)	(0.0127)	(0.00877)	(0.0107)	(0.0466)	(0.0257)	(0.0209)	(0.0118)
Observations	1012	1012	1012	1012	644	644	644	644
R^2	0.064	0.009	0.079	0.022	0.015	0.008	0.010	0.004

Pre-GFC is from 1997q1–2007q4. Post-GFC is from 2008q1-2014q4. All regressions include country fixed effects. Errors are clustered at the country level. ** $p < 0.05$, *** $p < 0.01$

TABLE C11. Inflows, Pre- vs Post-GFC, Emerging Markets

	Pre-GFC				Post-GFC			
	(1) All	(2) Public	(3) Banks	(4) Corporates	(5) All	(6) Public	(7) Banks	(8) Corporates
Panel A: Total Debt								
$\log(VIX_{t-1})$	-4.699***	0.354	-3.022***	-1.906***	-1.258	0.576	-1.761***	-0.187
	(0.991)	(0.385)	(0.679)	(0.461)	(0.825)	(0.563)	(0.614)	(0.292)
GDP Growth_{it-1}	0.0367	-0.0286	0.0501***	0.0127	0.0686***	-0.0376***	0.0680***	0.0375***
	(0.0217)	(0.0149)	(0.0143)	(0.00687)	(0.0197)	(0.0126)	(0.0165)	(0.00987)
Observations	1181	1181	1181	1181	855	855	855	855
R^2	0.087	0.022	0.101	0.075	0.027	0.016	0.066	0.044
Panel B: Other Investment Debt								
$\log(VIX_{t-1})$	-4.069***	0.535	-2.857***	-1.690***	0.157	1.280**	-1.510**	0.0744
	(1.005)	(0.291)	(0.709)	(0.422)	(0.926)	(0.587)	(0.585)	(0.273)
GDP Growth_{it-1}	0.0439**	-0.0220	0.0464***	0.0168**	0.0962***	-0.0117	0.0670***	0.0411***
	(0.0191)	(0.0112)	(0.0139)	(0.00720)	(0.0201)	(0.00930)	(0.0158)	(0.00943)
Observations	1181	1181	1181	1181	855	855	855	855
R^2	0.091	0.030	0.098	0.079	0.042	0.018	0.061	0.058
Panel C: Portfolio Debt								
$\log(VIX_{t-1})$	-0.631	-0.243	-0.206	-0.192	-1.410***	-0.816**	-0.187	-0.250***
	(0.333)	(0.276)	(0.123)	(0.100)	(0.389)	(0.324)	(0.0943)	(0.0863)
GDP Growth_{it-1}	-0.00695	-0.00596	0.00314	-0.00355**	-0.0268**	-0.0240**	-0.000381	-0.00251
	(0.00675)	(0.00528)	(0.00228)	(0.00161)	(0.0114)	(0.00902)	(0.00369)	(0.00326)
Observations	1181	1181	1181	1181	855	855	855	855
R^2	0.004	0.001	0.006	0.006	0.022	0.016	0.004	0.008

Pre-GFC is from 1997q1–2007q4. Post-GFC is from 2008q1-2014q4. All regressions include country fixed effects. Errors are clustered at the country level. ** $p < 0.05$, *** $p < 0.01$

TABLE C12. Cyclical component of Capital Inflows

	(1) All	(2) Public	(3) Banks	(4) Corporates
Panel A: All Countries				
$\log(VIX_{t-1})$	-3.879***	0.627	-3.343***	-0.809***
	(1.086)	(0.478)	(0.840)	(0.297)
GDP Growth$_{it-1}$	0.181***	-0.000864	0.140***	0.0298***
	(0.0589)	(0.0123)	(0.0409)	(0.0104)
Observations	2071	2071	2071	2071
R^2	0.062	0.002	0.061	0.023
Panel B: Advanced Economies				
$\log(VIX_{t-1})$	-5.105**	0.929	-5.048***	-0.399
	(2.359)	(1.099)	(1.629)	(0.626)
GDP Growth$_{it-1}$	0.345	0.0574**	0.224**	0.0205
	(0.162)	(0.0236)	(0.102)	(0.0287)
Observations	854	854	854	854
R^2	0.076	0.009	0.060	0.004
Panel C: Emerging Markets				
$\log(VIX_{t-1})$	-2.968***	0.599	-2.265**	-1.057***
	(0.935)	(0.330)	(0.895)	(0.278)
GDP Growth$_{it-1}$	0.114**	-0.0258**	0.106**	0.0344***
	(0.0419)	(0.0111)	(0.0382)	(0.00933)
Observations	1057	1057	1057	1057
R^2	0.093	0.017	0.116	0.069

Dependent variable is the cyclical component extracted using a linear projection filter as in Hamilton (2018). 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 C13. 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.
$\log(VIX_{t-1})$	-3.368***	-0.0182	-2.895***	-0.814***	-0.266	-3.629**	-0.0767	-3.005**	-1.660***	-0.386	-3.324***	-0.218	-3.010***	-0.858**	-0.308
	(0.789)	(0.358)	(0.715)	(0.263)	(0.581)	(1.530)	(1.112)	(1.095)	(0.444)	(1.527)	(0.958)	(0.557)	(0.989)	(0.341)	(0.895)
GDP Growth_{it-1}	0.0722***	0.0120**	0.0549**	0.00854	0.0341**	0.121	0.0186	0.121	0.0132	0.0374	0.119***	0.0133	0.116***	0.0132	0.0396**
	(0.0262)	(0.00547)	(0.0212)	(0.00545)	(0.0129)	(0.0575)	(0.0114)	(0.0580)	(0.0117)	(0.0273)	(0.0392)	(0.00801)	(0.0413)	(0.00860)	(0.0191)
Observations	2622	2622	3285	2759	2620	720	720	720	720	720	1274	1274	1274	1274	1274
R^2	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															
$\log(VIX_{t-1})$	-5.717***	0.497	-4.884***	-1.462**	1.067	-4.108	0.0579	-3.611**	-1.784**	-0.122	-5.497***	0.0614	-5.560***	-1.209	0.903
	(1.515)	(0.757)	(1.338)	(0.532)	(1.087)	(1.874)	(1.397)	(1.265)	(0.516)	(1.844)	(1.746)	(1.085)	(1.762)	(0.637)	(1.593)
GDP Growth_{it-1}	0.211***	0.0235	0.177***	0.0120	0.0270	0.141	0.0222	0.141	0.0133	0.0410	0.269**	0.0202	0.287**	0.0116	0.0162
	(0.0745)	(0.0118)	(0.0559)	(0.0122)	(0.0215)	(0.0807)	(0.0161)	(0.0810)	(0.0152)	(0.0348)	(0.0984)	(0.0199)	(0.102)	(0.0172)	(0.0332)
Observations	1171	1171	1558	1173	1170	576	576	576	576	576	637	637	637	637	637
R^2	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															
$\log(VIX_{t-1})$	-1.666***	-0.578**	-1.226***	-0.350	-1.636***	-1.651	-0.619	-0.506**	-1.155	-1.454	-1.595***	-0.551	-0.869***	-0.529**	-1.366
	(0.391)	(0.219)	(0.315)	(0.236)	(0.502)	(1.149)	(0.513)	(0.0231)	(1.015)	(2.876)	(0.480)	(0.344)	(0.227)	(0.235)	(0.794)
GDP Growth_{it-1}	0.0103	0.00222	0.00197	0.00640	0.0293	0.0725	0.00834	0.0745	0.0138	0.0261	0.0474**	0.00804	0.0349**	0.0169	0.0365
	(0.0119)	(0.00472)	(0.00862)	(0.00587)	(0.0156)	(0.0161)	(0.00712)	(0.0411)	(0.0221)	(0.0513)	(0.0154)	(0.00754)	(0.0130)	(0.00993)	(0.0219)
Observations	1302	1302	1505	1394	1301	144	144	144	144	144	588	588	588	588	588
R^2	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.
** $p < 0.05$, *** $p < 0.01$

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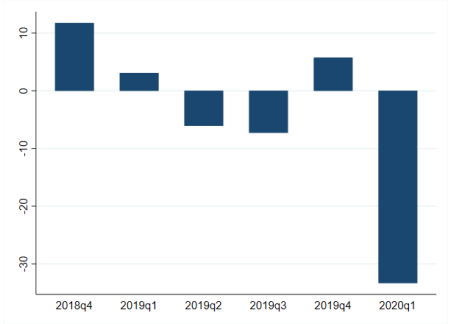
TABLE C14. Outflows by Instrument

	Other Investment Debt				Portfolio Debt			
	(1) All	(2) Public	(3) Banks	(4) Corps.	(5) All	(6) Public	(7) Banks	(8) Corps.
Panel A: All Countries								
$\log(VIX_{t-1})$	-2.498***	0.105	-2.841***	-0.446**	-0.669**	-0.00625	-0.433**	-0.311
	(0.573)	(0.231)	(0.622)	(0.204)	(0.269)	(0.103)	(0.185)	(0.182)
GDP Growth_{it-1}	0.0642***	0.00552	0.0635**	0.0154***	0.00911	0.00896**	0.00407	-0.00342
	(0.0235)	(0.00367)	(0.0248)	(0.00561)	(0.00662)	(0.00420)	(0.00534)	(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								
$\log(VIX_{t-1})$	-4.095***	0.668	-5.011***	-0.711	-1.220**	-0.000253	-0.727**	-0.646
	(1.091)	(0.415)	(1.161)	(0.358)	(0.559)	(0.178)	(0.346)	(0.394)
GDP Growth_{it-1}	0.182**	0.0115	0.200***	0.0219	0.0306	0.0140	0.0217	-0.00296
	(0.0662)	(0.00756)	(0.0682)	(0.0147)	(0.0192)	(0.0104)	(0.0145)	(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								
$\log(VIX_{t-1})$	-1.378***	-0.471	-1.107***	-0.274	-0.245	-0.00664	-0.241	-0.0187
	(0.329)	(0.241)	(0.238)	(0.242)	(0.168)	(0.139)	(0.184)	(0.0879)
GDP Growth_{it-1}	0.0101	-0.00165	0.00600	0.0115**	0.000914	0.00695	-0.00320	-0.00273
	(0.0109)	(0.00253)	(0.0121)	(0.00460)	(0.00405)	(0.00403)	(0.00393)	(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

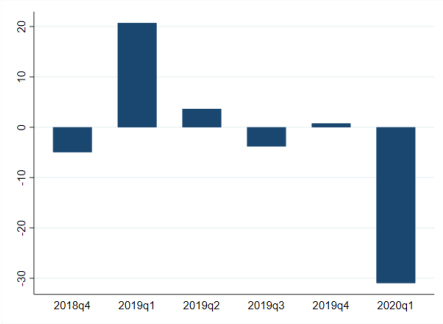
Sample is from 1997Q1–2014Q4. All regressions include country fixed effects. Errors are clustered at the country level. ** $p < 0.05$, *** $p < 0.01$

C.1. Additional Figures

FIGURE C1. EPFR and IIF Portfolio Debt Flows to Emerging Markets. Source: EPFR, IIF, authors' calculations. Figure C1a 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 C1b 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.

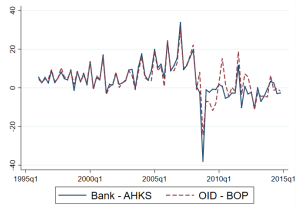


(A) COVID Crisis, IIF Data on Portfolio Debt Flows

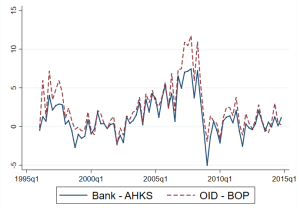


(B) COVID Crisis, EPFR Data on Portfolio Debt Flows

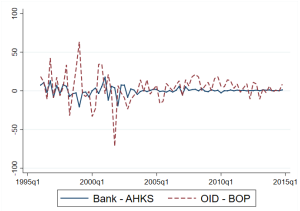
FIGURE C2. Banks vs Other Investment Debt flows, Corporates vs Portfolio debt flows. Source: AHKS data, BOP, authors' calculations. Average external debt inflows, % trend GDP. Correlations are for the plotted time series. Pre-GFC is 1996q1-2007q4, post-GFC is 2008q1-2014q4.



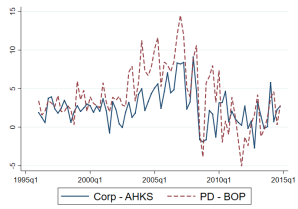
(A) **Advanced:** corr = 0.90; pre-GFC corr = 0.97; post-GFC corr = 0.79



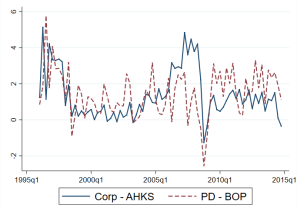
(B) **Emerging:** corr = 0.93; pre-GFC corr = 0.94; post-GFC corr = 0.90



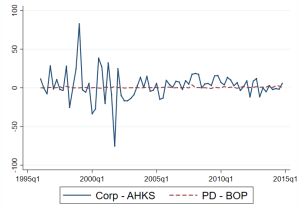
(C) **Developing:** corr = -0.04; pre-GFC corr = -0.05; post-GFC corr = -0.01



(D) **Advanced:** corr = 0.69; pre-GFC corr = 0.80; post-GFC corr = 0.48

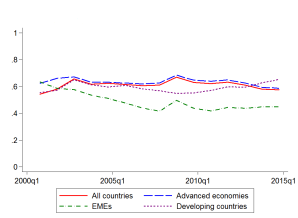


(E) **Emerging:** corr = 0.30; pre-GFC corr = 0.35; post-GFC corr = 0.26

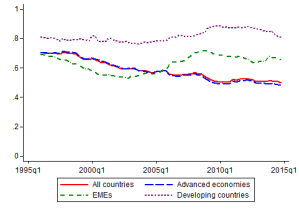


(F) **Developing:** corr = -0.07; pre-GFC corr = -0.07; post-GFC corr = -0.20

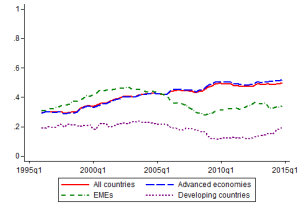
FIGURE C3. Composition of External Debt Liabilities and Assets by Debt Type. Source: Raw data from IIP, QEDS, and BIS. Final data is constructed by the authors.



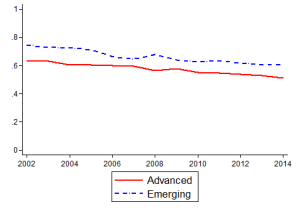
(A) Share of Debt in External Liabilities



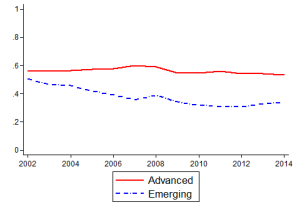
(B) Share of Other Investment Debt in Total External Debt Liabilities



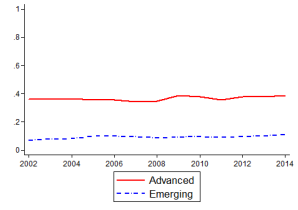
(C) Share of Portfolio Debt in Total External Debt Liabilities



(D) Share of Debt in External Assets

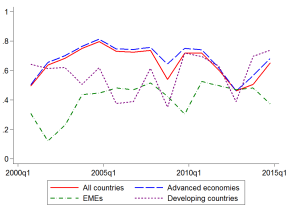


(E) Share of Other Investment Debt Assets in Total External Debt Assets

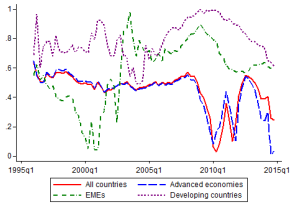


(F) Share of Portfolio Debt Assets in Total External Debt Assets

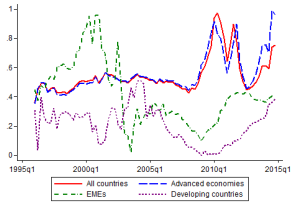
FIGURE C4. Composition of External Debt Inflows by Debt Type and Sector. Source: BOP, IIP, QEDS, and BIS, authors' calculations. Panel (a) uses annual data after 2001 in order to get a balanced sample.



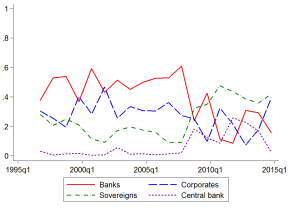
(A) Share of Debt in Total Stocks



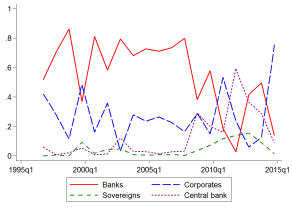
(B) Share of Other Investment in Total Debt Stocks



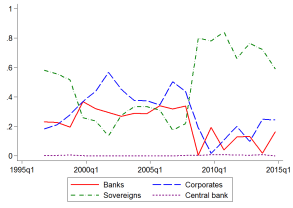
(C) Share of Portfolio Debt in Total Debt Stocks



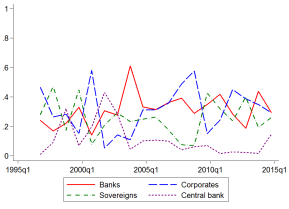
(D) Share of Sectors in Total Debt - Advanced



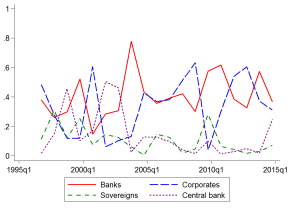
(E) Share of Sectors in Other Investment Debt - Advanced



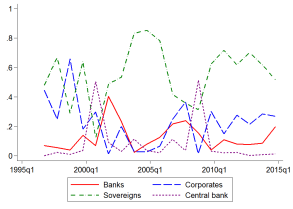
(F) Share of Sectors in Portfolio Debt - Advanced



(G) Share of Sectors in Total Debt - Emerging

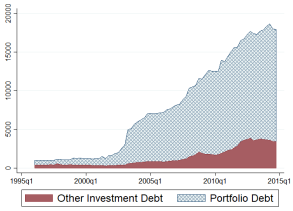


(H) Share of Sectors in Other Investment Debt - Emerging

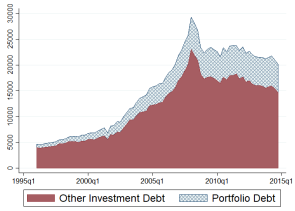


(I) Share of Sectors in Portfolio Debt - Emerging

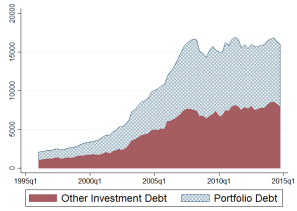
FIGURE C5. External liabilities, by sector and instrument, billions USD. Source: AHKS data, authors' calculations.



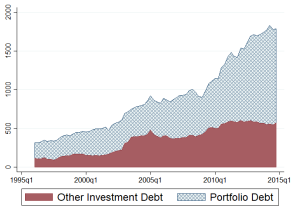
(A) Advanced, Public



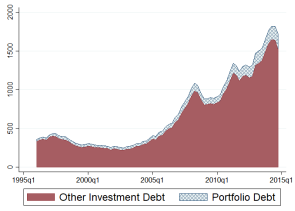
(B) Advanced, Banks



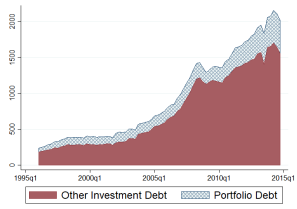
(C) Advanced, Corporates



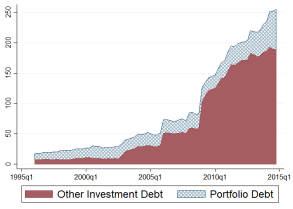
(D) Emerging, Public



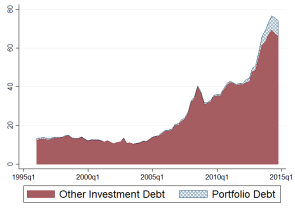
(E) Emerging, Banks



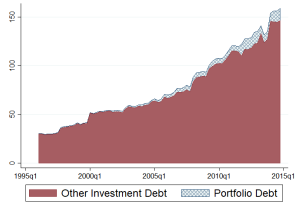
(F) Emerging, Corporates



(G) Developing, Public

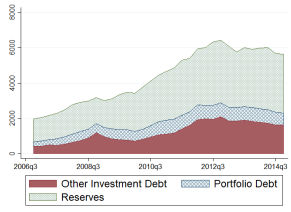


(H) Developing, Banks

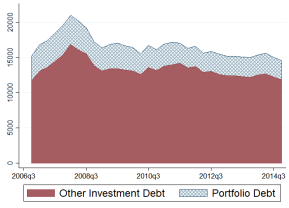


(I) Developing, Corporates

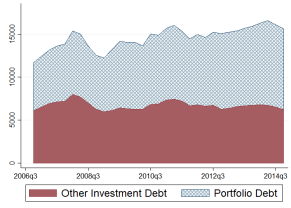
FIGURE C6. External assets, by sector and instrument, billions USD. Source: AHKS data, authors' calculations. Sample consists of 17 AEs and 12 EMs, balanced over 2006q4-2014q4. Only 3 developing countries have complete data over this period, so that aggregate is now shown.



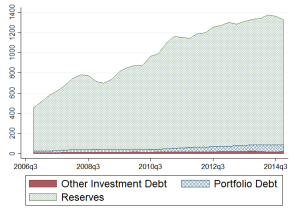
(A) Advanced, Public



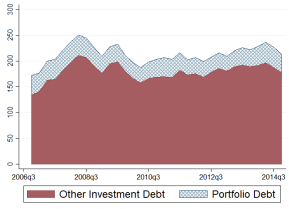
(B) Advanced, Banks



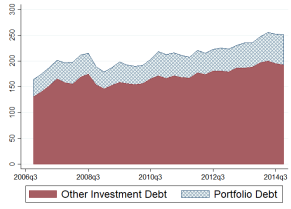
(C) Advanced, Corporates



(D) Emerging, Public

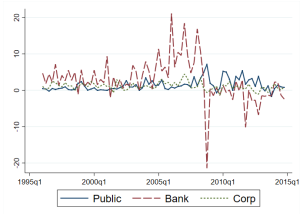


(E) Emerging, Banks

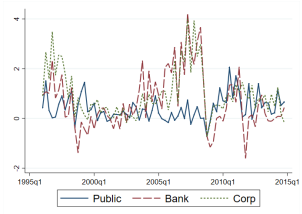


(F) Emerging, Corporates

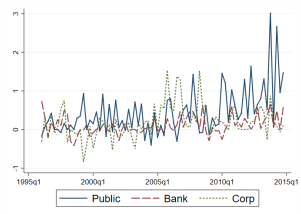
FIGURE C7. Median External Debt Inflows, % Trend GDP. Source: AHKS data, authors' calculations. Total debt is portfolio debt + other investment debt.



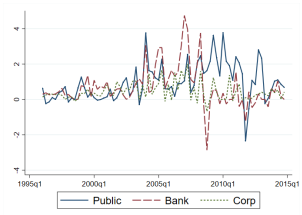
(A) Total Debt, Advanced



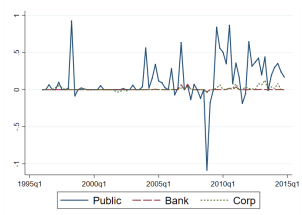
(B) Total Debt, Emerging



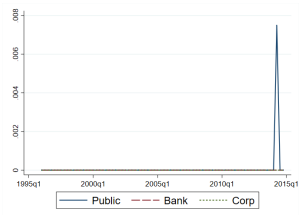
(C) Total Debt, Developing



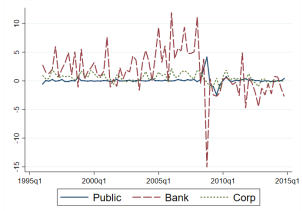
(D) Portfolio Debt, Advanced



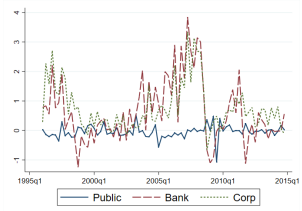
(E) Portfolio Debt, Emerging



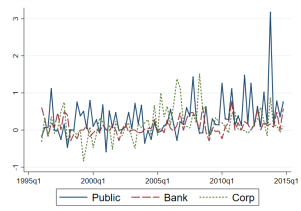
(F) Portfolio Debt, Developing



(G) Other Investment Debt, Advanced

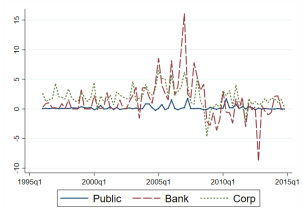


(H) Other Investment Debt, Emerging

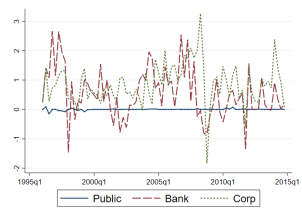


(I) Other Investment Debt, Developing

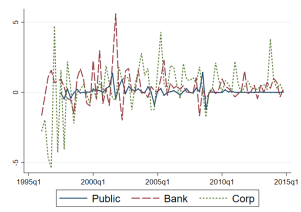
FIGURE C8. Median External Debt Outflows, % Trend GDP. Source: AHKS data, authors' calculations. Total debt is portfolio debt + other investment debt.



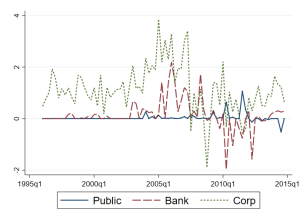
(A) Total Debt, Advanced



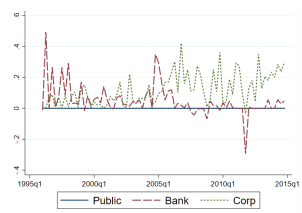
(B) Total Debt, Emerging



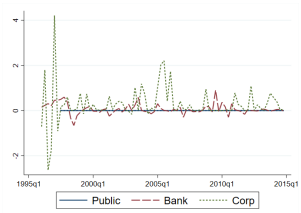
(C) Total Debt, Developing



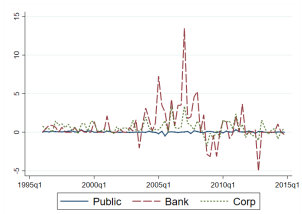
(D) Portfolio Debt, Advanced



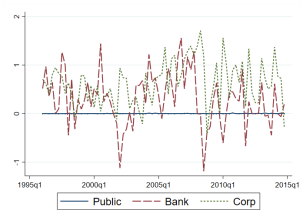
(E) Portfolio Debt, Emerging



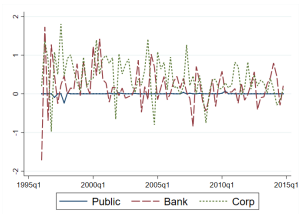
(F) Portfolio Debt, Developing



(G) Other Investment Debt, Advanced

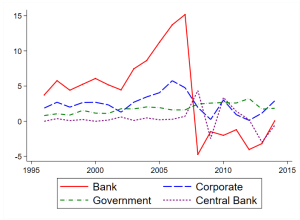


(H) Other Investment Debt, Emerging

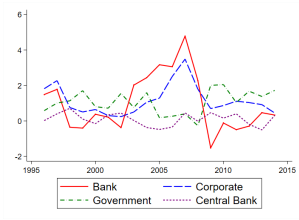


(I) Other Investment Debt, Developing

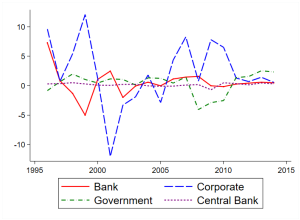
FIGURE C9. Average External Debt Inflows, Percent of GDP. Source: AHKS data, authors' calculations. Total debt is portfolio debt + other investment debt.



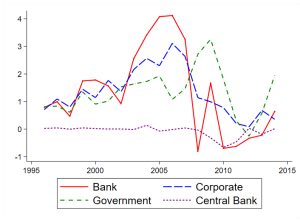
(A) Total Debt, Advanced



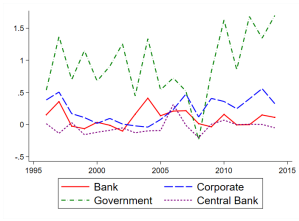
(B) Total Debt, Emerging



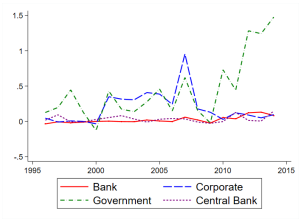
(C) Total Debt, Developing



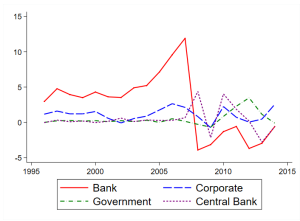
(D) Portfolio Debt, Advanced



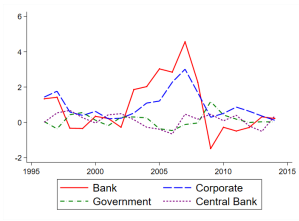
(E) Portfolio Debt, Emerging



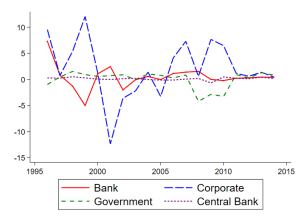
(F) Portfolio Debt, Developing



(G) Other Investment Debt, Advanced

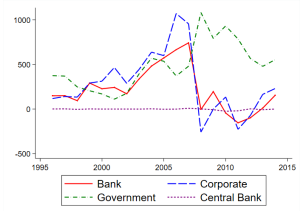


(H) Other Investment Debt, Emerging

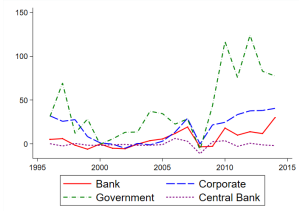


(I) Other Investment Debt, Developing

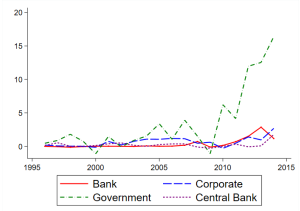
FIGURE C10. Aggregate External Debt Inflows, Billions 1996 USD. Source: AHKS data, authors' calculations. Total debt is portfolio debt + other investment debt.



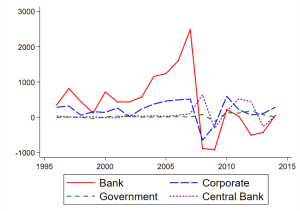
(A) Portfolio Debt, Advanced



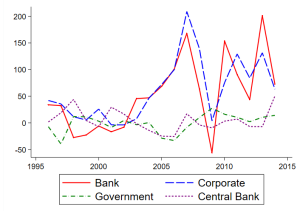
(B) Portfolio Debt, Emerging



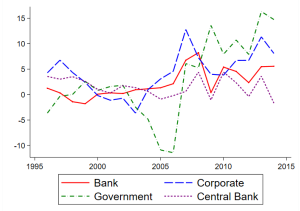
(C) Portfolio Debt, Developing



(D) Other Investment Debt, Advanced

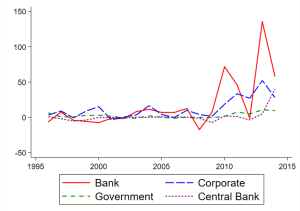


(E) Other Investment Debt, Emerging

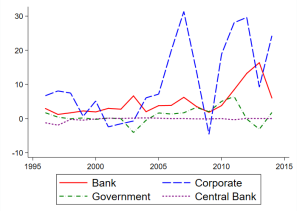


(F) Other Investment Debt, Developing

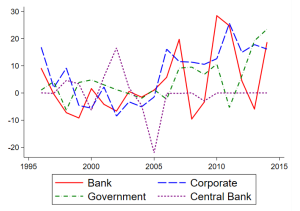
FIGURE C11. Emerging Market External Debt Inflows, Billions 1996 USD, Source: AHKS data, authors' calculations. Debt is portfolio debt + other investment debt.



(A) China Debt

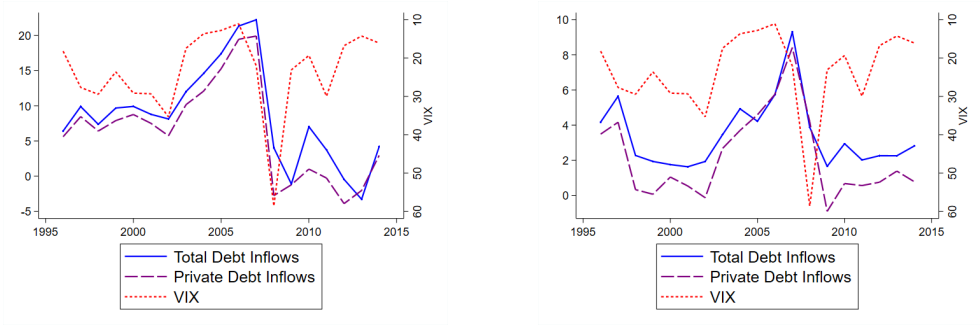


(B) India Debt



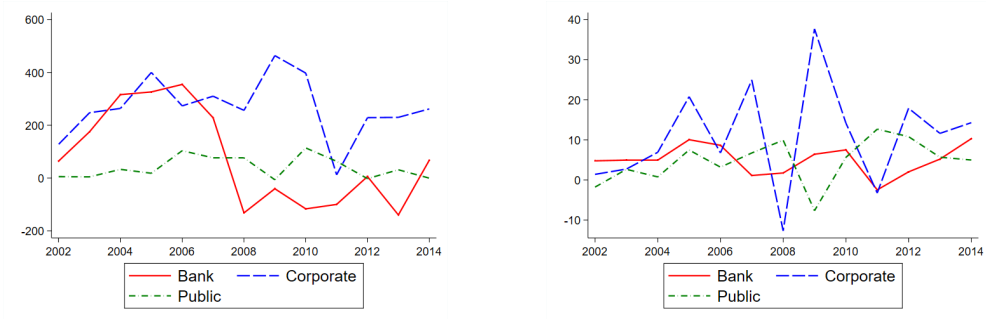
(C) Brazil Debt

FIGURE C12. Total vs Private Average Debt Inflows, Percent of GDP, Source: AHKS data, authors' calculations.



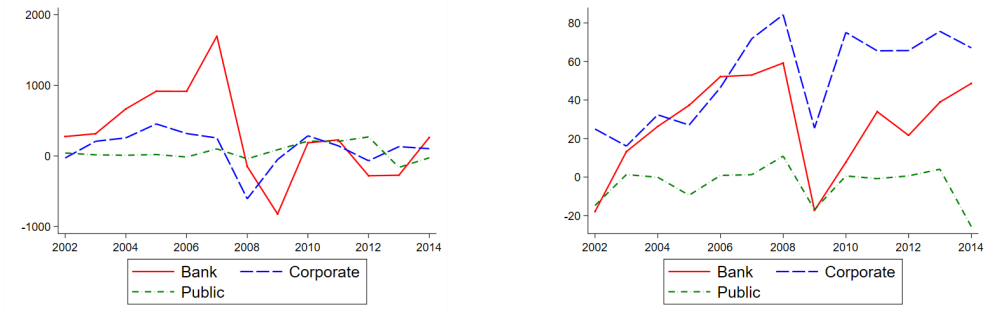
(A) Advanced (B) Emerging

FIGURE C13. Aggregate Asset Outflows, Billions USD. Source: AHKS data, authors' calculations.



(A) Portfolio Debt Asset Flows, Advanced

(B) Portfolio Debt Asset Flows, Emerging



(C) Other Investment Debt Asset Flows, Advanced

(D) Other Investment Debt Asset Flows, Emerging

C.2. Direct Investment Debt

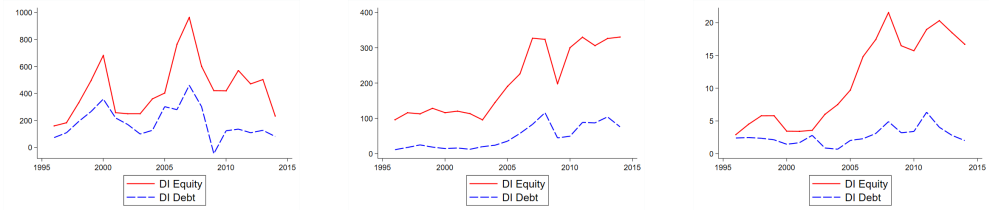
The direct investment debt (DID) component of the data is not as extensively reported as our augmented data for portfolio debt and other investment inflows, so we limit our sample for this analysis.[88] The balanced DID sample is a subsample of 67 countries, of which there are 20 advanced, 28 emerging, 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 C14 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.

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 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

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

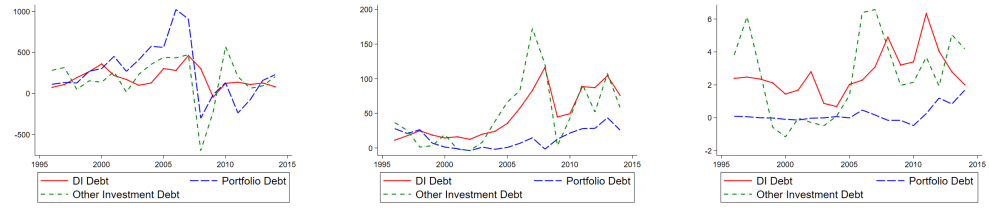
FIGURE C14. Aggregate Direct Investment Inflows, Billions 1996 USD. Source: BOP data and authors' calculations.



(A) Advanced (B) Emerging (C) Developing

to the corporate sector. We compare direct investment debt, portfolio debt, and other investment debt for the corporate sector in Figure C15.[89]

FIGURE C15. Aggregate Corporate Debt Inflows, Billions 1996 USD. Source: BOP data and authors' calculations.



(A) Advanced (B) Emerging (C) Developing

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

89. 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.

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.[90] We can do this for emerging and developing economies using the World 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:[91]

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

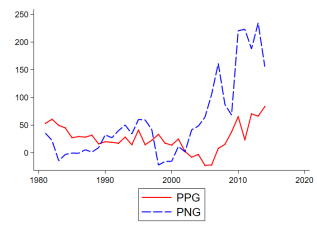
Developing (60): Algeria, Bangladesh, Belize, Benin, Bhutan, Bolivia, Botswana, Burkina Faso, Burundi, Cameroon, Cape Verde, Central African Republic, Chad, Comoros, Republic of Congo, Costa Rica, Cote d'Ivoire, Dominica, Dominican Republic, Ecuador, El Salvador, Ethiopia, Fiji, Gabon, Ghana, Grenada, Guatemala, Guinea-Bissau, Guyana, Honduras, Jamaica, Kenya, Lesotho, Liberia, Madagascar, Malawi, Maldives, Mali, Mauritania, Morocco, Nepal, Nicaragua, Niger, Nigeria, Pakistan, Papua New Guinea,

90. 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 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.

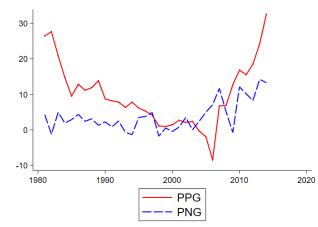
91. The DRS data is first split into short term, long term, and IMF credits. The long term data can be further subdivided by PNG debt and PPG debt. The PPG debt can further be split by creditor. We assume that the portion of PPG debt that is short term is negligible, and so attribute all Short Term Debt 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 analagous to the decomposition done in Alfaro, Kalemli-Özcan, and Volosovych (2014), who do their analysis in the context of net flows.

Paraguay, Rwanda, Senegal, Sierra Leone, Solomon Islands, Sri Lanka, Sudan, Swaziland, Togo, Tunisia, Uganda, Vanuatu, Zambia, Zimbabwe

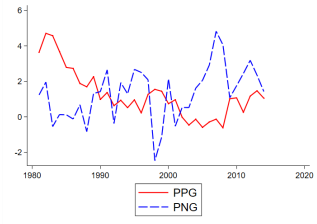
FIGURE C16. PPG vs. PNG Debt Inflows. Source: World Bank DRS data and authors' calculations.



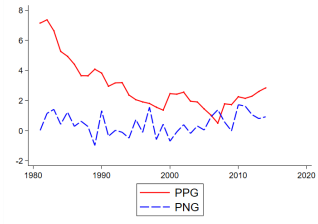
(A) Aggregate, Billions 1996 USD, Emerging



(B) Aggregate, Billions 1996 USD, Developing



(C) Average, Percent GDP, Emerging



(D) Average, Percent GDP, Developing

Figure C16 (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 7 and C9, where much of the post-2008 increase in aggregate flows is driven by large and quickly growing EM such as China.[92]

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

92. These figures will not be exactly comparable in terms of magnitude with our previous dataset in Figure 7, as the underlying sample of countries is somewhat different.

GFC, after which it rebounds, and significantly so in the case of developing economies. This is similar to what we observe in Figures 7 and C9, 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.