

# Capital Flows and Leverage

Şebnem Kalemli-Özcan<sup>1,2,3</sup> and Jun Hee Kwak<sup>1</sup>

<sup>1</sup>Department of Economics, University of Maryland, College Park, Maryland 20742, USA;  
email: kalemli@umd.edu, jhkwak@umd.edu

<sup>2</sup>National Bureau of Economic Research, Cambridge, Massachusetts 02138, USA

<sup>3</sup>Center for Economic and Policy Research, Washington, DC 20009, USA

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## Keywords

capital flows, leverage, intermediation, banking flows, corporate debt

## Abstract

This article surveys the literature on capital flows and leverage. We summarize results from the existing papers and document new facts. The empirical literature takes both a macro and a micro approach. The macro approach focuses on aggregate data both over time and in the cross-section of countries, and it documents a positive correlation between total capital flows, build-ups in terms of external and domestic debt to GDP ratio, and financial crises. The micro approach uses granular data and focuses on leverage at the firm and bank level and associates this leverage with country-level capital flows and related exchange rate movements. We document new facts from a hybrid approach that focuses on the relationship between sector-level capital flows and sectoral leverage. We highlight the interconnections between different approaches and argue that harmonization of the macro and micro approaches can yield a more complete understanding of the effect of capital flows on country-, sector-, and firm- and bank-level leverage associated with credit booms and busts.

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## 1. INTRODUCTION

International capital flows have nontrivial consequences for macro- and microeconomic outcomes. There is a large empirical literature that studies both the determinants and the effects of capital flows. This literature utilizes cross-country and time-series panel data, making use of both between-country and within-country variation. The former source of variation compares countries to each other, averaging the data over decades and focusing on the long-run causes and effects of capital flows, while the latter source of variation keeps average differences across countries fixed, using country fixed effects, and it exploits yearly or even quarterly changes in variables for identification. In general, this literature recognizes that the most important determinant of capital flows is the institutional quality of countries in the long run.

When yearly or quarterly variation is used, macroeconomic policies turn out to be more important than institutional quality, as the latter changes slowly over time. The consensus view is that countries with higher levels of institutional quality have lower levels of risk of expropriation, are more productive, and have consistent macroeconomic policies. Hence, foreign investors can get a higher return from investing in these countries, which have lower probabilities of default. This literature also finds that strong fundamentals in terms of GDP growth attract capital flows. External factors, such as the US interest rates, oil prices, and global financial conditions, are also important determinants of capital flows, especially in the short run. Connecting the effects of fundamentals and external factors, Kalemli-Özcan (2019) shows that capital flows in and out of countries with higher levels of default risk are more sensitive to changes in the US interest rates.<sup>1</sup> On the effects of capital flows, the literature tends to find a strong association between capital flows, GDP volatility, and financial crises. In terms of growth benefits, only certain forms of capital flows such as foreign direct investment (FDI) seem to bring growth to host countries.

This literature mostly focuses on net capital flows, that is, the current account. Recently, Forbes & Warnock (2012) and Fratzscher (2012) have studied total gross flows and shown the importance of global risk factors for gross capital flows for the period after 1995. Obstfeld & Taylor (2005) argue that gross flows provide risk sharing and should not be considered from the perspective of the efficient allocations of capital that are associated with current account deficits and surpluses. In general, current account deficits are associated with large gross inflows, too, especially for emerging markets. Several papers argue that credit booms and capital inflows go hand in hand, leading to debt build-ups and high leverage in the receiving economies. This process in general ends with a financial crisis and a long deleveraging process. Even without capital flows, as shown by Jordà et al. (2013), credit growth is important to understand financial crises.

For open economies, a credit boom can be financed by capital flows and can manifest itself as higher leverage in the banking sector or the corporate and government sectors. Gourinchas & Obstfeld (2012), using data from advanced and emerging markets during the period 1973–2010, show that the most important determinants of financial crises are an increase in leverage, credit growth, and a sharp appreciation of the currency. Similarly, Borio & Disyatat (2011) show evidence on the relationship between leverage in the banking sector, cross-border capital flows, and the exchange rate. The recent work by Bruno & Shin (2015a,b) provides a model and supporting evidence that can connect these findings. This work links global banks' leverage to global push factors that are related to capital flows. The authors' argument is that when global financial conditions are easy (due to expansionary monetary policy in the United States,

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<sup>1</sup>Readers are referred to, among others, Calvo et al. (1996), Calvo (1998), Gourinchas & Jeanne (2006), Alfaro et al. (2008), Reinhart & Rogoff (2009), Aguiar & Amador (2011), Gourinchas & Obstfeld (2012), Gourinchas & Jeanne (2013), and Alfaro et al. (2014).

for example), global banks' leverage goes up due to a relaxation in their value-at-risk constraint, and this process is associated with an increase in cross-border banking flows. An alternative model by Gabaix & Maggiori (2015) focuses on the risk-bearing capacity of global financial intermediaries.

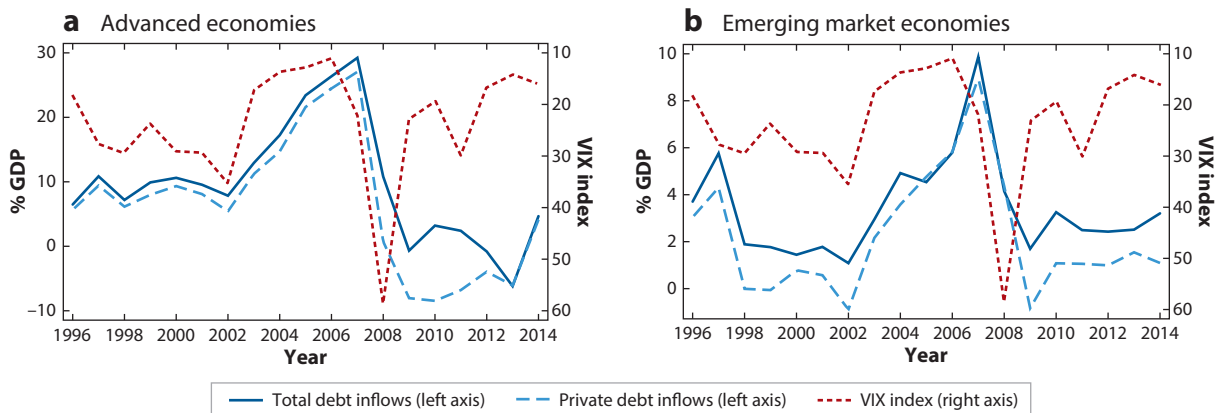
In order to understand the relationship between capital flows and leverage, we have to understand the effects of global push factors on capital flows. As shown by Rey (2013), a global financial cycle (GFC)—which involves synchronized surges and retrenchments in gross capital flows, and booms and busts in risky asset prices and leverage—is an important phenomenon to understand in terms of its effects on domestic credit creation and leverage. GFC has a strong common component that moves together with VIX.<sup>2</sup> VIX is related to monetary policy in the United States and global changes in risk aversion and uncertainty (Bekaert et al. 2013, Bruno & Shin 2015b, Miranda-Agrippino & Rey 2019). In association with these findings, many researchers show that VIX has an important role in pushing capital flows, especially into emerging markets (see Forbes & Warnock 2012; Fratzscher et al. 2016; Cerutti et al. 2019a,b; di Giovanni et al. 2019; Miranda-Agrippino & Rey 2019). However, this literature also underlines the importance of the cyclicality in the relationship between VIX and capital flows (see Avdjiev et al. 2018, 2019; di Giovanni et al. 2019). Kalemli-Özcan (2019) shows that changes in US monetary policy affect capital flows in and out of emerging markets more than they do in advanced economies, since the capital flows of emerging markets are more risk sensitive, and US policy affects the risk sentiments of global investors.

The theoretical work by Bruno & Shin (2015a) suggests that global banks' US dollar lending increases during the boom phase of the GFC due to abundant liquidity in US dollar funding markets. An appreciating exchange rate resulting from capital inflows then allows banks and firms with currency mismatch on their balance sheets to take on more leverage in terms of increasing the share of foreign currency debt (e.g., Bruno & Shin 2015b). The model by Coimbra & Rey (2019) points to the importance of bank heterogeneity in leverage in such a mechanism, whereas the models by Bruno & Shin (2015a,b) consider the aggregate leverage of the banking sector. Kalemli-Özcan et al. (2018) show that firms increase their leverage with exchange rate appreciations and decrease it with depreciations. As shown by Kalemli-Özcan (2019), this relationship is stronger in countries with higher foreign currency debt, while it disappears in countries with a lower level of foreign currency debt. Fluctuations in VIX affect firm leverage in all countries, regardless of the extent of the foreign currency debt.

The model by Coimbra & Rey (2019) shows that financial cycles are due to heterogeneous intermediaries and credit growth is driven in part by lower funding costs, especially for the more leveraged intermediaries. Coimbra & Rey (2018) test the implications of their model using bank-level data from several countries and show that the negative relationship between funding costs and credit growth is stronger when the distribution of leverage across intermediaries is more positively skewed. Avdjiev et al. (2019), using confidential bank-level data from several countries, show that the heterogeneity in the cross-border liabilities of domestic banks is the key to the transmission of global financial conditions. Using detailed bank-to-firm loan-level data from Turkey, di Giovanni et al. (2019) show that lower funding costs for banks pass through as lower borrowing costs for firms, leading to a credit boom. This process is mainly driven by large banks with access to international funding markets.

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<sup>2</sup>VIX is a forward-looking volatility index of the Chicago Board Options Exchange. It measures the market's expectation of 30-day volatility and is constructed using the implied volatilities of a wide range of S&P 500 Index options.



**Figure 1**

Total versus private average debt inflows (% GDP) and VIX in (a) advanced economies and (b) emerging market economies, using a sample of 25 advanced and 35 emerging market economies. VIX is plotted on an inverted scale. Figure adapted with permission from Avdjiev et al. (2018).

In the next section, we summarize findings from the literature that uses macro and micro data in detail. Section 3 documents new facts from a hybrid approach that focuses on sector-level capital inflows and leverage. Section 4 concludes.

## 2. LITERATURE

### 2.1. Macro Approach: Countries

**Figure 1** shows the importance of VIX as a global push factor in determining total capital inflows into both advanced economies (AEs) and emerging market economies (EMEs). Given our focus on leverage, we use debt flows, and we calculate debt inflows to GDP ratios as the average over the country group in a given year.

It is clear that VIX and capital (debt) flows move together. Notice the importance of private debt inflows in driving the dynamics of the relationship between total debt inflows and VIX. The decline in total debt inflows is smaller than the decline in private debt inflows when VIX is high. This means that public debt inflows move in the opposite way of private inflows and help to smooth out the decline in total inflows, especially in emerging markets. This figure is informative, because it indicates that the leverage of different sectors might change differentially over time as a response to global and country shocks, and it may not be straightforward to detect the relationship between leverage and total capital flows in the aggregate data.

The global factor VIX is clearly important, but we should consider the role of external factors together with the countries' own fundamentals. Avdjiev et al. (2018) construct a new data set for gross capital flows during the period of 1996–2014 for a large set of countries at a quarterly frequency, decomposing debt inflows and outflows by borrower and lender type: banks, firms, and sovereigns. They run regressions of both total capital inflows and capital inflows by sector on VIX and countries' GDP growth. These regressions show that banking flows are important for the comovement of capital inflows and outflows. These regressions also show that capital inflows move procyclically with the GDP growth, and this procyclicality is driven by both banking inflows and corporate inflows. This means that when countries grow fast, their banking sectors and corporate sectors borrow more externally, and that foreign investors leave these sectors during recessions. These results hold for both advanced countries and emerging markets.

## 2.2. Micro Approach: Firms and Banks

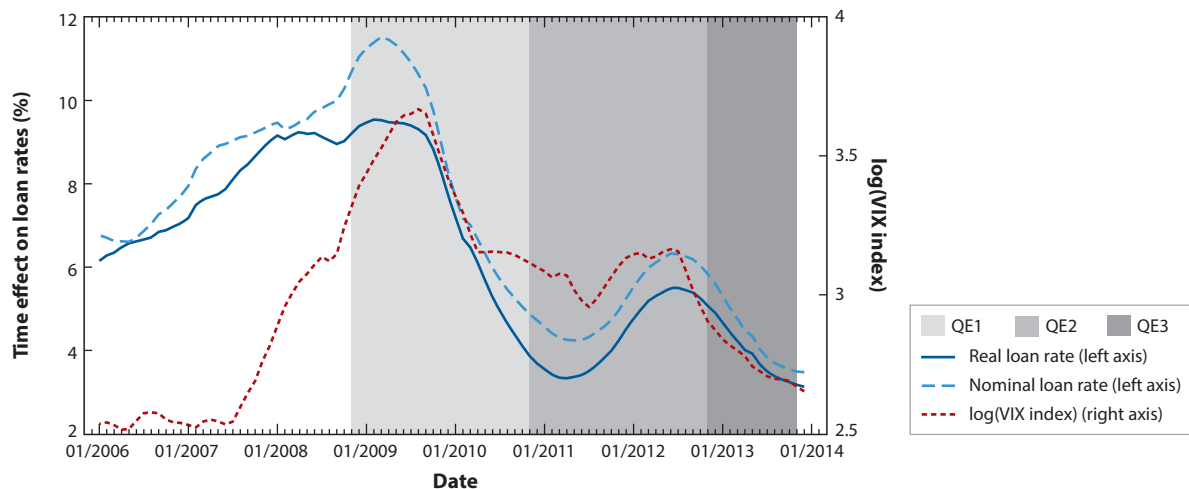
Several papers in the literature focus on bank- and firm-level data and try to connect leverage at this granular level to capital flows. It is important to have an understanding of the stylized facts on bank and firm leverage that can be generalized to more than one country before establishing the connection to capital flows.

Kalemli-Özcan et al. (2012) show that bank leverage is heterogeneous across banks and varies a great deal over time. The leverage at the firm level, although still heterogeneous in the cross-section of firms, does not move as much over time as the bank-level leverage. The authors show that there was an increase in leverage for investment banks prior to the 2008–2009 crisis not only in the United States but also in other countries. They also show a procyclical leverage ratio for investment banks in other countries, as shown by Adrian & Shin (2008) for investment banks in the United States. In addition, Kalemli-Özcan et al. (2012) show that procyclical leverage is not limited to investment banks, but rather leverage is procyclical for large commercial banks in many countries. Although there are theoretical papers that aim at understanding the endogenous leverage process (e.g., Fostel & Geanakoplos 2008, Brunnermeier & Pedersen 2009, Farhi & Tirole 2012), the literature mostly lacks evidence on the leverage of firms and banks based on internationally comparable data. The exception is the seminal work by Rajan & Zingales (1995), who focus on the comparison of firm-level leverage across G7 countries using data on listed firms.

Kalemli-Özcan et al. (2012) utilize the most comprehensive and comparable firm-level and bank-level worldwide data set (Orbis, by Bureau van Dijk) for the years 2000–2010; the data set covers listed, private, large, and small nonfinancial firms, financial firms, and banks. It is important to use micro data because aggregate country-level data may mask micro-level patterns. Adrian & Shin (2008, 2009, 2010) and He et al. (2010) investigate US commercial banks and investment banks mainly using aggregate sectoral flow-of-funds data from the Federal Reserve. Such sectoral data may be driven by the largest banks, and it is important to know how typical investment and commercial banks behave. In fact, the key finding by Kalemli-Özcan et al. (2012) that large banks are more leveraged supports models such as the one by Coimbra & Rey (2019) mentioned in the introduction.

**2.2.1. Funding cost channel.** What about the relationship between the leverage of large banks and capital flows? Some papers have emphasized the role of financial intermediaries in channeling capital flows into leverage in both financial and nonfinancial private sectors. Cetorelli & Goldberg (2012) use bank-level data to study the role of global banks in transmitting capital flows–related liquidity conditions across borders. Using Mexican loan-level data, Morais et al. (2018) find that, during easy global liquidity conditions, the supply of credit of foreign banks to Mexican firms increases. This transaction would register as a capital flow in the balance of payments from a foreign country to the Mexican banking sector. Bräuning & Ivashina (2019) show that, during easy monetary conditions in the United States, cross-border syndicated bank loans increase.

Using confidential loan-level data on the universe of loans combined with firm- and bank-level data from Turkey, Baskaya et al. (2017) and di Giovanni et al. (2019) show a direct link between banking inflows, bank leverage, corporate leverage, and a credit boom; they show that increased capital inflows into Turkey led to a leveraged corporate sector and a credit boom via bank intermediation of the capital inflows themselves. There are particular banks creating this type of procyclicality, though: These are the banks that have a higher level of noncore liabilities. A high level of noncore liability ratio means more access to international funding, since most of the noncore liabilities are nondomestic-deposit liabilities and externally funded. Baskaya et al. (2017) show that banks' noncore liabilities move in tandem with banking sector inflows.



**Figure 2**

VIX, US monetary policy, and Turkish firms' borrowing costs. Figure adapted with permission from di Giovanni et al. (2019).

Abbreviation: QE, quantitative easing.

The key intuition behind these patterns is the pass-through of the cost of funds. Large banks, which fund themselves cheaply in international markets, pass through this cheap cost of funding as a lower cost of borrowing to firms. **Figure 2**, by di Giovanni et al. (2019), illustrates the relationship between Turkish firms' borrowing costs and VIX, showing that this relationship gets stronger during low VIX periods associated with quantitative easing policies of the US Federal Reserve. The figure plots the time effects on loan rates (nominal and real) in the sense that the authors plot the average interest rate on the average loan after purging that loan's interest rate out of its determinants such as loan amount, maturity, risk, currency, and so forth. The aim is to focus exclusively on the time pattern of borrowing costs at a very granular level and to see if this time pattern is associated with the global push factor, VIX. They find that it is the case.

Some papers link firm-level leverage to capital flows and other aggregate outcomes. The work by Gopinath et al. (2017) links corporate leverage and credit growth to capital flows and to misallocation of this capital, which leads to a decline in aggregate productivity. They show that countries in Southern Europe experienced low productivity growth alongside declining real interest rates in 1999–2008 due to capital inflows from Northern Europe. They argue that capital inflows from Northern to Southern Europe led to the misallocation of this capital across firms, which gave rise to lower aggregate productivity. They show that firms with higher net worth got more capital, although they were not always the most productive. They develop a model with size-dependent financial frictions that is consistent with firm leverage being a function of firm size in the data. They provide evidence consistent with their model from six European countries.

Kalemli-Özcan et al. (2018) also focus on firm-level leverage, but they link it to declining aggregate investment in Europe in the aftermath of the 2008–2009 crisis. They show that declining firm-level and aggregate investment can be explained by higher firm-level leverage, increased debt service associated with this leverage, and a decrease in credit supply due to a relationship with a weak bank. Banks' role is linked to capital flows, since Northern European banks expand their credit supply to Southern European banks while these banks are exposed to Southern European governments' debt. This deadly embrace creates a doom loop between firms, banks, and sovereigns across Europe that is funded by capital flows.

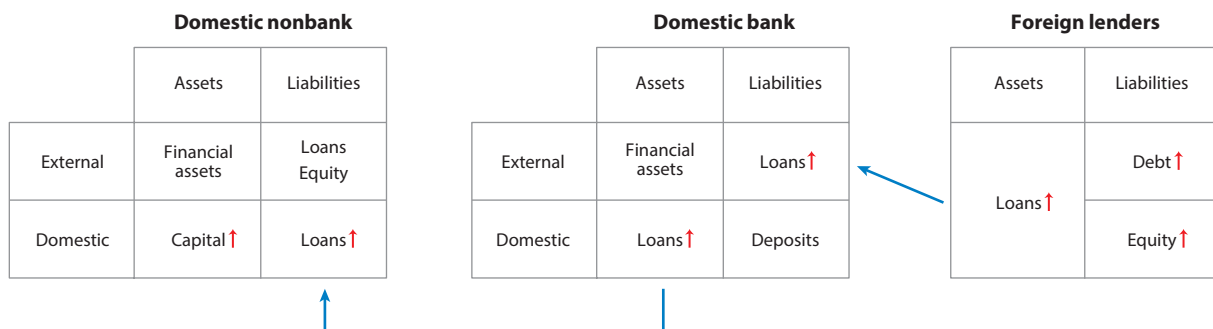
**2.2.2. Balance sheet channel.** One dimension of the bank- and firm-level leverage is borrowing/lending in local versus foreign currency. As argued in the introduction, the model by Bruno & Shin (2015a) explicitly predicts higher leverage for banks and firms when there is currency mismatch on their balance sheets as a result of movements in the exchange rate, which is linked to capital flows.

Kalemli-Özcan et al. (2018) directly test Bruno & Shin’s (2015a) model. Using firm-level data from private and public firms in ten Asian emerging markets from 2002 to 2015, they show that firms that had higher foreign currency debt before the exchange rate appreciated increased their leverage more after the appreciation. Kalemli-Özcan et al. (2016) show that these balance sheet currency mismatch effects can be detrimental on the downside, when the credit boom turns into a bust and there is liquidity shortage, which is almost always the case (with a few exceptions). Using firm-level data from six Latin American countries, the authors show that if currency crises are accompanied by banking crises, domestic exporters holding unhedged foreign currency debt decrease investment, while foreign exporters with better access to credit increase investment despite their unhedged foreign currency debt. There is no such effect if the crisis is a pure currency crisis.

### 3. NEW FACTS FROM A HYBRID APPROACH: SECTORS

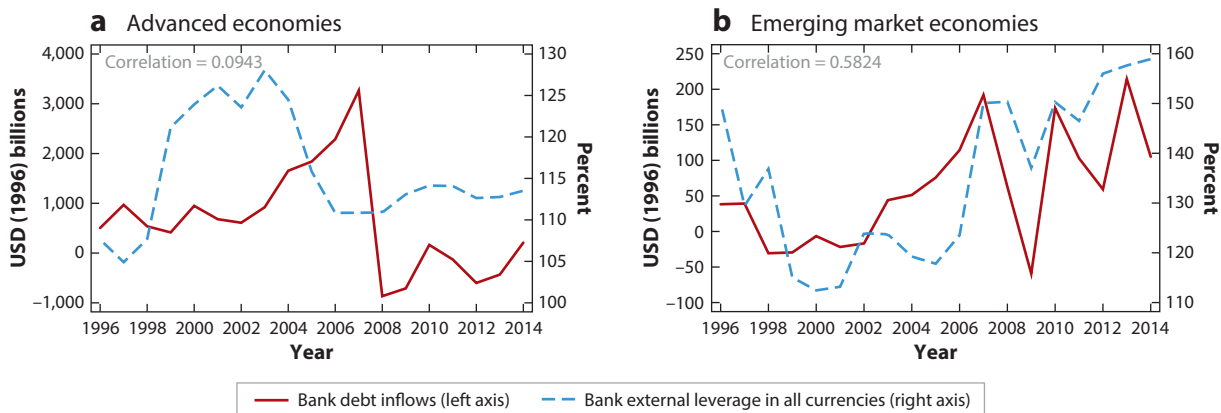
In this section, we undertake an exercise that is a hybrid between micro and macro approaches. Using data from Avdjiev et al. (2018), we aim to establish a direct link between capital inflows into the banking sector and leverage in the corporate sector. Note that the previous literature could not undertake such an exercise for a large set of countries over a long period since capital flows data by sector are very limited at the quarterly frequency. Avdjiev and colleagues have built a new sector-level capital flow data set that expands the existing data sets significantly in terms of country and time coverage (see Avdjiev et al. 2018 for details).

Domestic banks play an important role in channeling funds offered by foreign lenders into domestic nonbanks. **Figure 3** presents an example of how domestic banks intermediate funds and how the balance sheets of the domestic banks and those of the counterparties are adjusted. If foreign lenders grant loans to a domestic bank, the domestic bank’s external liabilities increase. If the domestic bank’s external assets do not change, its external leverage (defined as external liabilities to external assets ratio) increases, and this implies that its domestic assets should increase so that the balance sheet identity holds. The increase in the bank’s domestic assets means that the domestic



**Figure 3**

Balance sheets and capital inflows. This figure illustrates how domestic banks intermediate funds and how the balance sheets of the domestic bank and those of counterparties (domestic nonbank and foreign lenders) are adjusted. Red arrows indicate how assets and liabilities are adjusted within each entity according to balance sheet identity. Blue arrows indicate how balance sheets are adjusted with each transaction between two entities.



**Figure 4**

Bank debt inflows and bank external leverage in all currencies in (a) advanced economies and (b) emerging market economies. We calculate aggregate debt inflows into the bank sector in a given year as the sum of deflated debt inflows [USD (1996) billions] over the country group. We calculate the external leverage of the bank sector in a given year as the sum of the bank sector's external liabilities over the country group divided by the counterpart of external assets. Data from Avdjiev et al. (2018).

bank grants loans to the domestic nonbanking sector (nonfinancial firms and households), and in turn, the domestic nonbanking sector's debt increases.

First, we show empirical evidence that domestic banks' external leverage has increased since 2000 in EMEs. **Figure 4b** shows that bank debt inflows are positively correlated with bank external leverage (that is, external liabilities to assets ratio) in EMEs. This finding indicates that domestic banks' external assets do not change much, and hence their domestic assets should increase.<sup>3</sup> As a result, the banking sector in EMEs mainly uses funds abroad to make loans to the domestic sector instead of acquiring assets held by the external sector. **Figure 4a** shows that this is not the case in AEs.

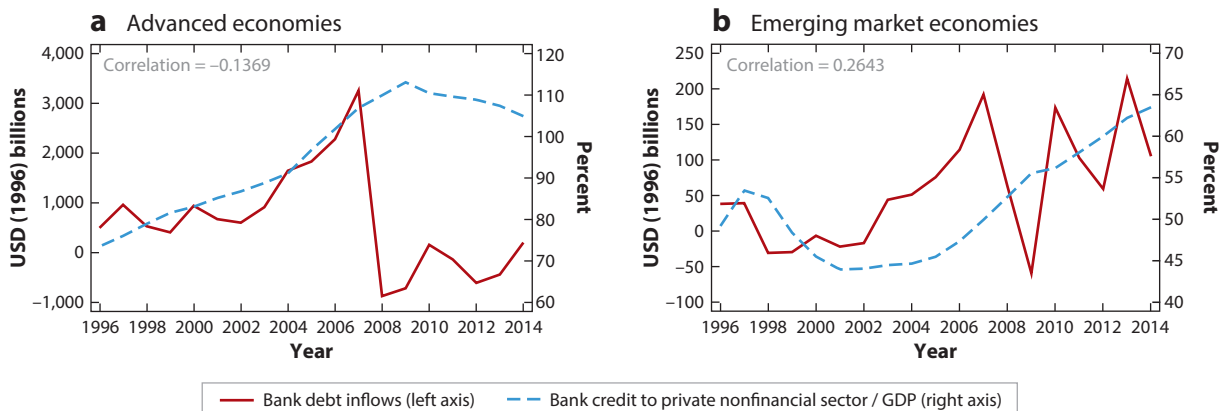
Second, in EMEs, domestic banks grant more loans to the domestic nonbanking sector when they have more external funds obtained abroad, as shown in **Figure 5b**, and as before, this is not the case for AEs, as shown in **Figure 5a**. This is a new and important finding, which points toward a hidden financial stability risk: For emerging markets, capital flows into the banking sector can substantially increase the domestic vulnerabilities. However, as shown in **Supplemental Figure 9**, capital flows into the corporate sector do not increase the corporate sector's external leverage, suggesting that firms that borrow directly in international markets are special multinationals that also increase their external assets at the same time. These sector-level results are also consistent with the bank-to-firm loan-level data provided by di Giovanni et al. (2019).

Next, to further support our results, we show firm-level evidence on the effects of bank inflows on firm leverage. In **Table 1**, we regress firm-level leverage on sectoral inflows using the Orbis database, which covers 43 countries. Leverage is measured as financial debt (loans and debt instruments) to total assets ratio. It is noteworthy that this ratio is usually considered to be a better measure of the vulnerability of firms than other leverage measures.<sup>4</sup>

<sup>3</sup>**Supplemental Figure 8** illustrates that rising external leverage in EMEs is driven by increasing external liabilities.

<sup>4</sup>For example, the Bank for International Settlements (BIS) includes debt securities and loans in its main credit indicator (core debt in total credit statistics) but excludes other liabilities such as pension, trade credit, or other accounts receivable/payable.





**Figure 5**

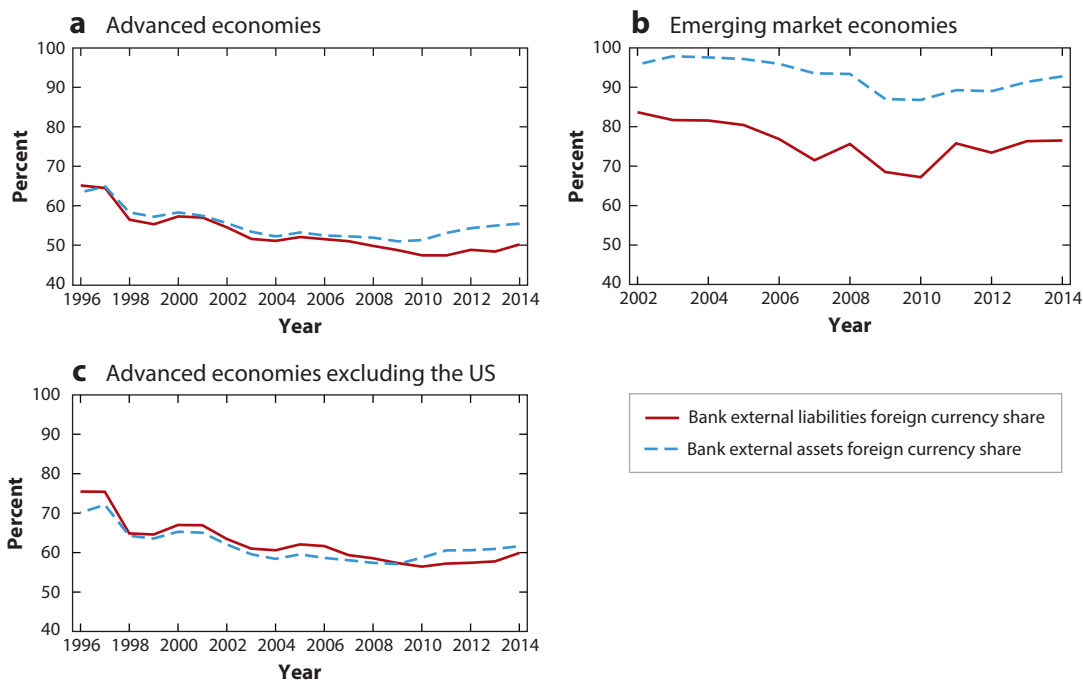
Inflows and bank credit to the private nonfinancial sector to GDP ratio in (a) advanced economies and (b) emerging market economies. We calculate aggregate debt inflows into the bank sector in a given year as the sum of deflated debt inflows [USD (1996) billions] over the country group. We use the average of bank credit to the private nonfinancial sector to GDP ratios over the country group in a given year as the measure of the private nonfinancial sector’s leverage. Data from Avdjiev et al. (2018) and BIS Credit Statistics (<https://www.bis.org/statistics/totcredit.htm>).

We find that the financial debt to assets ratio is positively correlated with bank inflows in (a) EMEs, (b) countries with high foreign currency debt share, and (c) managed floats. These results suggest that domestic banks channel funds obtained abroad into domestic firms in these country groups and that these firms are more vulnerable to capital inflows as they build up leverage significantly via the domestic bank lending channel. **Table 1** shows that there is no significant positive effect of capital flows into the corporate sector and the government sector on

**Table 1 Firm leverage regression**

Dependent variable	Financial debt to total assets ratio					
	Advanced economies	Emerging market economies	High FX debt	Low FX debt	Managed float	Free float
(BankInflows/GDP) <sub>c,t</sub>	0.02 (0.02)	0.24*** (0.05)	0.16** (0.05)	0.00 (0.04)	0.22*** (0.05)	-0.02 (0.09)
(CorporateInflows/GDP) <sub>c,t</sub>	-0.12 (0.07)	0.04 (0.03)	0.08 (0.05)	-0.10 (0.11)	0.09* (0.05)	-0.20** (0.10)
(PublicInflows/GDP) <sub>c,t</sub>	0.04 (0.04)	-0.07 (0.08)	0.05 (0.08)	0.02 (0.04)	-0.07 (0.07)	0.18 (0.19)
Adjusted R <sup>2</sup>	0.8685	0.7583	0.7621	0.8829	0.7634	0.8680
Number of observations	22,352	631,593	605,705	17,078	611,365	4,163
Number of countries	22	17	15	15	23	6
Country fixed effects	yes	yes	yes	yes	yes	yes
Firm fixed effects	yes	yes	yes	yes	yes	yes

\*\*\*, \*\*, and \* indicate significance at the 1%, 5%, and 10% levels, respectively. Firm-year two-way clustered standard errors are in parentheses. We run the following regression:  $Leverage_{i,c,t} = \beta_1 BankInflows_{c,t} + \beta_2 CorporateInflows_{c,t} + \beta_3 PublicInflows_{c,t} + \gamma_i + \delta_c + \epsilon_{i,c,t}$ , in which leverage is measured as financial debt (loans and debt instruments, proxied by the items “loans” and “longtermdebt”) to assets ratio of each firm *i* in a given country *c* and year *t*. Leverage is winsorized at the 1st and 99th percentile.  $\gamma_i$  and  $\delta_c$  are firm and country fixed effects, respectively. We include country-specific aggregate sectoral debt inflows as explanatory variables. A country’s foreign currency (FX) debt share (obtained from Kalemli-Özcan et al. 2018) is considered to be high if average FX debt share in the nonfinancial corporate sector of that country during the sample period is above the median among all countries, and low otherwise. Using Ilzetzi et al.’s (2019) exchange regime classification, we classify a country as a managed float if the coarse classification code is 2 or 3 and a free float if the code is 4, 5, or 6.



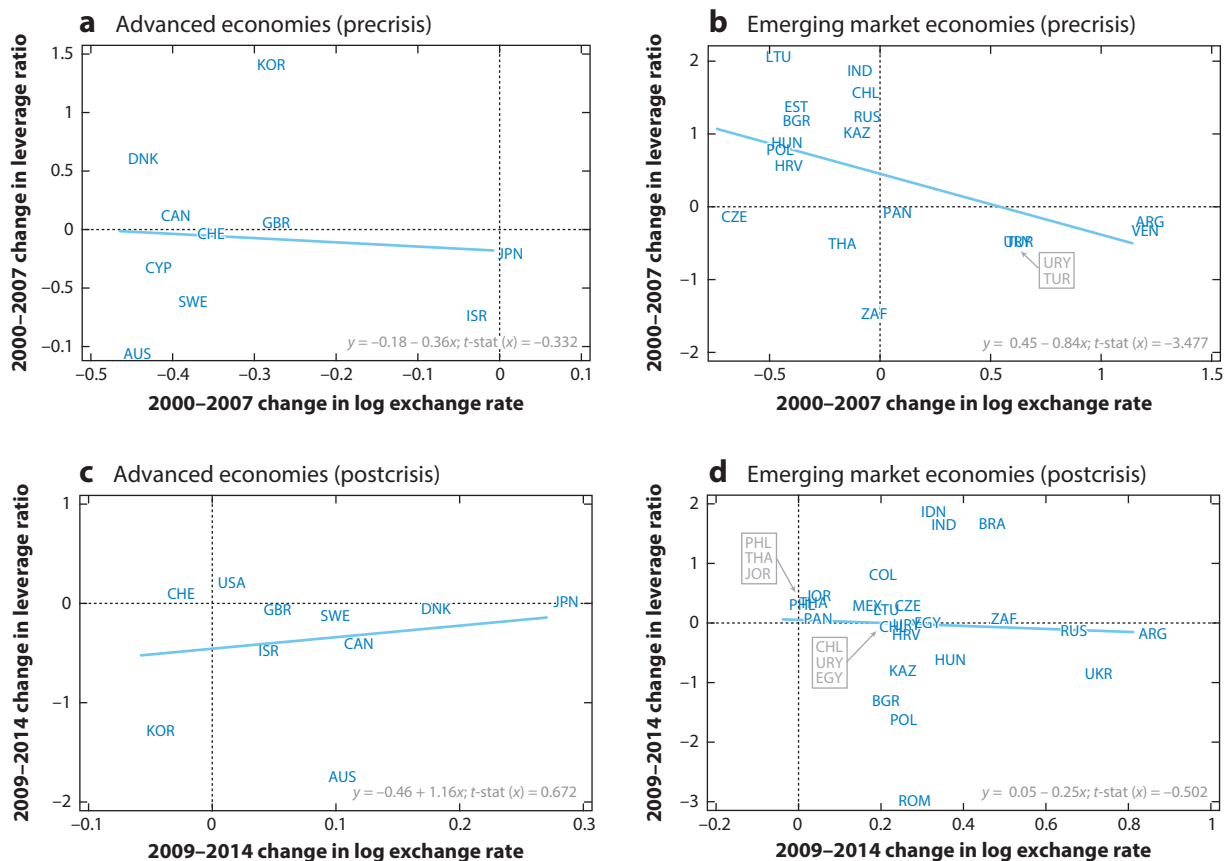
**Figure 6**

Foreign currency share of bank external liabilities and assets in (a) advanced economies, (b) emerging market economies, and (c) advanced economies excluding the United States. We calculate the share of foreign currency liabilities as the sum of the liabilities in foreign currency across countries divided by total liabilities across countries. The share of foreign currency assets is calculated in the same fashion. Data from BIS Locational Banking Statistics (<https://www.bis.org/statistics/bankstats.htm>).

firm leverage. If anything, more capital flows into the corporate sector decrease firm leverage in countries with free floats.

Finally, we investigate the currency decomposition of domestic banks' liabilities and assets to assess the vulnerability of these banks' balance sheets to exchange rate shocks. Given that domestic banks play a pivotal role in channeling funds between foreign lenders and the domestic nonbanking sector, currency mismatch in these domestic intermediaries' balance sheets poses a great risk to the financial system of a country. In **Figure 6**, we calculate the share of foreign currency liabilities as the sum of the liabilities in foreign currency across countries divided by total liabilities. We also calculate the share of foreign currency assets in the same fashion. Foreign currency shares in both liabilities and assets have gradually declined over time, but they look fairly stable. In fact, from these figures, it does not seem that there is a currency mismatch issue for banks' balance sheets in AEs and EMEs. It goes the other way around, in that assets in foreign currency exceed liabilities in foreign currency.

**Figure 7b** shows that a 1%p increase in the appreciation rate was associated with a 0.84%p increase in bank external leverage build-up (and, similarly, a depreciation was associated with deleveraging) across EMEs during the precrisis period of 2000–2007. This cross-country correlation is significant, with t-statistic of  $-3.48$ . However, notice that causality can go the other way around, in that more borrowing by domestic banks from overseas can lead to an appreciation of



**Figure 7**

Bank external leverage and exchange rate in (a) advanced economies (precrisis), (b) emerging market economies (precrisis), (c) advanced economies (postcrisis), and (d) emerging market economies (postcrisis). The three-letter codes represent countries (see list of country codes at <https://unstats.un.org/unsd/tradekb/knowledgebase/country-code>). The change in bank external leverage ratio is the difference between a bank's external liabilities to assets ratio in 2007 and the one in 2000 for the precrisis period. The exchange rate is the price of the US dollar in local currency. The change in the log exchange rate is the difference between the log exchange rate in 2007 and the one in 2000. We use 2009–2014 changes for the postcrisis period. We drop country observations if a change in bank external leverage ratio is larger than 3 or smaller than  $-3$  in a given country. Data from Avdjiev et al. (2018) and IMF International Financial Statistics (<https://data.imf.org/?sk=4C514D48-B6BA-49ED-8AB9-52B0C1A0179B>).

the domestic currency. We do not find the same pattern during the postcrisis period of 2009–2014. Also, we do not find this pattern in AEs during pre- and postcrisis periods.

#### 4. CONCLUSION

This article surveys the literature on capital flows and leverage. We summarize results from the existing papers and document some new facts. The literature takes both a macro and a micro approach. The macro approach focuses on aggregate country-level data over time and in the cross-section, and it documents a positive correlation between total capital inflows, build-ups in terms of external and domestic debt, and financial crises associated with deleveraging. The micro approach

uses granular data, focuses on leverage at the firm and bank levels, and associates this leverage with aggregate country-level capital inflows.

The key messages from these approaches are as follows. At the macro level, boom periods in countries that are associated with domestic credit growth, and hence leverage, are also associated with periods of capital inflows, especially for emerging markets. These occurrences end with financial crises most of the time. At the micro level, firm leverage is not as cyclical as bank leverage; the latter moves in tandem with global push factors, most notably the VIX index, which is a measure of global uncertainty and risk aversion. The connection between bank-level leverage and the cyclicity in this leverage as a function of VIX can be explained by the effect of VIX on capital inflows. When VIX is low, capital flows into the banking sectors of many countries, where bank-level leverage increases. There is important heterogeneity in bank-level leverage, though, as not all banks increase their leverage when global liquidity conditions are easy (i.e., low VIX); rather, it is large banks and banks that fund themselves in the international markets that do so, and they end up with higher leverage during such periods. Firm-level leverage is connected to bank-level leverage and capital flows via easy borrowing conditions.

We document some new facts from a hybrid approach that focuses on the relationship between sector-level capital inflows and sectoral leverage. We show that capital flows into the domestic banking sector of a given country are associated with increased leverage in the same country's corporate sector. This result is strong for emerging markets but weaker for advanced countries.

The bottom-line finding from this review is that countries' own domestic banks are central to the relationship between capital flows and leverage. This is not to say that global banks are not important. They are. Rather, this is simply because, in open economies that are financially integrated with the rest of the world, domestic banks fund themselves mostly through global banks using the interbank market. The realization of the importance of the domestic banking sector in the intermediation process of capital flows has a very important policy implication. Macroprudential authorities that aim at financial stability should start with their own domestic banking sector in open economies.

## DISCLOSURE STATEMENT

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# Contents

Economics with a Moral Compass? Welfare Economics: Past, Present, and Future <i>Amartya Sen, Angus Deaton, and Timothy Besley</i> .....	1
Trade Policy in American Economic History <i>Douglas A. Irwin</i> .....	23
An Econometric Perspective on Algorithmic Subsampling <i>Sokbae Lee and Serena Ng</i> .....	45
Behavioral Implications of Causal Misperceptions <i>Ran Spiegler</i> .....	81
Poverty and the Labor Market: Today and Yesterday <i>Robert C. Allen</i> .....	107
The Econometrics of Static Games <i>Andrés Aradillas-López</i> .....	135
On Measuring Global Poverty <i>Martin Ravallion</i> .....	167
Taxation and the Superrich <i>Florian Scheuer and Joel Slemrod</i> .....	189
How Distortions Alter the Impacts of International Trade in Developing Countries <i>David Atkin and Amit K. Khandelwal</i> .....	213
Robust Decision Theory and Econometrics <i>Gary Chamberlain</i> .....	239
Cities in the Developing World <i>Gharad Bryan, Edward Glaeser, and Nick Tsivanidis</i> .....	273
New Developments in Revealed Preference Theory: Decisions Under Risk, Uncertainty, and Intertemporal Choice <i>Federico Echenique</i> .....	299
Computing Economic Equilibria Using Projection Methods <i>Alena Miftakbova, Karl Schmedders, and Malte Schumacher</i> .....	317

Social Identity and Economic Policy	
<i>Moses Shayo</i> .....	355
Empirical Models of Lobbying	
<i>Matilde Bombardini and Francesco Trebbi</i> .....	391
Political Effects of the Internet and Social Media	
<i>Ekaterina Zhuravskaya, Maria Petrova, and Ruben Enikolopov</i> .....	415
Nash Equilibrium in Discontinuous Games	
<i>Philip J. Reny</i> .....	439
Revealed Preference Analysis of School Choice Models	
<i>Nikhil Agarwal and Paulo Somaini</i> .....	471
Social Networks and Migration	
<i>Kaivan Munshi</i> .....	503
Informality: Causes and Consequences for Development	
<i>Gabriel Ulyssea</i> .....	525
The Theory and Empirics of the Marriage Market	
<i>Pierre-André Chiappori</i> .....	547
Modeling Imprecision in Perception, Valuation, and Choice	
<i>Michael Woodford</i> .....	579
Peer Effects in Networks: A Survey	
<i>Yann Bramoullé, Habiba Djebbari, and Bernard Fortin</i> .....	603
Alternative Work Arrangements	
<i>Alexandre Mas and Amanda Pallais</i> .....	631
Shotgun Wedding: Fiscal and Monetary Policy	
<i>Marco Bassetto and Thomas J. Sargent</i> .....	659
Social Identity, Group Behavior, and Teams	
<i>Gary Charness and Yan Chen</i> .....	691
Aspirations and Economic Behavior	
<i>Garance Genicot and Debraj Ray</i> .....	715
The Search Theory of Over-the-Counter Markets	
<i>Pierre-Olivier Weill</i> .....	747
Econometric Models of Network Formation	
<i>Áureo de Paula</i> .....	775
Dynamic Taxation	
<i>Stefanie Stantcheva</i> .....	801
Capital Flows and Leverage	
<i>Şebnem Kalemli-Özcan and Jun Hee Kwak</i> .....	833