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The macro-financial effects of international bank lending on emerging markets[*]

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Abstract

Banking flows to emerging market economies (EMEs) are a potential source of vulnerability capable of generating boom-bust cycles. The causal effect of such inflows on EME macro-financial conditions is hard to pin down empirically and should be key to well-informed policy design. We provide novel empirical evidence on the effects of cross-border bank lending on EMEs macro-financial conditions. We identify causal effects by leveraging the heterogeneity in the size distribution of bilateral cross-border bank lending to construct granular instrumental variables for aggregate cross-border bank lending to 22 EMEs. We find that cross-border bank credit causes higher domestic activity in EMEs through looser financial conditions. Financial condition indices ease, nominal and real effective exchange rates appreciate, sovereign and corporate spreads narrow, and domestic interest rates fall. At the same time, real domestic credit grows, real GDP expands, imports rise, and housing prices increase as well. Effects are weaker for countries with relatively higher levels of capital inflow controls, supporting the view that these policy measures can be effective in dampening the vulnerabilities associated with external funding shocks.

JEL Classification: E0, F0, F3
Keywords: Granular instrumental variables; Capital flows; Emerging markets; Cross-border claims; Credit Shocks; International banking; Capital controls.

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1 Introduction

What are the effects of capital inflows on emerging market economies' (EMEs) macro-financial conditions? Policy-makers and practitioners tend to see capital inflows as expansionary, as they ease domestic financial conditions and boost credit and domestic demand (Blanchard et al., 2016). This, coupled with their volatility, implies that gross cross-border capital flows to EMEs are also seen as a source of vulnerability capable of generating boom-bust cycles (Reinhart et al., 2016).[1] These procyclical effects can give grounds to the use of capital controls and macroprudential policies as relevant policy tools to smooth capital inflows and manage associated risks. However, a convincing causal effect of capital inflows on EMEs' macro-financial conditions is hard to pin down empirically and should be key to well-informed policy design.[2]

The identification of the causal effect of capital flows on EMEs is challenging. Capital flows are endogenous to the current and future prospects of lenders and borrowers, as well as global financial and real conditions. Improved domestic economic prospects might induce foreign lending, while the latter in turn will affect domestic economic conditions (financial conditions, exchange rates, corporate spreads, credit and real GDP growth, among others). The effects of capital flows also need to be disentangled from other confounding factors associated with global developments that may also influence EMEs through other channels. In particular, capital flows are sensitive to risk perceptions, that are in turn affected by changes in the global financial cycle and US monetary policy (Kalemli-Özcan, 2020). For example, a global increase in risk appetite could increase global demand for EMEs' exports, growth expectations, and indirectly increase capital inflows and appreciate the real exchange rate.[3]

In this paper, we study the causal effect of international bank lending on key financial and real variables for a sample of 22 EMEs over 1990Q1-2018Q4. We address endogeneity concerns by using confidential bilateral country-level international bank lending data from the Bank for International Settlements' (BIS) locational banking statistics to construct granular instrumental variables (GIVs)

[1] This idea is well established in the international finance literature. Early discussions emphasized the role of "push" versus "pull" factors in driving cross-border capital flows (Calvo et al., 1993, 1996), followed by the literature on "sudden stops" (Calvo and Reinhart, 2000).

[2] Theoretical models with imperfect asset substitution (Greenwood and Vayanos, 2010; Gromb and Vayanos, 2010) predict that an increase in the supply of international lending appreciates domestic assets (the real exchange rate in particular). The textbook channel that Mundell-Fleming type models emphasize stresses the contractionary effect that this would have through lower export growth. Models with financial frictions can help reconcile theory with policy-makers' views (Jeanne and Korinek, 2010; Mendoza, 2010; Bianchi, 2011).

[3] Work using matched firm-bank data (di Giovanni et al., 2018, 2019) or event studies (Williams, 2018; Pandolfi and Williams, 2019) can provide clean identification strategies in specific circumstances and for particular countries. The issue of the general applicability of such results, however, remains open.

in the spirit of Gabaix and Koijen (2019).[4] International bank lending is an important component of capital flows, as emphasized by the growing literature on the role of global banks in transmitting financial conditions across borders.[5] Understanding its effects on EMEs' macro-financial conditions is not only relevant because of its significant share, but also because cross-border credit tends to be the marginal source of funding during credit booms, growing faster than domestic credit (Borio et al., 2011; Cesa-Bianchi et al., 2019).

We find that cross-border bank credit has a positive causal effect on EMEs' domestic activity through looser financial conditions and less binding balance sheet constraints. This is in line with the literature emphasizing the financial channel of exchange rate appreciation (Bruno and Shin, 2015a,b), that tends to be more pronounced for EMEs (Banerjee et al., 2020). A positive shock to international bank inflows causes EMEs' financial condition indices to ease, nominal and real effective exchange rates to appreciate, sovereign and corporate spreads to narrow, domestic interest rates to fall, and housing prices to increase. The shock has a positive causal effect on real domestic credit growth, and on real gross domestic product, being driven by investment. Our baseline results are robust to extensive checks regarding the role of crises, the sample of lending countries, and the method used to construct the GIVs.

We also study whether the effects of international bank lending on EMEs' macro-financial conditions differ depending on the level of controls to capital inflows.[6] We use the capital control index of Fernández et al. (2016) and find that the causal effects of international bank lending on domestic EME outcomes are weaker for countries that have higher degrees of capital inflow controls. In other words, controls on capital inflows can help EMEs cushion the effects of international bank lending shocks (e.g. moderate a boom in financial conditions, or limit the growth of credit), consistent with Forbes et al. (2015), Zeev (2017), Pasricha (2017) and Nier et al. (2020).

Our empirical strategy relies on the construction of instruments for *aggregate* international bank lending. We exploit the heterogeneous size distribution of international *bilateral* bank claims (Aldasoro and Ehlers, 2019) to construct exogenous shocks to international bank lending. The key intuition is that as some international lenders have large shares in aggregate international lending to any given EME, they will affect aggregate international lending to said country and, through that, aggregate outcomes. Idiosyncratic shocks to such lenders should be thus correlated with changes in overall cross-border bank lending, but unlikely to be endogenous to the recipient country – if

[4]The bilateral data used capture lending from banks resident in BIS reporting countries to bank and non-bank borrowers resident in 22 EMEs.

[5]See for instance Rey (2015), Miranda-Agrippino and Rey (2015) and Bruno and Shin (2015a,b).

[6]The flexibility of our framework allows to introduce non-linear effects based on different states or regimes, so in principle, our methodology could be used to assess the role of other regimes as well. We have explored the role of different exchange rate regimes, as in Zeev (2019) and Kalemli-Özcan (2020). The findings are broadly consistent with theirs, but the unbalanced nature of the exchange rate regime data generates results that are likely driven by only few observations/countries.

they were endogenous, they would be correlated with the change in lending from other banking systems and would thus not be idiosyncratic. We use these shocks to construct a valid and optimal instrument for aggregate lending. After obtaining the GIVs, the methodology boils down to a standard two-stage least squares approach. We use these instruments to assess the dynamic effect shocks to aggregate international bank lending on EMEs' domestic macro-financial conditions using local projections with instrumental variables (Jordà, 2005).

The exclusion restriction on which our identification strategy relies is the assumption that idiosyncratic shocks to bilateral bank lending affect economies only through total international bank lending. More concretely, idiosyncratic shocks to one of the multiple international lenders to a particular EME are exogenous to the EME's macroeconomic outcomes. Our GIVs are relevant and, we argue, likely to satisfy the exclusion restriction. The idiosyncratic shocks that underpin the construction of the GIVs can be recovered by removing common factors that drive each of the bilateral claims to a given EME, and capture systematic supply and demand components of international bank lending.[7]

Global components of international bank lending can not be used to estimate a causal effect of international lending on EMEs' domestic macro-financial conditions. The simple reason is that those components are likely to affect EMEs through channels other than changes in the supply of lending itself, despite likely being exogenous for EMEs. A clear example is the use of changes in the global financial cycle. These will surely affect the availability and cost of capital flows, but they will also affect terms of trade and global demand for EME exports.[8] That makes global components non-valid instruments.

The GIVs we construct are orthogonal to indicators of the global financial cycle.[9] The fit of regressions of our GIVs on these indicators is virtually indistinguishable from zero and the point estimate for each global financial cycle indicator is very small and not statistically significant. We document that international bank lending is linked with measures of the global financial cycle but, in line with the literature (see Cerutti et al. (2017)), it explains a small share of its variation. The factor analysis we use to recover idiosyncratic shocks to bilateral bank lending captures those sources of variation in the aggregate data.

[7] We do this by means of factor analysis. Results are robust to alternative methods to extract factors.

[8] So while it could be sound to regress EMEs' outcomes on measures of the global financial cycle, the estimated coefficients should be interpreted carefully as they will capture the full effect of the shock including, for example, the effects on present and future global growth.

[9] We proxy the global financial cycle by the three most commonly used measures: the common factor in global risky asset prices (Rey, 2015; Miranda-Agrippino and Rey, 2015), the first principal component of capital flows (Cerutti et al., 2019) and the VIX (di Giovanni et al., 2019). See Arregui et al. (2018) and Acalin and Rebucci (2020) for recent contributions to global financial cycle measurement.

Our GIVs improve upon other instruments used in the literature. We show that, when used to instrument international banking claims, these alternative instruments: (i) are either not relevant, and their first stage statistics are poor; or (ii) very likely reflect the global financial cycle and thus fail to be excludable. In particular, we consider the excess bond premium measure of Gilchrist and Zakrajšek (2012) as used by Zeev (2019), the leverage of the US broker-dealer sector as in Cesa-Bianchi et al. (2018), a Bartik-type instrument inspired by the measure used in Blanchard et al. (2016) but applied to our cross-border banking data, and the "host" and "common" components of aggregate cross-border lending growth as identified in Avdjiev et al. (2020) based on the methodology of Amiti and Weinstein (2018).[10] The only instruments that are relevant in the first stage regressions are the common component of Avdjiev et al. (2020), the leverage of the US broker-dealer sector, and the instrument based on Blanchard et al. (2016). However, they are strongly correlated with the different measures of the global financial cycle, making them non-excludable. We show that these instruments can generate large biases in the estimation of the causal effect of international banking lending on domestic EME outcomes. We argue such biases are consistent with the global demand shocks that these instruments cannot fully purge themselves from.

Related literature. Our paper contributes to the literature along several dimensions. First, we directly estimate a macro-causal effect of capital (banking) flows on EMEs. Previous studies (Calvo and Reinhart, 2000; Calvo et al., 1996; Reinhart and Reinhart, 2009) have shown that capital flows correlate with boom-bust cycles. This paper contributes to this literature by providing an identification strategy for the causal macroeconomic impact of international bank flows.

Second, to the best of our knowledge, ours is the first application of the GIV approach to international bank lending and capital flows in general. International banking data such as the locational banking statistics of the BIS are a natural candidate for the use of the GIV approach. Recent applications of the method include Galaasen et al. (2019), who use it to estimate the effect of firm level shocks on the banks that lend to these firms, or Camanho et al. (2019), who estimate the elasticity of supply of foreign exchange and quantify the effect of portfolio rebalancing on the exchange rate. di Giovanni et al. (2018) use detailed firm-level data for French firms to document that large firms are the key channel through which foreign shocks are transmitted domestically.

Third, we extend the GIV method to a non-linear panel setting and adapt the local projection approach to estimate the dynamic effects of bank lending shocks on EME macroeconomic and financial outcomes. Gabaix and Koijen (2019), who introduce this methodology, only show how to achieve identification using the procedure in static frameworks. We develop a dynamic framework for the evolution of cross-border bank flows and domestic macroeconomic variables and show how to use GIV in this setting.

[10] In an appendix we extensively compare our GIVs with the bank lending growth decomposition in Avdjiev et al. (2020). Our GIVs are uncorrelated with the components of this decomposition, whereas the endogenous factors we explicitly exclude from the construction of our GIVs are.

A number of recent studies leverage bilateral international banking data. Related to our paper, Amiti et al. (2019) and Avdjiev et al. (2020) provide a decomposition of aggregate growth rates of international bank claims using the BIS consolidated and locational banking statistics respectively. We focus on the country/geographical perimeter and use the BIS locational banking statistics, which align with national accounting and balance-of-payments accounting conventions and therefore are a better fit to assess the impact of cross border lending on EMEs' domestic macro-financial variables. We compare our GIVs with the decomposition in Avdjiev et al. (2020) and use it to further validate our identification strategy.

Several related papers study the transmission of international credit supply shocks and show they have expansionary effects in EMEs. Cesa-Bianchi et al. (2018) and Zeev (2019) use US credit supply shocks (US broker dealer leverage and the excess bond premium of Gilchrist and Zakrajšek (2012), respectively) to identify the effects on several macroeconomic variables. Obstfeld et al. (2019) and Baskaya et al. (2017) use the variation of global risk to study the transmission of global financial conditions to domestic financial markets. Our approach differs from these papers by extracting not only the potential domestic confounding factors, but also foreign shocks that might be related to domestic variables through, for example, global growth expectations. Other studies focus on either a single country or at a single point in time. di Giovanni et al. (2019) use corporate loan transactions matched to banks' balance sheets for Turkey to study in detail how changes in global financial conditions transmit to domestic financial conditions, using the VIX as a proxy for the global financial cycle. Finally, Williams (2018) and Pandolfi and Williams (2019) exploit episodes of large sovereign debt inflows to EMEs to identify the effects of these inflows on credit and firm returns.

A final strand of related literature studies the role of capital controls in the transmission of international shocks.[11] The extension to a non-linear setting allows us to also speak to the role of different degrees of capital flow management. A key difference is that we identify and estimate the differential effect of international banking flows for different levels of capital controls as opposed as the literature that only looks at global financial shocks. The work by Bergant et al. (2020) is close to our analysis. They study the effectiveness of the level of macroprudential measures on the transmission of external financial shocks proxied by the VIX and a Bartik-type measure of exposure to push factors as in Blanchard et al. (2016).

Roadmap. The rest of the paper is structured as follows. Section 2 briefly motivates the importance of looking at international bank claims. Section 3 presents the intuition behind the granular instrumental variable approach in a simple and generic context, in order to highlight the source of identification. It then presents the extended model and the estimation approach. Section 4 describe the data, with an emphasis on that used for construction of the GIVs. Section 5 presents

[11] Forbes et al. (2015), Edwards and Rigobon (2009), Pasricha et al. (2018), Pasricha (2017).

and discuss the results, as well as the validity of our GIVs. Section 6 shows several robustness checks on the construction of our GIVs. Section 7 compares the GIVs with other instruments from the literature. Finally, Section 8 concludes.

2 Cross-border bank lending in perspective

According to the balance of payments (BoP) accounting framework, total liabilities in the international investment position (IIP) of a country can be decomposed in four broad types of gross liabilities: foreign direct investment (FDI, both debt and equity), portfolio debt and equity investment, financial derivatives, and other investments.

Cross-border bank credit is an important component of gross liabilities, more so after excluding FDI.[12] This credit is for the most part made up of direct cross-border bank loans and bank holdings of debt securities.[13] Bank loans fall within (and take the lion's share of) the "other investment" category under BoP definitions. Bank holdings of debt securities, in turn, are reflected in the BoP under "portfolio debt". To give a sense of the importance of cross-border bank claims, we compute their ratio to (i) total international liabilities, and (ii) total international liabilities excluding FDI liabilities, which we call "non-FDI" liabilities. Figure 1 shows that, for the median EME in our sample of 22 countries (see Table 1), bank claims represent around 18 percent of total IIP liabilities, and 28 percent if FDI is excluded. As shown in Figure 1 the median ratio of banking claims to non-FDI liabilities has been stable over the last two decades.[14]

Cross-border credit is also important for the role it plays as the marginal source of funding during credit booms (Borio et al., 2011). Despite being small relative to the total stock of domestic credit, cross-border credit tends to be more volatile and can amplify domestic credit trends (Figure 2). Indeed, cross-border bank credit can be an important early warning indicator of banking crises (Aldasoro et al., 2018). Furthermore, changes in cross-border bank claims are representative of the changes in total aggregate liabilities. Figure 3 illustrates this point by means of pairwise correlations for our core sample of EMEs. Cross-border bank claims and total liabilities (with and without FDI) are strongly and positively correlated. This correlation is also statistically significant, as illustrated

[12] The most comprehensive and complete source of cross-border banking data comes from the BIS locational banking statistics, which are collected following principles consistent with BoP statistics. We provide more details on the data in Section 4.

[13] About two thirds of cross-border bank credit is accounted for by bank loans, around 20% by debt securities, and the residual is made of other instruments and positions unallocated by instrument type.

[14] These ratios should be taken as illustrative of the magnitudes. While both IIP and the banking statistics are measured in US dollars (USD), the LBSR data correct for exchange rate movements whereas the IIP does not. So any movement in the exchange rate will result in changes in IIP positions for liabilities issued in currencies other than the USD.

by the simple regression in Table 4. The fit of these regressions is particularly good (given the simplicity of the estimation) when looking at total liabilities excluding FDI. Interestingly, even as LBSR data adjust for exchange rate movements (see footnote 11), growth rates in international bank claims are more volatile than total and non-FDI international liabilities (which are not adjusted for exchange rate movements).

3 Empirical strategy

The goal of our exercise is to recover the causal effect of international bank lending on EMEs. As in many macroeconomic settings, we face an identification problem, as aggregate outcomes (e.g. domestic GDP or credit growth) and aggregate lending flows are both endogenous. We use the granular instrumental variable approach of Gabaix and Koijen (2019) to identify the causal effect of interest.

3.1 Understanding GIVs: the basic intuition

The goal of our estimation is to identify α, the elasticity of a generic country-specific endogenous variable F_t (for example, real GDP growth, domestic credit, corporate spreads) to growth in international bank claims ($\tilde{y}_t$). We start by presenting our estimation problem for the case of a single economy under the strong assumption that all sources of lending have the same sensitivity to a common shock:[15]

$$F_t = \alpha \tilde{y}_t + \varepsilon_t \tag{1}$$

We observe the total claims by country of origin (indexed by j). We thus denote by $y_{j,t}$ the growth rate of claims from country j on the domestic economy. Suppose for now that $y_{j,t}$ does not depend on F_t:

$$y_{j,t} = \eta_t + u_{j,t} \tag{2}$$

where η_t is a shock common to all j lenders[16] and $u_{j,t}$ is an idiosyncratic, lender-specific, shock. By assumption, let $u_{j,t}$ be orthogonal to η_t and ε_t.

[15] This can be thought of as a small open economy. We do not include control variables to simplify the exposition, but they will be included in the full model presented in subsection 3.2, where the assumption of no heterogeneity in sensitivity to common shocks is also relaxed.

[16] This captures both recipient country aggregate domestic shocks as well as global shocks such as for example changes in dominant currency monetary policy.

Growth in aggregate bank claims is given by the weighted average of growth rates from individual lender countries, where weights are given by the share of source j in the aggregate (s_j)[17]:

$$\tilde{y}_t = \sum_j y_{j,t} \times s_j \tag{3}$$

Importantly, we can not recover α directly from estimating equation (1) with OLS, as ε_t and η_t are likely correlated, biasing the estimate of α. An instrument for $\tilde{y}_t$ is needed. Such instrument, which we label z_t, can be constructed from observable data on the j sources of claims. To that end, we exploit the heterogeneity in shares s_j and use the difference between the *share-weighted* growth in claims and the *unweighted* (or *equally-weighted* by $1/N$) growth in claims, with the latter defined as $\bar{y}_t = \sum_j y_{j,t} \frac{1}{N}$:

$$\begin{aligned} z_t =& \tilde{y}_t - \bar{y}_t \\ =& \sum_j \left(S_j y_{j,t} - \frac{1}{N} y_{j,t} \right) \\ =& \sum_j \left((\eta_t + u_{j,t}) S_j - (\eta_t + u_{j,t}) \frac{1}{N} \right) \\ =& \sum_j \left(u_{j,t} \left(S_j - \frac{1}{N} \right) \right) \\ =& \tilde{u}_t - \bar{u}_t \end{aligned} \tag{4}$$

where, $\tilde{u}_t$ and $\bar{u}_t$ are the share-weighted and equally-weighted sums of idiosyncratic shocks, respectively. The difference between share-weighted and equally-weighted claims boils down to the difference between the sums of size-weighted and unweighted idiosyncratic shocks.[18]

The intuition why z_t can be a good instrument is simple. First, the difference between $\tilde{y}_t$ and $\bar{y}_t$ removes the common shock η_t and thus the possibility of endogeneity. This renders z_t exogenous as, by assumption, idiosyncratic shocks are uncorrelated with aggregate shocks (e.g. $E(u_{j,t}\varepsilon_t) = E(u_{j,t}\eta_t) = 0$). That is, idiosyncratic shocks "shift" flows but are not correlated with shocks to the endogenous variable F_t.[19] Second, for z_t to be relevant, $y_{j,t}$ has to be "granular": idiosyncratic shocks to large players give a valid IV for growth in aggregate international lending.

[17] The aggregate growth rate is approximated by $\frac{\partial \ln \tilde{y}_t}{\partial t} \approx \sum_j s_j \frac{\partial \ln y_{j,t}}{\partial t}$. Again, for the sake of simplicity, we ignore for now that the shares may be time-varying.

[18] Gabaix and Koijen (2019) present a methodology to "optimally extract" such idiosyncratic shocks from the data in order to construct granular instrumental variables.

[19] The exogeneity or exclusion restriction would imply in this case that the difference between share-weighted and equally weighted idiosyncratic shocks to lender countries is uncorrelated with the unexplained part of our borrower country domestic variable of interest (e.g. $E(z_t\varepsilon_t) = 0$).

That is, there has to be heterogeneity in the share/size distribution, which is clear from line 4 in equation 4: if there were no difference between share-weighted and equally weighted errors, z_t would be close to zero and would be a poor instrument. The heterogeneity in the size distribution allows the difference in share-weighted and equally-weighted shocks to correlate with total claims growth (e.g. $E(z_t \tilde{y}_t) \neq 0$).

3.2 Endogenous bank lending flows in a panel structure

In this section we present the baseline model, which extends the setting presented in the previous section along four dimensions. First, we allow for a panel structure. We want to capture how N borrowing EMEs, indexed by i, respond to exogenous shocks to international bank lending. Second, we generalize the model by allowing bank lending to depend on our endogenous variables of interest. Thus, in equilibrium, there is simultaneity between bank claims and, for instance, domestic financial conditions, GDP growth, or credit growth. Third, we allow for sensitivity to common factors to be heterogeneous across lending sources for each EME. Fourth, we also include additional controls and allow shares of each lending source to be time-varying for each EME.

Setting up the model. With a panel structure, we index aggregate variables by i for the recipient country. We denote by $y_{i,j,t}$ the growth in bilateral bank claims on borrower country i from lender country j at time t. The weighted sum of these over all lender countries j yields the growth in total international bank claims on country i (the extended version of equation (3)): $\tilde{y}_{i,t} = \sum_j s_{i,j,t-1} y_{i,j,t}$, where the weights $s_{i,j,t-1}$ are measured as of the previous period.

As above, we are interested in identifying and estimating the parameter α, which captures the marginal effect of banking flows on the domestic variable $F_{i,t}$:

$$F_{i,t} = \alpha \tilde{y}_{i,t} + \gamma^F X^F_{i,t} + \varepsilon_{i,t} \tag{5}$$

where $\varepsilon_{i,t}$ is an aggregate shock and $X^F_{i,t}$ is a vector of borrower country-specific controls. Equation (5) is analogous to equation (1) in this extended setting.

With the panel structure in mind and allowing for reverse causality, the growth in bilateral claims from country j to country i previously given by equation (2) now takes the following form:

$$y_{i,j,t} = \Lambda_{i,j} F_{i,t} + \Lambda^{\star}_{i,j} F^{\star}_{i,t} + \gamma^Y X^y_{i,j,t} + u_{i,j,t}, \tag{6}$$

where $\Lambda_{i,j}$ is a vector of the exposures of these bilateral claims to domestic factors, $F_{i,t}$, [20] $F^{*}_{i,t}$

[20] Note that these are allowed to vary across bilateral pairs (i, j), so different countries of origin

captures international factors such as global risk appetite or monetary policy in dominant currency countries, and $\Lambda^{\star}_{i,j}$ is the exposure of bilateral claims to these international factors, which also vary across bilateral pairs (i, j). Finally, $X^{y}_{i,j,t}$ stands for a set of controls. Endogeneity in this setting comes from reverse causality. As discussed above, if one were to directly estimate α by OLS, the estimator would likely be biased. Not only domestic factors are affected by aggregate capital flows growth, but also capital flows growth may depend on domestic – observed and unobserved – factors.

There are two critical steps to ensure a clean identification of α. First, we need to recover the idiosyncratic shocks $u_{i,j,t}$ from the data. In principle, there could be many endogenous variables F, so it is not obvious what would be an appropriate specification of equation (6). We therefore opt for a non-parametric alternative and estimate the equation for each country i by using principal component analysis (PCA, see below for more details).

The second critical step is to avoid a violation of the exclusion restriction. In our context, this is the assumption that idiosyncratic shocks to bilateral bank lending $(u_{i,j,t})$ only affect domestic EME outcomes $(F_{i,t})$ through total international bank lending $(\tilde{y}_{i,t})$ and thus are orthogonal to unobserved aggregate shocks $(\varepsilon_{i,t})$ in equation (5). When the model is just identified the exclusion restriction is untestable, though a violation of our exclusion restriction would require that idiosyncratic shocks affect aggregate outcomes through channels other than aggregate lending flows. We argue that it is non-trivial to come up with a strong justification for why this exclusion restriction may not hold, at least approximately.

Obtaining granular instruments. In order to construct a valid GIV, the idiosyncratic shocks $u_{i,j,t}$ need to be extracted from equation (6). To this end, the factors need to be filtered out first. To estimate the factors for each country we run a panel regression as follows:

$$y_{i,j,t} = a_{i,t} + e_{i,j,t}, \tag{7}$$

where $e_{i,j,t} = \Lambda_{i,j} F_{i,t} + \Lambda^{\star}_{i,j} F^{\star}_{i,t} + \gamma^{Y} X^{y}_{i,j,t} + u_{i,j,t}$ and $a_{i,t}$ is a fixed time effect for the recipient country i. This model allows for heterogeneous exposures across lenders. As we do not have a priori knowledge of the parametric structure of the loadings ($\Lambda_{i,j}$ and $\Lambda^{\star}_{i,j}$) we follow Gabaix and Koijen (2019) and estimate the common factors in $e_{i,j,t}$ via PCA for each country. To determine the number of factors, we use the method proposed by Bai and Ng (2002) and include an additional factor to take a conservative stance.[21] We use an average of 3 factors per country, with minimum and maximum number of factors of 2 and 6 respectively. Table 9 shows the distribution of the number

may have different sensitivities to changes in conditions in each recipient country. For some EMEs, cross-border credit intermediated via financial centres could be important. In addition, some country pairs could have strong financial links. Having the factors vary at the bilateral (i, j) level helps us control for this.

[21] Our results are robust to adding more factors.

of factors across countries used in our analysis. We further validate our choice by conducting the different tests in Bai and Ng (2002), which recommend using at least one factor per country.[22]

Given an estimate for the loading vector, we define $u_{i,t}$ as the vector of the idiosyncratic shocks from the N sources of origin. Then, let Q_i be the $N \times N$ matrix projecting vectors onto a space orthogonal to Λ_i (i.e. the matrix representation of $\Lambda_{i,j}$ and $\Lambda^{\star}_{i,j}$), so that $Q_i \Lambda_i = 0$. Then, $Q_i y_{it} = Q_i u_{i,t}$. The GIV is then given by

$$z_{i,t} \equiv S'_{i,t} u_{i,t} = S'_{i,t} Q_i y_{i,t} = \Gamma'_i y_{i,t} \tag{8}$$

where $\Gamma_{i,t} \equiv Q'_i S_{i,t}$, such that

$$z_{i,t} \equiv \Gamma'_{i,t} u_{it}. \tag{9}$$

Our GIV $z_{i,t}$ is a valid instrument as it is formed by idiosyncratic shocks. Our identification assumption is that these idiosyncratic shocks to bilateral relationships are orthogonal to aggregate shocks to country i (i.e. $u_{i,j,t} \perp \varepsilon_{i,t}$). Moreover, we choose the projection matrix Q_i such that $z_{i,t}$ is the optimal GIV.[23] We refer the reader to Proposition 3 in Gabaix and Koijen (2019) for a proof.

We illustrate how to use this instrument in our setting. To do so, we solve the system of equations composed by equations (5) and (10). We sum equation (6) over j, replace equation (5), and solve for $\tilde{y}_{i,t}$:

$$\tilde{y}_{i,t} = \gamma M_i X_{i,t} + \tilde{\lambda}_i \alpha M_i \varepsilon_{i,t} + M_i \tilde{u}_{i,t} \tag{10}$$

where M_i is the general equilibrium multiplier (which is a function of the individual loadings), $X_{i,t}$ is the vector of controls and $\tilde{\lambda}_i$ is a function of the individual loadings. We rewrite this equation as follows

$$\tilde{y}_{i,t} = \beta z_{i,t} + \tilde{\gamma} X_{i,t} + v_{i,t} \tag{11}$$

where $v_{i,t}$ is an unobserved variable, which is correlated with aggregate shocks in (5). Under our identification assumptions, $z_{i,t}$ is orthogonal to aggregate shocks, hence can be used as an instrument for the growth in bank lending.

[22] For robustness, we conduct other standard tests that use the Akaike and Bayesian information criteria that also recommend using at least one factor per country. We also test the robustness to an alternative method for deciding the number of factors to be extracted, namely the parallel analysis method Horn (1965) – see Section 6.

[23] In particular, we choose $Q_i \equiv I - \Lambda_i \left(\Lambda'_i \left(V^u\right)^{-1} \Lambda_i \right) \Lambda'_i \left(V^u\right)^{-1}$ where V^u is the variance-covariance matrix of the idiosyncratic shocks $u_{i,j,t}$.

Estimation procedure. In practice, our estimation procedure consists of constructing $z_{i,t}$ – an optimal GIV from the growth rates of bilateral bank claims – and using it as an instrument for the growth in total bank claims to consistently estimate α. After having constructed $z_{i,t}$, the procedure is akin to the usual two-stage least squares (2SLS).

The estimation steps can be summarized as follows:

1. Recover $\hat{u}_{i,j,t}$ from equation (6) using PCA. We follow the procedure described in Section 2.7 in Gabaix and Koijen (2019).
2. Build the optimal GIV ($z_{i,t}$) using equation (9).
3. Estimate 1^{st} stage: regress $\tilde{y}_{i,t}$ on $z_{i,t}$ using equation (11).
4. Estimate 2^{nd} stage: regress $F_{i,t}$ on the instrumented $\hat{\tilde{y}}_{i,t}$ using equation (5). As long as $E(u_{i,j,t}\varepsilon_{i,t}) = 0$, then $E(z_{i,t}\varepsilon_{i,t}) = 0$ and α is identified.

3.3 Full non-linear dynamic model

Having discussed the core model and the construction of the GIVs, we now present the general empirical model used in the rest of the paper. To assess the dynamic response of EME domestic variables to exogenous shocks to international bank lending, we use Jordà (2005) local projection method with instrumental variables.[24] This allows us to also explore non-linearities such as the effects of different levels of capital controls. Details about this exercise are left to section 5.

Statistical design. We denote a given macroeconomic aggregate observed for country i at time t by $F_{i,t}$. Our aim is to characterize the change in this variable over some future time horizon indexed by $h = 0, 1, \cdots, H$. The h period ahead change is denoted by $\Delta_h F_{i,t+h}$, which sometimes we can interpret as the cumulative growth. Following Jordà and Taylor (2016), we are interested in the average cumulative response to international banking lending shocks

$$\begin{aligned} CR(\Delta_h F_{i,t+h}, y_{i,t}, \delta) = \; & \mathbb{E}_t \left(\Delta_h F_{i,t+h} | \tilde{y}_{i,t} = \bar{y}_i + \delta; \mathcal{F}_t\right) \\ & -\mathbb{E}_t \left(\Delta_h F_{i,t+h} | \tilde{y}_{i,t} = \bar{y}_i; \mathcal{F}_t\right) \end{aligned} \tag{12}$$

where $\mathcal{F}_t$ is the information set up until t and δ is the size of the shock. We are interested in the limit case where $\delta \to 0$. Since changes in $\tilde{y}_{i,t}$ might not be exogenous, we rely on the GIV $z_{i,t}$ to identify the causal effect of banking flows on macroeconomic variables (we include GIV lags). The causal impact at horizon h can be identified as follows:

$$\alpha_h^{IV} = \frac{\lim_{\delta \to 0} CR(\Delta_h F_{i,t+h}, z_{i,t}, \delta)}{\lim_{\delta \to 0} CR(\Delta_0 y_{i,t}, z_{i,t}, \delta)} \tag{13}$$

[24] See Ramey (2016) and Stock and Watson (2018).

Equation (13) can be estimated by assuming that the expectation can be approximated by a local projection. We make this assumption for two reasons: (i) a VAR approach would be parametrically more intensive, and (ii) it is not straightforward to get a Wald representation in the context of time-varying states (e.g. high versus low capital controls). Local projections allow us to deal with non-linearities in a robust and flexible fashion. The first stage equation becomes

$$\tilde{y}_{i,t} = \beta z_{i,t} + \theta z_{i,t} \mathbb{I}_{i,t}^{state} + \psi B_{i,t} + v_{i,t}, \tag{14}$$

where $\mathbb{I}_{i,t}^{state}$ is a dummy variable equal to one if country i is in a particular state (e.g. if it has a high level of capital controls). Here $B_{i,t}$ includes all control variables, including panel fixed effects, interacted with the state dummy. The second stage can be approximated by estimating the following sequence of fixed-effects panel regressions:

$$\Delta_h F_{i,t+h} = \alpha^{(h)} \hat{\tilde{y}}_{i,t} + \rho^{(h)} \hat{\tilde{y}}_{i,t} \mathbb{I}_{i,t}^{state} + \kappa_{i,t}^{(h)} \mathbb{I}_{i,t}^{state} + \Omega_{i,t}^{(h)} + \varepsilon_{i,t}^{(h)}, \tag{15}$$

where the projection horizon h goes from 1 to H quarters and $\hat{\tilde{y}}_{i,t}$ is the fitted growth rate in bank claims from the first stage. The expressions $\Omega_{i,t}^{(h)}$ and $\kappa_{i,t}^{(h)}$ include control variables and panel fixed-effects. We are interested in $(\alpha^{(h)}, \rho^{(h)})$, which characterize the average cumulated response.

4 Data

We rely on a number of datasets. The most important given the contribution of the paper is the one on cross-border banking, which we use to construct our granular instruments.

Cross-border banking. To construct the GIVs we use the BIS locational banking statistics by Residence (LBSR).[25] The data capture the outstanding claims and liabilities of internationally active banks located in BIS reporting jurisdictions vis-à-vis bank and non-bank counterparties residing in more than 200 recipient countries.[26] Positions are recorded on an unconsolidated basis, i.e. transactions between different entities of the same banking group ("intragroup") are included in the data. The BIS LBSR capture around 95% of global cross-border banking activity (Bank for International Settlements, 2015). Three characteristics of the data make it particularly useful for our purposes (Avdjiev and Hale, 2019). The first two are features of how the data are collected, whereas the third is a statistical property of the data.

[25] These data include free, restricted, and confidential observations. We use the latter, which can only be accessed on BIS premises, and it is the only version in which all bilateral lending pairs are observable.

[26] Internationally active banks report to the central bank of the jurisdiction in which they reside. These data are aggregated at the country level and submitted to the BIS.

First, the LBSR are compiled following principles consistent with the balance of payments statistics. As the name indicates, they are based on the *residence* of reporting banks as well as that of their counterparties. Our focus is on the role of banking flows for borrowing EMEs and how their macroeconomic and financial conditions are affected, with data based on either the system of national accounts or balance of payments. Having a residence perspective is thus better fit for purpose than the alternative of consolidated data.[27]

Second, the LBSR provide a currency breakdown, as well as information on break in series due to the changes in methodology, reporting practice or reporting population. This enables the BIS to compute break- and exchange rate-adjusted changes in amounts outstanding, which approximate underlying flows during a quarter.[28] Comparing these flows with previous stocks allows for the computation of growth rates which are clean of methodological and sample breaks, and movements in exchange rates.[29] These adjusted growth rates will be the focus of our analysis.

Third, and most important for our paper, bilateral cross-border data show a strong degree of concentration (Aldasoro and Ehlers, 2019). At one end, there is a very large number of bilateral links of relatively small size. On the other hand, a few dozen very large bilateral links account for the lion's share of cross-border bank lending volumes (Figure 4). The distribution of cross-border bilateral country-level links is extremely unequal: The largest 1% of observed cross-border banking links contribute as much to the total volume as the smallest 99%. With such a skewed distribution, idiosyncratic shocks can become "granular" and have aggregate effects (Gabaix, 2011), making the LBSR data a natural application of the GIV methodology.[30]

Financial conditions index. The FCI is designed to capture both domestic and global financial price factors in a single parsimonious indicator. We construct FCIs for 22 EMEs using up to 17 price-based variables.[31] The estimation is based on a vector autoregression model with

[27]The BIS also collects consolidated banking statistics, which capture the worldwide consolidated positions of internationally active banking groups headquartered in reporting countries, excluding intragroup positions. These data respects balance sheet perimeters rather than national borders, and can be used to, inter alia, decompose banking flows into supply, demand, and common factors as in Amiti et al. (2019).

[28]These adjusted changes may still over or underestimate underlying flows due to changes in valuations, write-downs, the under-reporting of breaks, and differences between the exchange rates on the transaction date and that used for conversion of non-US dollar amounts to US dollars, namely average-of-quarter exchange rates.

[29]Throughout the paper we use bilateral country-level claims vis-à-vis all counterparty sectors and in all currencies.

[30]In Figures 5a and 5b in the Appendix we present further evidence of this high concentration by plotting the median and $25^{th}/75^{th}$ percentiles of the measures of excess Herfindahl and the Gini coefficient for our sample of EMEs.

[31]The variables include interbank spreads, corporate spreads, sovereign spreads, term spreads, equity returns, equity return volatilities, equity implied volatilities, changes in real long-term rates,

time-varying parameters which takes into account differences in data availability across variables as well as changes in the interaction between them (Koop and Korobilis, 2014). For more details on the methodology, we refer the reader to Adrian et al. (2018); for more details on the sources underlying the different series used for the construction of the FCI, see Chapter 3 in IMF (2017).

Macro and other data. The macroeconomic data used as either additional controls or as left-hand side variables are sourced from the International Financial Statistics of the IMF (GDP, CPI, stock prices, government spreads) and from the credit and property price statistics of the BIS (private domestic credit, housing prices).

For capital controls we rely on the updated dataset of Fernández et al. (2016). We use their composite measure of capital inflow controls. We interpolate the yearly data to obtain quarterly series[32] and compute the median across countries for every quarter. Countries above the median are classified as "high" capital control countries, whereas those below the median are classified as "low" capital control countries.

Final sample. We work with a quarterly unbalanced panel that covers 22 EMEs over the period 1990q1-2018q4. Country selection is mostly constrained by reliable sovereign and corporate spreads data. Table 1 presents the list of countries included in the sample, Table 2 presents data availability by series and country, and Table 3 summary statistics.

5 Estimation results

This section presents the main results of the paper. First, we show our core results. We find that an increase in international banking flows has a causal effect on financial conditions: interest rate spreads compress, nominal and real exchange rates appreciate, and financial conditions indices loosen. Moreover, this increase in inflows also causes an expansion of domestic activity lead by a strong effect on private credit and moderate yet significant effect housing prices, together with investment growth and a trade balance deterioration. Second, we investigate how these causal effects are affected by different levels of capital controls. In particular, we contrast *high* versus *low*

interest rate implied volatilities, house price returns, the percent changes in the equity market capitalizations of the financial sectors to total market capitalizations, equity trading volumes, expected default frequencies for banks, market capitalizations for equities, market capitalizations for bonds, domestic commodity price inflation rates, and foreign exchange movements.

[32]Fernández et al. (2016) find that that capital controls are strongly acyclical and have a very small standard deviation at annual frequencies. An alternative would be to assume that capital controls have no variation within years as in Zeev (2019). We prefer interpolation to avoid artificially generating a seasonal effect in the first quarter of each in year in which changes are measured.

capital controls using the composite capital inflow controls indicator of Fernández et al. (2016). An above-median (i.e. high) level of capital controls is associated with more muted responses of financial conditions, equity and house prices, credit, GDP, investment and imports. For countries with below-median values of the capital inflow control measure (i.e. relatively low prevalence of capital controls), the causal effects discussed in the baseline case are strong. Our findings suggest that capital inflow controls can afford countries some degree of flexibility in dealing with the effects arising from cross-border bank flows.

5.1 The causal effect of cross-border bank lending on EMEs

The first set of results looks at the causal effects of cross-border bank lending shocks for the full sample of 22 EMEs jointly (see Table 1). As these regressions do not include an interaction of instrumented banking flows with indicator variables capturing the exchange rate regime, we refer to them as our baseline linear model.

Figures 6 and 7 present the cumulative causal effect of a one standard deviation shock to cross-border bank lending on EME domestic financial and macro variables respectively. To validate the relevance of our GIVs, Table (5) shows the t-statistics of the first stage of each of the regressions presented in these Figures. In all cases, our GIVs are statistically significant in first stage regressions.[33] As Table 5 shows, the GIVs we construct are always strongly correlated with the growth in cross-border bank claims.

Financial conditions loosen as a result of a positive shock to international bank lending. Exchange rates, however measured, appreciate: as shown in Figures 6a to 6c the nominal effective exchange rate, as well as multilateral and bilateral (vis-à-vis the US dollar) real effective exchange rates appreciate noticeably in response to a shock to international bank lending, especially in the short term (i.e. up to one year). Cross-border flows and the associated exchange rate fluctuations influence macroeconomic and financial stability in EMEs through domestic financial conditions. Just as exchange rates appreciate, sovereign and in particular corporate spreads (both in USD) also narrow (Figures 6d and 6e, respectively). Domestic short and long-term interest rates fall and equity prices increase (Figures 6f to 6h. More broadly, financial conditions as measured by the FCI loosen significantly (Figure 6i).[34] The response of all these financial variables differs significantly from zero in the short term (quarters 1 to 4). The easing of financial conditions can foster the rise of asset prices, in the limit contributing to unsustainable bubbles. The most important domestic asset price is housing. Real house prices increase following a shock to cross-border bank lending

[33] As discussed in Section 7.2, many alternative instruments from the literature are not relevant in similar first stage regressions.

[34] We do not find any clear or significant effect on other domestic variables underlying the construction of the FCI when analyzed in isolation, such as interbank spreads, real interest rate, trading volatility, or domestic commodity prices.

(Figure 6j). [35] This result is in line with the findings of Cesa-Bianchi et al. (2018). The magnitude of the effects we uncover, however, is notably smaller.

An exogenous increase in cross-border banking flows also has effects on domestic credit markets. As financial conditions ease and the exchange rate appreciates, the relaxation of balance sheets allows for non-financial leverage to increase. This is in line with the literature emphasizing the financial channel of exchange rate appreciation (Bruno and Shin, 2015a,b), that tends to be more pronounced for EMEs (Banerjee et al., 2020). Nominal domestic private credit growth increases significantly after four quarters following a shock to cross-border bank lending (Figure 7a), in line with di Giovanni et al. (2019) and Borio et al. (2011). This is also reflected in a significant increase in the real stock of credit, which materializes after a few quarters (Figure 7b).

Finally, shocks to international bank lending also affect the real economy. There is a significant effect on real GDP growth and a fall in inflation, as shown in Figures 7c and 7d. While there is no significant effect on consumption (Figure 7e, in contrast to Cesa-Bianchi et al. (2018)), the boost to domestic activity is associated with an increase in investment (Figure 7f)[36] and imports (Figure 7h). This, together with the lack of a significant effect on exports (Figure 7g) is consistent with the deterioration in the trade balance (Figure 7i).

Interestingly, while real GDP is boosted especially in the short term, the effect on credit is larger and significant at longer horizons (beyond 4 quarters). These results are consistent with a relaxation of balance sheets that allows for non-financial leverage to increase.[37] They are also consistent with cross-border bank lending being a contributor to domestic credit booms and the build up of domestic vulnerabilities (Cesa-Bianchi et al., 2018, 2019; Borio et al., 2011; Aldasoro et al., 2018).

Using OLS instead of a GIV approach can lead to large estimation biases. Table 6 shows the largest differences between the OLS estimates and our results when both are significative.[38]

[35] When we run several methodological robustness checks (see Section 7), we lose the statistical significance in the estimation involving real house prices. The point estimate of Figure 6j remains broadly unchanged.

[36] Unfortunately we can not disentangle whether this is driven by construction or machines and equipment, due to lack of sufficient cross-country data availability.

[37] While the timing of the effect on real GDP being statistically significant only in the very short run may seem puzzling, this is reconciled in the next sub-section where we explore the non-linear effects arising from different exchange rate regimes.

[38] In general, the estimation is not precise enough for a Hausman test to reject the null hypothesis of coefficient equality, so the comparison between point estimates can only be made heuristically. Still, the magnitudes of the difference between statistically significant point estimates are large and suggest that OLS coefficients are biased. Note that the approach used is a conservative choice. In some cases in which the GIV estimates are not statistically different from zero and OLS are statistically significant, the differences are larger. This tends to happen in the medium/longer horizons.

The overall picture that emerges from the OLS estimations is that interest rates fall by less, and asset prices and real variables increase by more relative to the GIV results. This is consistent with unobserved demand shocks playing a role that at least partially offset the pure supply shock captured by the GIV.[39]

5.2 The role of capital controls

In this subsection we explore whether the effects of international bank lending on domestic EME outcomes differ depending on the level of capital inflow controls. We use the full non-linear model as specified in equations (14) and (15) and include interaction terms between the GIV-instrumented banking flows and dummies that define relevant states. To accommodate limited country availability, we focus on a binary classification, as discussed above. Based on the dataset of Fernández et al. (2016), we define as "high" and "low" capital control countries respectively as those above and below the median of all countries for any given quarter. We use the one-quarter lag of the capital control index in order to limit endogeneity concerns. We refer the reader to Fernández et al. (2016) for details on the data.

The effects of international bank lending on domestic EME outcomes are notably stronger for countries with relatively lower scores on the capital inflow control index. Panels 8 to 10 present the estimated causal effects of international bank lending shocks on selected financial and macro variables for "low" and "high" levels of capital controls, as well as the differential effect (i.e. low minus high). Overall, the evidence shows that the effects are larger and significative for countries with lower levels of capital control. The differences with respect to countries with high capital inflow controls are significative in several cases. [40]

The causal effect of international bank lending on the nominal and real effective exchange rate is stronger for countries with lower levels of capital controls (Figures 8a to 8i). The difference between low and high capital control countries is significant in the case of he nominal effective exchange rate (Figure 8c). For other financial variables, the differences between low and high countries are starker.[41] Equity prices rise for countries with low scores (Figure 9d), whereas for countries with high scores equity prices in fact decline one year after the shock (Figure 9e). Accordingly,

[39]Given that the OLS estimates are significative for private domestic consumption at a one year horizon, but are not significative for exports, it could be interpreted as unobserved domestic demand shocks playing a larger role than unobserved foreign demand shocks.

[40]An important caveat of these results is that we do not control for the potential endogeneity of capital controls. There could be underlying structural features of the countries that influence both their sensitivity to international bank flows and their choice of capital inflow controls, as well their intensity. Our approach is in line with that used in Zeev (2017). An additional qualification of our approach is that it is not an analysis of the effects of *changes* in capital controls. Such analysis would directly speak to how these controls affect the magnitude of inflows.

[41]The one exception are sovereign spreads, see Figures 9a to 9c.

the difference between the two states is large and significant (Figure 9f). Financial conditions as measured by the FCI loosen in both low and high countries (Figures 9g and 9h), but this loosening is stronger for the former group. Furthermore, for countries with stricter controls, there is a reversal after 5-6 quarters, when financial conditions begin to tighten. Comparing between low and high, the picture that emerges is of financial conditions loosening significantly more in the former than in the latter (Figure 9i). Finally, high capital control countries do not witness domestic house price appreciation, whereas for low capital control countries there is a significant rise in housing prices (Figures 9j to 9l). Interestingly, the increase in house prices for low capital control countries swiftly reverses after around 8 quarters.

The causal effect of cross-border bank claims on macroeconomic variables follows a similar pattern. Credit growth responds by more to an increase in international bank lending when capital controls are lower, and the difference between low and high is statistically significant (Figures 10a to 10c). Real GDP growth increases in response to international bank lending shocks when capital controls are lower (Figure 10d), whereas the effect for countries with high capital controls and the difference between low and high are not statistically significant (Figures 10e and 10f, respectively). Finally, investment and imports present patterns similar to those observed for credit growth (Figures 10g to 10l).

Taken together, the evidence presented in this section is consistent with the notion that capital controls can be effective in moderating the boom in financial and macroeconomic conditions associated with increased inflows.

6 Robustness

In this section we discuss the robustness of the GIVs. We first argue that our GIVs are likely to satisfy the exclusion restriction, and argue why a narrative validation strategy is hard to defend in our context. We then move to the key robustness checks we perform when computing the GIVs. These pertain to the sample of countries used, the method to extract endogenous factors and the role of crises.

Robustness of the exclusion restriction. Given our empirical setup, the primary threat to identification comes from the idiosyncratic shocks used to construct the GIVs potentially affecting domestic variables not only through growth in international bank lending. That is, a violation of the exclusion restriction could occur if the bilateral idiosyncratic shocks $u_{i,j,t}$ affect domestic outcomes through channels other than movements in international banking flows ($\tilde{y}_{i,t}$). Additional influences via such channels are referred to as "spillover effects" (Jordà et al., 2019). Such effects would only occur if a lending or a recipient country experience a country-specific shock that could affect unobservables in the structural equation (6) and therefore affect domestic outcomes.

As the idiosyncratic shocks are by construction orthogonal to aggregate factors that drive total international bank lending flows and that would include expectation terms, we are skeptical of a possible violation of the exclusion restriction. Moreover, the data on bilateral relationships is not observed in real time or may directly be confidential so it is even harder to argue how it could drive domestic outcomes indirectly through unobserved factors.

Narrative validation. Gabaix and Koijen (2019) suggest a narrative approach as an alternative validation of GIVs. This consists of selecting the top shocks – say, based on some threshold approach or simply selecting the top five/ten shocks – and then browsing the news for relevant information of what occurred around the dates of these shocks. This is a good alternative validation approach when the underlying data is of high frequency. Contrary to some of the applications in Gabaix and Koijen (2019) that use daily data, our analysis is based on quarterly data. This unfortunately prevents us from applying a narrative validation strategy to our idiosyncratic bilateral lending shocks. It is hard to unambiguously pin down idiosyncratic shocks to an event occurring on any given day when the observations are at quarterly frequency.

Constant sample of reporters. New reporting countries enter the reporting population of the BIS banking statistics over time. While we account for this when computing growth rates,[42] a valid concern is that such changes can affect the shares we use to compute the GIVs. We thus perform a robustness check using a constant sample of reporting countries, namely those that constitute the reporting population at the beginning of our sample period. We take this one step further and also do not consider entries or re-entries, e.g. we disregard observations in which a given lender initiates a previously non-existent bilateral relationship with one of our borrower countries, or if stops and then resumes a relationship. We recalculate the GIVs, including the shares, and replicate the entire analysis. Our baseline results are robust this change. Figures 13 and 14 present the impulse response functions to cross-border bank lending shocks for financial and macro variables respectively. The results are virtually indistinguishable from those discussed in Section 5.1 (compare with Figures 6 and 7 respectively).[43]

Alternative estimation of factors. A key step in the construction of our instrument is the correct extraction of the commonality across bilateral lending flows. We use principal compo-

[42]As discussed in more detail in Section 4, we deal with this issue by using growth rates that account for changes in the number of countries reporting to the BIS, as well as changes in the reporting population within a country, methodological changes such as different thresholds used for reporting, and accounting for exchange rate effects.

[43]Note this is a more stringent version of considering a constant sample that includes entries and exits of bilateral relationships. We also performed such analysis and the baseline results also remain robust. These results are available upon request.

nents and follow the method in Bai and Ng (2002). We follow the IC_{p2} criterion, as in Gabaix and Koijen (2019). In the baseline estimates we take a conservative stance and include an additional factor to those recommended by this criteria. To verify that the selection method of the number of factors is not driving our results, we use the parallel analysis method as in Horn (1965). Results are robust to using this alternative method for extracting factors, as shown in Figures 15 and 16.

Table 9 presents the summary statistics of the number of factors across countries for different samples and methods. Our baseline estimation is the most conservative in terms of factors included – on average it selects three factors oer country. On average, the parallel analysis method recommends less factors by country (2.5). Using alternative methods for computing the optimal number of factors may deliver less or more factors for individual countries, however. For example, there is one country for which the parallel analysis method recommends 4 factors less than the baseline, whereas there is another country for which it recommends two more factors than the baseline. In any event, the results we obtain are robust using alternative methods and samples.

Dealing with crises. A potential concern is that our instrument is systematically capturing the variation from domestic crises and that our results are therefore driven by these extreme events. To address this, we check if our instrument systematically reflects the extreme movements from domestic crises. We define large shocks as events where our instrument is 2 or more standard deviations below the mean. We check whether these large shocks coincide with a domestic crisis episode. To do so, we use the definition of a systemic crisis from Laeven and Valencia (2020), which includes banking, currency, and sovereign debt crises, as well as events of restructuring of sovereign debt. These large shocks coincide only 7 times out of the total 58 crises that we observe in our sample (see Table 11). Moreover, in most of these events, there are no important aggregate outflows from these countries. These observations reassure us that our instrument is not picking up systematically extreme outflows correlated with domestic conditions.

We perform an additional robustness check to verify that our results are not impacted by these events. We estimate the impulse response functions ignoring the events in Table 11. The results are presented in Figures 17 and 19 and show that our results are almost invariant without these events.

We further investigate the events presented in Table 11. For the countries that experience a crisis that coincides with a large reduction in our instrument, we verify and eliminate from our estimates lender countries that satisfy the following criteria: (1) are small in terms of the historical share of total claims to the country of destination and (2) experience large increases in cross border claims during the event under consideration. The presence of these outlier observations overestimates the average bilateral growth rate and therefore might lead to the identification of large negative shocks. For example, the bilateral relationship between Colombia and the Netherlands at the end of the 1990s was characterized by economic cooperation for the peace negotiations in Colombia. In the quarter that we identify, we observe a large capital inflow from the Netherlands to Colombia. However, the Netherlands accounts for a relatively small share of total claims on Colombia, and we thus consider the bilateral growth rate during the 1998 crisis as an outlier. To that extent, the behavior of the Netherlands in this period is not representative of the bilateral claims, and we eliminate it from our sample as a robustness check.

The results from this robustness check are presented in Figures 19 and 20. Again, the impulse responses summarizing the effect of cross-border bank claims on EME domestic macro and financial variables look notably similar to those in the baseline results.

7 Alternative IVs and the global financial cycle

7.1 GIVs and the global financial cycle

A growing literature in international macro-finance emphasizes the importance of the global financial cycle (Rey, 2015). This focuses on how global financial conditions affect individual economies – especially EMEs – and is intimately related to international bank lending. To be a meaningful instrument, our GIVs should not be capturing developments in the global financial cycle.

The GIVs we construct from bilateral cross-border bank lending are orthogonal to measures of the global financial cycle.[44] Table 10 presents regressions of our GIVs on the three global financial cycle measures. The coefficients for all the cycle variables are very small, statistically insignificant, and the fit of the regression is virtually indistinguishable from zero.[45] This is a reassuring finding, as it is a necessary condition for our GIVs to be valid. We revisit this issue in Section 7.2 when we discuss the validity of other possible instruments used in the literature.

International bank lending and measures of the global financial cycle are correlated (Rey, 2015; Bruno and Shin, 2015a,b). In fact, a key tenet of the literature on the global financial cycle is the link between US monetary policy and cross-border lending, running through the balance sheets of global banks. It remains unclear, however, what exactly is being identified: is it exogenous changes in dominant currency monetary policy? The risk appetite of global banks (arguably a function of US monetary policy)? Global risk aversion? Risk sentiment of global investors? All of

[44] We focus on the three key indicators used to measure this cycle: (i) the price-based indicator developed in Miranda-Agrippino and Rey (2015) and updated in Miranda-Agrippino et al. (2020), which is the most common measure of the global financial cycle and focuses on the common component in a large number of global risky asset prices; (ii) a quantity-based measure based on the first principal component of capital flows across countries (Cerutti et al., 2019); and (iii) the VIX as a measure of global risk aversion (di Giovanni et al., 2019).

[45] Results are identical when considering the global financial cycle measures one at a time or in pairs. We do not present them for the sake of space; they are available upon request.

the above? Furthermore, as policy changes in center countries elicit responses in other countries, domestic macroeconomic and financial outcomes in the latter group of countries are endogenous to the policy-induced changes in, inter alia, cross-border bank flows.

Table 7 presents regressions of international banking flows on the three measures of the global financial cycle discussed above, controlling for country fixed effects.[46] The global financial cycle as most commonly measured ($GFCy$) shows a statistically significant and strong correlation with banking flows. An increase in $GFCy$ (i.e. an upswing in the global financial cycle) is associated with increased banking flows. Similarly, if the upswing in the global financial cycle is measured by means of the common component of capital flows across countries ($PC1$), there is an associated increase in banking flows. Finally, an increase in global risk aversion as measured by a higher VIX is associated with lower banking flows.

7.2 GIVs and alternative instruments

Finally, in this subsection we compare our GIVs with alternative instruments taken from the literature. These instruments can be categorized into two groups. A first group has poor first stage statistics properties for international banking claims; these instruments are thus not relevant. A second group is significant in the first stage but correlates strongly with the global financial cycle, and thus fail to be excludable: these affect domestic outcomes through many channels, including non-observables, and renders their estimates biased.

We consider the following alternative instruments. Work on international credit supply shocks has used the excess bond premium measure of Gilchrist and Zakrajšek (2012) (see Zeev, 2019) and the leverage of the US broker-dealer sector (Cesa-Bianchi et al., 2018) as exogenous shocks to capital flows to EMEs. We use these as alternative instruments, which we label EBP and BD respectively. Recently, Avdjiev et al. (2020) (AHMP henceforth) apply the methodology proposed by Amiti and Weinstein (2018) to the LBSR data and decompose US dollar-denominated cross-border bank claims into a "common" component that can be thought of capturing the global financial cycle, a "host" component that captures developments that affect lender countries' claims, and a "borrower" component that captures developments on the recipient country end.[47] We thus consider their *Host* and *Common* series as alternative IVs, but compute them for claims in all currencies and not just US dollar claims. Finally, we compute a Bartik-type of instrument inspired by the approach used in Blanchard et al. (2016) but applied to our data. For a given EME i, we take the growth rate of cross-border bank claims on all other EMEs ($j \neq i$), and use it as an instrument for the growth rate of claims on country i (we label this $BOGC$). More concretely, we

[46] We refer to the three cycle measures as $GFCy$, $PC1$ and VIX, respectively.

[47] In Appendix C we discuss in more detail how their methodology relates to ours and how we can use it to test a necessary condition for the validity of our GIV.

define the instrument as follows: $z_{i,t}^{BOGC} = \sum_j S_{i,j,t-1} g_{j,-i,t}$, where $S_{i,j,t-1}$ is the initial exposure of country i to country j. We define $g_{j,-i,t}$ as the growth rate of claims on all other EMEs. Note that, contrary to the instrument in Blanchard et al. (2016), the Bartik-type instrument used here varies significantly across countries because the exposures to each lender vary in the cross-section.[48]

Table 8 presents the results for the first stage of the 2SLS. EBP and $Host$ are not relevant instruments for cross-border banking flows. The instruments that have a positive correlation with cross-border bank flows are the $Common$ component of international banking flows computed using AHMP's methodology, the leverage of US broker-dealers (BD) and the Bartik-type of instrument constructed for any country i by using the growth of claims to all EMEs other than i ($BOGC$).

While the correlation of these three instruments with banking flows makes them relevant, they are unlikely to fulfill the exclusion restriction. As columns (3) to (5) in Table 10 show, the three IVs are highly correlated with the three different measures of the global financial cycle discussed earlier, namely the price-based factor of Miranda-Agrippino and Rey (2015), the VIX, and the first principal component of capital flows.[49] As noted in Section 7.1, cross-border bank flows are also highly correlated with the measures of the global financial cycle (Table 7). On the contrary, our GIVs are not (column (1) in Table 10).[50]

We use these alternative instruments for banking flows to recompute impulse response functions and contrast them with those obtained in our baseline results. Figures 11 and 12 we present the IRFs for selected outcome variables when we use $Common$, BD, and $BOGC$ as IVs. The estimated effects are significative in some cases, though not all.[51]

Estimated effects using alternative IVs are an order of magnitude larger than when using our $GIVs$, sometimes implausibly large. While in many cases the sign of the effect is similar when using GIV or the alternative IVs, the latter have effects of magnitude between 4 (domestic long-term interest rate, equity prices) to 8 times larger (FCI, $RGDP$) than when using the $GIVs$. In some instances, these effects seem implausibly large. We interpret this as evidence of a bias in the

[48] In principle one could find more IVs in the literature on spillovers from US monetary policy to EMEs. Examples include the narrative monetary policy shocks originally proposed in Romer and Romer (2004), or the high-frequency monetary policy and news shocks from Nakamura and Steinsson (2018) or Miranda-Agrippino and Ricco (2017). The channels through which these would act, however, would not allow us to identify the causal effect of exogenous changes in international bank lending as they would capture all ways in which these spillovers affect domestic outcomes and thus are not excludable. Consistently with the findings in Ramey (2016), these shocks tend to produce weak instruments as they tend to perform poorly in the first stage of our model. Furthermore, they correlate strongly with measures of the global financial cycle.

[49] Somewhat surprisingly, $Common$ and BD also correlate positively with the VIX.

[50] The results in this table are robust to alternative specifications were we consider one global financial cycle indicator at a time or in pairs. These results are available upon request.

[51] We omitted the results of other variables where estimates are not significative at all. These results are available upon request.

alternative IVs, related to their strong correlation with the global financial cycle. This bias emerges from the various channels through which changes in global risk-taking appetite affect EMEs *above and beyond* the increase in capital inflows. Such catch-all changes are likely to reflect a number of simultaneous changes affecting both demand and supply. The significant and large effect on exports that we obtain when using the alternative IVs is an example of this: a global increase in risk-taking appetite not only relaxes each EME financial constraints and boosts growth through investment and credit growth, but it also raises global growth and gives a sizable boost to exports. Another interesting result is that some measures of financial conditions (corporate and sovereign spreads, FCI, equity prices) show some statistically significant reversal effects at longer horizons when using the alternative IVs. Together with the statistically significant increases in consumption after a few quarters, this points to demand shocks.

8 Conclusion

In this paper we estimate the causal effects of cross-border bank lending on EME domestic financial and macroeconomic conditions. Contrary to most of the literature that uses EME-specific firm-level data or event studies to achieve identification at the micro level, we do this at the macro level in a cross-country panel context using the richness of bilateral (country-level) bank lending data.

We address the endogeneity of banking flows – an important component of capital flows – by leveraging the heterogeneity in the size distribution of bilateral cross-border bank lending. Using confidential BIS data, we construct granular instrumental variables (GIVs) for international bank lending. Our GIVs improve upon available instruments in the literature, are unrelated to measures of the global financial cycle and thus only capture exogenous changes in international bank lending.

International bank lending loosens financial conditions and boosts the economy of emerging markets. Financial condition indices ease, sovereign and corporate spreads narrow, and real exchange rates appreciate. Likewise, domestic private credit growth, real GDP and imports are also boosted. We also find significant though quantitatively small effects on house prices.

These effects are significantly weaker for countries that rank high in a comprehensive capital inflow control index. Capital controls can thus help EMEs moderate the effects of cross-border flows, in line with Forbes et al. (2015), Zeev (2017), Pasricha (2017) and Nier et al. (2020). In a world of international risk spillovers (Kalemli-Özcan, 2020), macroprudential policies can be important to smooth the effects of changes in risk sentiment, which can be particularly harmful for EMEs.

The framework we present lends itself to answer a number of interesting questions in the international finance literature, which we leave for future research. For example, further work could explore the role of how biased estimates of the elasticities of domestic variables to capital inflows may affect the choice of optimal macroprudential policies.

References

Acalin, J. and Rebucci, A. (2020). Global business and financial cycles: A tale of two capital account regimes. Technical report, National Bureau of Economic Research. [9]

Adrian, T., Grinberg, F., Liang, N., and Malik, S. (2018). The Term Structure of Growth-at-Risk. IMF Working Papers 18/180, International Monetary Fund. [4]

Aldasoro, I., Borio, C., and Drehmann, M. (2018). Early warning indicators of banking crises: expanding the family. *BIS Quarterly Review*, March:29–45. [2, 5.1]

Aldasoro, I. and Ehlers, T. (2019). Concentration in cross-border banking. *BIS Quarterly Review*, December:1–11. [1, 4]

Amiti, M., McGuire, P., and Weinstein, D. E. (2019). International bank flows and the global financial cycle. *IMF Economic Review*, 67(1):61–108. [1, 27, C, 56]

Amiti, M. and Weinstein, D. E. (2018). How much do idiosyncratic bank shocks affect investment? evidence from matched bank-firm loan data. *Journal of Political Economy*, 126(2):525–587. [1, 7.2, C]

Arregui, N., Elekdag, S., Gelos, R. G., Lafarguette, R., and Seneviratne, D. (2018). Can Countries Manage Their Financial Conditions Amid Globalization? IMF Working Papers 2018/015, International Monetary Fund. [9]

Avdjiev, S. and Hale, G. (2019). US monetary policy and fluctuations of international bank lending. *Journal of International Money and Finance*, 95:251–268. [4]

Avdjiev, S., Hardy, B., McGuire, P., and von Peter, G. (2020). Home sweet host: Prudential and monetary policy spillovers through global banks. BIS Working Papers 853, Bank for International Settlements. [*, 1, 10, 1, 7.2, 8, 10, 11, 12, C, 53, 55, 12, 13]

Bai, J. and Ng, S. (2002). Determining the number of factors in approximate factor models. *Econometrica*, 70(1):191–221. [3.2, 6, 15, 16]

Banerjee, R. N., Hofmann, B., and Mehrotra, A. (2020). Corporate investment and the exchange rate: The financial channel. BIS Working Papers 839, Bank for International Settlements. [1, 5.1]

Bank for International Settlements (2015). Introduction to BIS statistics. *BIS Quarterly Review*, pages 35–51. [4]

Baskaya, Y. S., Di Giovanni, J., Kalemli-Özcan, Ş., Peydró, J.-L., and Ulu, M. F. (2017). Capital flows and the international credit channel. *Journal of International Economics*, 108:S15–S22. [1]

Bergant, K., Grigoli, F., Hansen, N.-J., and Sandri, D. (2020). Dampening global financial shocks: Can macroprudential regulation help (more than capital controls)? [1]

Bianchi, J. (2011). Overborrowing and systemic externalities in the business cycle. *American Economic Review*, 101(7):3400–3426. [2]

Blanchard, O., Ostry, J. D., Ghosh, A. R., and Chamon, M. (2016). Capital flows: expansionary or contractionary? *American Economic Review*, 106(5):565–69. [1, 1, 7.2, 8, 10, 11, 12]

Borio, C., McCauley, R. N., and McGuire, P. (2011). Global credit and domestic credit booms. *BIS Quarterly Review*, September:43–57. [1, 2, 5.1]

Bruno, V. and Shin, H. S. (2015a). Capital flows and the risk-taking channel of monetary policy. *Journal of Monetary Economics*, 71(C):119–132. [1, 5, 5.1, 7.1]

Bruno, V. and Shin, H. S. (2015b). Cross-Border Banking and Global Liquidity. *Review of Economic Studies*, 82(2):535–564. [1, 5, 5.1, 7.1]

Calvo, G. and Reinhart, C. (2000). When Capital Inflows Come to a Sudden Stop: Consequences and Policy Options. MPRA Paper 6982, University Library of Munich, Germany. [1, 1]

Calvo, G. A., Leiderman, L., and Reinhart, C. M. (1993). Capital Inflows and Real Exchange Rate Appreciation in Latin America: The Role of External Factors. *IMF Staff Papers*, 40(1):108–151. [1]

Calvo, G. A., Leiderman, L., and Reinhart, C. M. (1996). Inflows of Capital to Developing Countries in the 1990s. *Journal of Economic Perspectives*, 10(2):123–139. [1, 1]

Camanho, N., Hau, H., and Rey, H. (2019). Global portfolio rebalancing and exchange rates. Technical report. [1]

Cerutti, E., Claessens, S., and Ratnovski, L. (2017). Global liquidity and cross-border bank flows. *Economic Policy*, 32(89):81–125. [1]

Cerutti, E., Claessens, S., and Rose, A. K. (2019). How Important is the Global Financial Cycle? Evidence from Capital Flows. *IMF Economic Review*, 67(1):24–60. [9, 44, 7, 10]

Cesa-Bianchi, A., Ferrero, A., and Rebucci, A. (2018). International credit supply shocks. *Journal of International Economics*, 112:219–237. [1, 1, 5.1, 7.2, 8, 10]

Cesa-Bianchi, A., Martin, F. E., and Thwaites, G. (2019). Foreign booms, domestic busts: The global dimension of banking crises. *Journal of Financial Intermediation*, 37:58–74. [1, 5.1]

di Giovanni, J., Kalemli-Özcan, Ş., Ulu, M. F., and Baskaya, Y. S. (2019). International spillovers and local credit cycles. Technical report. [3, 9, 1, 5.1, 44]

di Giovanni, J., Levchenko, A. A., and Mejean, I. (2018). Foreign shocks as granular fluctuations. Technical report, Working Paper. [3, 1]

Edwards, S. and Rigobon, R. (2009). Capital controls on inflows, exchange rate volatility and external vulnerability. *Journal of International Economics*, 78(2):256 – 267. [11]

Fernández, A., Klein, M. W., Rebucci, A., Schindler, M., and Uribe, M. (2016). Capital control measures: A new dataset. *IMF Economic Review*, 64(3):548–574. [1, 4, 32, 5, 5.2, 8, 9, 10]

Forbes, K., Fratzscher, M., and Straub, R. (2015). Capital-flow management measures: What are they good for? *Journal of International Economics*, 96:S76 – S97. 37th Annual NBER International Seminar on Macroeconomics. [1, 11, 8]

Gabaix, X. (2011). The granular origins of aggregate fluctuations. *Econometrica*, 79(3):733–772. [4]

Gabaix, X. and Koijen, R. S. (2019). Granular instrumental variables. *Available at SSRN 3368612*. [1, 1, 3, 18, 3.2, 3.2, 1, 6, 6]

Galaasen, S., Jamilov, R., Juelsrud, R., and Rey, H. (2019). Granular credit risk. Technical report. [1]

Gilchrist, S. and Zakrajšek, E. (2012). Credit spreads and business cycle fluctuations. *American Economic Review*, 102(4):1692–1720. [1, 1, 7.2, 8]

Greenwood, R. and Vayanos, D. (2010). Price pressure in the government bond market. *American Economic Review*, 100(2):585–90. [2]

Gromb, D. and Vayanos, D. (2010). Limits of arbitrage. *Annual Review of Financial Economics*, 2(1):251–275. [2]

Horn, J. L. (1965). A rationale and test for the number of factors in factor analysis. *Psychometrika*, 30:179–185. [22, 6, 15, 16]

IMF (2017). Financial conditions and growth at risk. Global financial stability report, International Monetary Fund. [4]

Jeanne, O. and Korinek, A. (2010). Excessive volatility in capital flows: A pigouvian taxation approach. *American Economic Review*, 100(2):403–07. [2]

Jordà, Ò., Schularick, M., and Taylor, A. M. (2019). The effects of quasi-random monetary experiments. *Journal of Monetary Economics*. [6]

Jordà, Ò. and Taylor, A. M. (2016). The time for austerity: estimating the average treatment effect of fiscal policy. *The Economic Journal*, 126(590):219–255. [3.3]

Jordà, (2005). Estimation and inference of impulse responses by local projections. *American Economic Review*, 95(1):161–182. [1, 3.3]

Kalemli-Özcan, Ş. (2020). US monetary policy and international risk spillovers. *Proceedings of the Jackson Hole Symposium*, Forthcoming. [1, 6, 8]

Koop, G. and Korobilis, D. (2014). A new index of financial conditions. *European Economic Review*, 71:101 – 116. [4]

Laeven, L. and Valencia, F. (2020). Systemic banking crises database ii. *IMF Economic Review*, pages 1–55. [6, 11]

Mendoza, E. G. (2010). Sudden stops, financial crises, and leverage. *American Economic Review*, 100(5):1941–66. [2]

Miranda-Agrippino, S. and Rey, H. (2015). US Monetary Policy and the Global Financial Cycle. NBER Working Papers 21722, National Bureau of Economic Research, Inc. [5, 9, 44, 7.2, 7, 10]

Miranda-Agrippino, S., Rey, H., and Nenova, T. (2020). Global Footprints of Monetary Policies. Discussion Paper 2020-04, Centre for Macroeconomics. [44, 7, 10]

Miranda-Agrippino, S. and Ricco, G. (2017). The transmission of monetary policy shocks. [48]

Nakamura, E. and Steinsson, J. (2018). High-frequency identification of monetary non-neutrality: the information effect. *The Quarterly Journal of Economics*, 133(3):1283–1330. [48]

Nier, E., Olafsson, T. T., and Rollinson, Y. G. (2020). Exchange Rates and Domestic Credit—Can Macroprudential Policy Reduce the Link? IMF Working Papers 2020/187, International Monetary Fund. [1, 8]

Obstfeld, M., Ostry, J. D., and Qureshi, M. S. (2019). A Tie That Binds: Revisiting the Trilemma in Emerging Market Economies. *The Review of Economics and Statistics*, 101(2):279–293. [1]

Pandolfi, L. and Williams, T. (2019). Capital flows and sovereign debt markets: Evidence from index rebalancings. *Journal of Financial Economics*, 132(2):384–403. [3, 1]

Pasricha, G. K. (2017). Policy Rules for Capital Controls. BIS Working Papers 670, Bank for International Settlements. [1, 11, 8]

Pasricha, G. K., Falagiarda, M., Bijsterbosch, M., and Aizenman, J. (2018). Domestic and multilateral effects of capital controls in emerging markets. *Journal of International Economics*, 115:48 – 58. [11]

Ramey, V. A. (2016). Macroeconomic shocks and their propagation. In *Handbook of macroeconomics*, volume 2, pages 71–162. Elsevier. [24, 48]

Reinhart, C. and Reinhart, V. (2009). Capital Flow Bonanzas: An Encompassing View of the Past and Present. In *NBER International Seminar on Macroeconomics 2008*, NBER Chapters, pages 9–62. National Bureau of Economic Research, Inc. [1]

Reinhart, C. M., Reinhart, V., and Trebesch, C. (2016). Global cycles: Capital flows, commodities, and sovereign defaults, 1815-2015. *American Economic Review*, 106(5):574–80. [1]

Rey, H. (2015). Dilemma not Trilemma: The Global Financial Cycle and Monetary Policy Independence. NBER Working Papers 21162, National Bureau of Economic Research, Inc. [5, 9, 7.1]

Romer, C. D. and Romer, D. H. (2004). A new measure of monetary shocks: Derivation and implications. *American Economic Review*, 94(4):1055–1084. [48]

Stock, J. H. and Watson, M. W. (2018). Identification and estimation of dynamic causal effects in macroeconomics using external instruments. *The Economic Journal*, 128(610):917–948. [24]

Williams, T. (2018). Capital inflows, sovereign debt and bank lending: Micro-evidence from an emerging market. *The Review of Financial Studies*, 31(12):4958–4994. [3, 1]

Zeev, N. B. (2017). Capital controls as shock absorbers. *Journal of International Economics*, 109:43–67. [1, 40, 8]

Zeev, N. B. (2019). Global credit supply shocks and exchange rate regimes. *Journal of International Economics*, 116:1–32. [6, 1, 1, 32, 7.2, 8]

A Tables and Figures

Table 1: Country sample list

Argentina	Hungary	Poland
Brazil	India	Russia
Bulgaria	Indonesia	South Africa
Chile	Israel	Thailand
China	Malaysia	Turkey
Colombia	Mexico	Ukraine
Czech Republic	Peru	
Egypt	Philippines	

Notes: This table shows the list of 22 countries covered in our sample.

Table 2: Data by country and variable

Code	Country	NEER		REER		RER US		Sov. Spread		Corp. Spread		Long-term interest rate		Short-term interest rate		Equity prices	
		start	end	start	end	start	end	start	end	start	end	start	end	start	end	start	end
186	Turkey	1994q1	2018q4	1994q1	2018q4	1990q1	2018q4	1996q2	2018q4	2007q1	2017q4	2007q2	2018q4	2016q3	2018q4	1992q2	2018q4
199	South Africa	1994q1	2018q4	1994q1	2018q4	1990q1	2018q4	1994q4	2018q4	2007q3	2017q4	1990q1	2018q4	1990q1	2018q4	1995q1	2018q4
213	Argentina	1994q1	2018q4	1994q1	2018q4	1990q1	2018q4	1993q4	2018q4	2001q4	2017q4					1993q1	2018q4
223	Brazil	1994q1	2018q4	1994q1	2018q4	1990q1	2018q4	1994q2	2018q4	2001q4	2017q4	2007q4	2018q4	1999q4	2018q4	1994q4	2018q4
228	Chile	1994q1	2018q4	1994q1	2018q4	1990q1	2018q4	1999q2	2018q4	2001q4	2017q4			2017q2	2018q4	1992q4	2018q4
233	Colombia	1994q1	2018q4	1994q1	2018q4	1990q1	2018q4	1997q1	2018q4	2007q2	2017q4	2013q1	2018q1	2017q2	2018q4	1993q4	2018q4
273	Mexico	1994q1	2018q4	1994q1	2018q4	1990q1	2018q4	1993q4	2018q4	2001q4	2017q4	2001q2	2018q4	1990q1	2018q4	1992q2	2018q4
293	Peru	1994q1	2018q4	1994q1	2018q4	1990q1	2018q4	1997q1	2018q4	2005q3	2017q4	2018q2	2018q4	2018q2	2018q4	1994q3	2018q4
436	Israel	1994q1	2018q4	1994q1	2018q4					2001q4	2017q4						
469	Egypt					1990q1	2018q4	2001q3	2018q4	2007q1	2018q4	2015q3	2018q4	1997q1	2018q4	1996q4	2018q4
534	India	1994q1	2018q4	1994q1	2018q4	1990q1	2018q4	2012q4	2018q4	2004q2	2017q4	2001q2	2018q4	2003q1	2018q4	1994q4	2018q4
536	Indonesia	1994q1	2018q4	1994q1	2018q4	1990q1	2018q4	2004q2	2018q4	2001q4	2017q4	2004q1	2018q4	2007q2	2018q4	1992q2	2018q4
548	Malaysia	1994q1	2018q4	1994q1	2018q4	1990q1	2018q4	1996q4	2018q4	2001q4	2017q4	1992q2	2018q4	1990q1	2018q4	1992q2	2018q4
566	Philippines	1994q1	2018q4	1994q1	2018q4	1990q1	2018q4	1993q4	2018q4	2001q4	2017q4	2000q1	2018q4	1990q1	2018q4	1992q2	2018q4
578	Thailand	1994q1	2020q1	1994q1	2020q1			1997q2	2017q4	2001q4	2017q4						
918	Bulgaria	1994q1	2020q1	1994q1	2020q1			1994q3	2017q4								
922	Russia	1994q1	2018q4	1994q1	2018q4	1990q1	2018q4	1997q4	2018q4	2002q2	2017q4	2009q2	2018q4	2010q1	2018q4	1996q1	2018q4
924	China	1994q1	2018q4	1994q1	2018q4	1990q1	2018q4	1994q1	2018q4	2002q2	2017q4	2005q2	2018q4	2002q1	2018q4	1995q4	2018q4
926	Ukraine					1990q1	2018q4	2000q2	2018q4	2006q3	2018q4	2015q2	2018q4	2017q2	2018q4	2005q1	2018q4
935	Czech Republic	1994q1	2020q1	1994q1	2020q1			2000q2	2017q4	2012q2	2017q4						
944	Hungary	1994q1	2018q4	1994q1	2018q4	1990q1	2018q4	1999q1	2018q4	2012q4	2017q4	1997q4	2018q4	1990q1	2018q4	1996q2	2018q4
964	Poland	1994q1	2018q4	1994q1	2018q4	1990q1	2018q4	1994q4	2018q4	2012q1	2017q4	1999q1	2018q4	2012q1	2018q4	1995q1	2018q4

Code	Country	FCI		House price index		Private domestic credt		Real GDP		Private Consumption		Investment		Exports		Imports	
		start	end	start	end	start	end	start	end	start	end	start	end	start	end	start	end
186	Turkey	1990q1	2018q4	2010q1	2018q4	2012q2	2018q4	1987q1	2018q3	1987q2	2017q2	1987q2	2016q4	1987q2	2017q2	1987q2	2017q2
199	South Africa	1990q1	2018q4	1980q1	2018q4	2012q2	2018q4	1980q1	2018q4	1980q1	2017q1	1980q1	2017q1	1980q1	2017q1	1980q1	2017q1
213	Argentina	1993q4	2018q4					1990q1	2017q1	1993q2	2017q2	1993q2	2016q4	1993q2	2017q2	1993q2	2017q2
223	Brazil	1994q2	2018q4	2001q1	2018q4	2012q2	2018q4	1995q1	2017q3	1995q2	2017q2	1995q2	2017q2	1995q2	2017q2	1995q2	2017q2
228	Chile	1992q4	2018q4	2002q1	2018q4	2012q2	2018q4	1986q1	2018q2	1996q2	2017q1	1996q2	2017q1	1996q2	2017q1	1996q2	2017q1
233	Colombia	1990q1	2018q4	1988q1	2018q4	2012q2	2018q4	1994q1	2018q4	1994q2	2016q2	1994q2	2016q2	1994q2	2016q2	1994q2	2016q2
273	Mexico	1990q1	2018q4	2005q1	2018q4	2012q2	2018q4	1980q1	2018q3	1981q2	2017q1	1981q2	2017q1	1981q2	2017q1	2008q2	2017q1
293	Peru	1994q3	2018q4	1998q1	2018q4	2012q2	2018q4	1980q1	2017q1	1980q1	2017q2	1980q1	2016q4	1980q1	2017q2	1980q1	2017q2
436	Israel			2012q2	2018q4	2012q2	2018q4	1980q1	2018q2	2002q1	2018q4	2002q1	2018q4	2002q1	2018q4	2002q1	2018q4
469	Egypt	1997q1	2018q4					2002q1	2018q4	2002q2	2014q1	2002q2	2014q1	2002q2	2014q1	2002q2	2014q1
534	India	2001q1	2018q4	2009q1	2018q4	2012q2	2018q4	2005q1	2017q4	2005q2	2017q2	2005q2	2017q1	2005q2	2017q2	2005q2	2017q2
536	Indonesia	1992q2	2018q4	2002q1	2018q4	2012q2	2018q4	1997q1	2018q3	1997q2	2017q2	1997q2	2017q1	1997q2	2017q2	1997q2	2017q2
548	Malaysia	1990q1	2018q4	1988q1	2018q4	2012q2	2018q4	1988q1	2017q1	1991q2	2017q2	1991q2	2017q2	1991q2	2017q2	1991q2	2017q2
566	Philippines	1990q1	2018q4	2008q1	2018q4	2012q2	2018q4	1981q1	2018q2	1981q2	2017q2	1981q2	2017q2	1981q2	2017q2	1981q2	2017q2
578	Thailand			2012q2	2018q4	2012q2	2018q4	1993q1	2018q2	1993q2	2017q2	1993q2	2017q2	1993q2	2017q2	1993q2	2017q2
918	Bulgaria			2012q2	2018q4	2012q2	2018q4	1995q1	2018q3	1996q2	2017q2	1996q2	2017q1	1996q2	2017q2	1996q2	2017q2
922	Russia	1996q1	2018q4	2001q1	2018q4	2012q2	2018q4	1995q1	2018q1	1995q2	2017q2	1995q2	2017q2	1995q2	2017q2	1995q2	2017q2
924	China	1995q4	2018q4	2005q2	2018q4	2012q2	2018q4	1991q4	2018q3	1992q2	2017q2	1995q2	2017q1	1992q2	2017q2	1992q2	2017q2
926	Ukraine	2005q1	2018q4					2000q1	2018q2	2001q2	2014q2	2001q2	2014q2	2001q2	2014q2	2001q2	2014q2
935	Czech Republic			2012q2	2018q4	2012q2	2018q4	1994q1	2018q3	1994q2	2017q2	1994q2	2017q2	1995q2	2017q2	1995q2	2017q2
944	Hungary	1996q2	2018q4	2007q1	2018q4	2012q2	2018q4	1995q1	2018q3	1995q2	2017q2	1995q2	2017q2	1995q2	2017q2	1995q2	2017q2
964	Poland	1992q1	2018q4	2010q1	2018q4	2012q2	2018q4	1995q1	2018q3	1995q2	2017q2	1995q2	2017q1	1995q2	2017q2	1995q2	2017q2

Table 3: Summary statistics

Variable	Nobs	Countries	Mean	Sd	Min	p25	p50	p75	Max
Total flows	2080	22	1.742	7.423	-31.92	-2.843	1.293	5.411	41.89
GIV	2080	22	-0.866	4.173	-27.88	-2.836	-0.458	1.401	14.93
Endogenous factor	2080	22	6.131	8.659	-31.04	0.973	4.872	10.27	126.6
Capital controls (Index)	1992	22	49.69	30.97	0	20	55	75	100
NEER appreciation (YoY)	2020	20	-4.661	18.87	-292.6	-7.252	-1.263	3.359	54.94
REER appreciation (YoY)	2020	20	0.119	11.43	-110.3	-4.099	0.911	5.389	75.72
RER US appreciation (YoY)	1438	17	-0.510	12.42	-99.00	-6.061	-0.0706	6.514	40.13
Sovereign spread	1844	21	3.565	5.818	-0.0767	1.324	2.120	3.865	66.24
Corporate spread	1199	19	5.128	7.024	0.0293	2.558	3.510	5.078	73.73
FCI	1680	18	0.878	97.11	-642.7	-65.56	-6.319	59.98	376.1
Housing prices growth (YoY)	1349	19	27.69	44.47	-28.56	-0.250	5.220	49.68	151.3
Stock prices growth (YoY)	1591	20	3.040	14.22	-45.40	-1.563	1.637	6.801	384.7
Equity prices	1777	18	1.975	0.990	0.0116	1.336	1.853	2.457	11.69
Real credit growth (YoY)	1607	17	7.052	10.53	-70.30	1.750	6.187	12.24	75.32
RGDP growth (YoY)	1912	22	3.922	4.494	-22.44	2.180	4.337	6.273	43.30
Consumption growth (YoY)	1758	22	0.348	0.945	-3.450	0.0668	0.180	0.315	11.93
Investment growth (YoY)	1742	22	0.370	1.561	-5.856	-0.0814	0.233	0.561	19.73
Exports growth (YoY)	1754	22	0.654	4.722	-166.5	-0.222	0.579	1.511	27.49
Imports growth (YoY)	1697	22	0.595	4.858	-164.9	-0.251	0.612	1.649	19.34
Trade Balance/GDP (%)	1708	21	1.388	8.284	-23.21	-3.485	-0.317	5.062	71.22
Inflation, CPI (YoY)	1802	18	8.129	11.47	-3.749	2.934	5.076	8.834	161.8
Short term interest rate	1337	17	9.489	10.22	-0.0300	4.100	6.967	10.77	94.94
Long term interest rate	1077	17	7.639	3.961	0.330	4.710	7.046	9.358	26.65

Notes: This table presents the summary statistics for the variables used in the empirical analysis.

Table 4: Cross-border bank lending and IIP liabilities are strongly related

	(1)	(2)
VARIABLES	Total	Total Non-FDI
Banking	0.394***	0.409***
	(0.0152)	(0.0157)
Observations	975	975
R-squared	0.413	0.417
Countries	22	22

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Notes: This table shows the results of a panel regression with country fixed effects of the quarterly growth rates of different measures of gross international liabilities (as reported by the IMF International Investment Position Statistics) on the quarterly growth rate of cross-border bank claims of all BIS reporting banking systems.

Table 5: First stage statistics for linear model

depvar	Coef.	SE	R^2	Countries	Observations
NEER	0.946***	(0.027)	0.843	20	1707
REER	0.946***	(0.027)	0.842	20	1707
RER US	0.964***	(0.025)	0.877	17	1309
Sov spread	0.867***	(0.060)	0.755	21	1549
Corp spread	0.869***	(0.077)	0.727	19	955
FCI	0.878***	(0.064)	0.775	18	1523
Housing prices	0.969***	(0.037)	0.852	19	1069
Stock prices	0.884***	(0.069)	0.784	20	1443
Equity prices	0.884***	(0.062)	0.764	18	1424
Credit growth	0.962***	(0.023)	0.884	17	1451
Real credit	0.960***	(0.023)	0.883	17	1463
RGDP	0.885***	(0.058)	0.781	22	1900
Consumption	0.944***	(0.028)	0.853	22	1662
Investment	0.947***	(0.028)	0.855	22	1639
Exports	0.942***	(0.029)	0.854	22	1657
Imports	0.944***	(0.029)	0.851	22	1584
Trade Balance	0.857***	(0.070)	0.765	21	1627
FX debt	0.879***	(0.064)	0.784	18	1580
Inflation	0.881***	(0.064)	0.784	18	1580
Short-term interest rate	0.936***	(0.029)	0.864	17	1059
Long-term interest rate	0.911***	(0.048)	0.838	17	822

*** $p<0.01$, ** $p<0.05$, * $p<0.1$

Notes: This table shows the t-statistics for the GIV in the first stage corresponding to regressions depicted in panels (6) and (7)

Table 6: Largest differences between OLS and GIV estimates for linear model

	OLS	IV	Difference	Time
$NEER$ (bps)	107.76	152.25	-44.49	2
$REER$ (bps)	129.73	74.04	55.69	4
$RER\,US$ (bps)	176.12	111.24	64.88	3
Sov. Spread (bps)	-27.06	-35.83	8.77	3
Corp. Spread (bps)	-37.62	-50.54	12.92	2
Short-term interest rate (bps)	-41.88	-91.39	49.51	1
Long-term interest rate (bps)	-8.85	-29.03	20.18	2
Equity prices (bps)	964.34	563.87	400.47	1
FCI (s.d.)	-0.05	-0.12	0.07	3
Housing prices	33.25	60.50	-27.25	2
Credit growth (bps)	146.67	93.45	53.22	4
Real credit (bps)	135.25	89.64	45.61	4
$RGDP$ (bps)	52.00	35.46	16.54	3
Inflation (bps)	-16.49	-65.62	49.13	2
Consumption (bps)	n.a.	n.a.	n.a.	n.a.
Investment (bps)	8.63	11.59	-2.96	2
Exports (bps)	n.a.	n.a.	n.a.	n.a.
Imports (bps)	21.52	31.21	-9.69	2
Trade Balance/GDP (bps)	-53.01	-37.22	-15.79	2

Notes: This table shows the largest differences between the point estimates from OLS and GIV estimations and the time horizon at which these occur. The GIV estimates correspond to the regressions depicted in panels (6) and (7). Results are reported for the cases in which both OLS and GIV estimates are significatively different from zero.

Table 7: International banking flows and the global financial cycle

VARIABLES	(1) Banking Flows	(2) Banking Flows	(3) Banking Flows	(4) Banking Flows	(5) Banking Flows
$GFCy$	0.0218***	0.0145***	0.0190***		0.0107***
	(0.00162)	(0.00250)	(0.00170)		(0.00258)
$PC1$		0.00768***		0.0149***	0.00860***
		(0.00202)		(0.00132)	(0.00201)
VIX			-0.00103***	-0.00133***	-0.00110***
			(0.000205)	(0.000198)	(0.000205)
Observations	2,435	2,435	2,435	2,435	2,435
R-squared	0.070	0.075	0.080	0.080	0.086
Country FE	YES	YES	YES	YES	YES
Countries	22	22	22	22	22

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Notes: This table shows the results of a panel regression with country fixed effects of the growth in international bank claims on different measures of the global financial cycle. $GFCy$ stands for the global financial cycle as computed by Miranda-Agrippino and Rey (2015) and updated in Miranda-Agrippino et al. (2020). $PC1$ stands for the first principal component of capital flows to all countries (constructed as in Cerutti et al. (2019)). VIX stands for the CBOE Volatility Index.

Table 8: First stage significance for alternative instruments

Dep Var/ Instrument	GIV	EBP	Host	Common	BD	BOGC
NEER	***			***	**	***
REER	***			***	**	***
RER US	***			**	**	***
Sov spread	***			***	**	***
Corp spread	***			***	*	***
FCI	***			***	***	***
Housing prices	***			***	***	***
Stock prices	***			***	**	***
Equity prices	***			***	***	***
Credit growth	***			***	**	***
Real credit	***			***	**	***
RGDP	***			***	**	***
Consumption	***			***	*	***
Investment	***			***	*	***
Exports	***			***	*	***
Imports	***			***	*	***
Trade Balance	***			***	*	***
Inflation, consumer prices	***			***	***	***
Short-term interest rate	***			***	**	***
Long-term interest rate	***			***	***	***

*** $p<0.01$, ** $p<0.05$, * $p<0.1$

Notes: This table shows the results of first stage regressions of alternative instruments on cross-border bank lending growth. GIV is our granular instrumental variable for cross-border lending, EBP is the excess bond premium by Gilchrist and Zakrajšek (2012), $Host$ and $Common$ come from the decomposition of international bank lending growth rates in Avdjiev et al. (2020) (see Appendix C), EBP is the external bond premium constructed by Gilchrist and Zakrajšek (2012), as used in Zeev (2019). BD stands for the leverage of the US broker-dealer sector, as used in Cesa-Bianchi et al. (2018). $BOGC$ is an instrument constructed using the LBSR data following Blanchard et al. (2016).

Table 9: Number of factors selected by model

	Baseline	Constant sample	Crisis	Parallel analysis
Mean	3.00	2.82	2.95	2.50
sd	1.69	1.56	1.62	0.67
Min	2.00	2.00	2.00	2.00
p25	2.00	2.00	2.00	2.00
p50	2.00	2.00	2.00	2.00
p75	3.00	3.00	3.00	3.00
Max	6.00	6.00	6.00	4.00
Av. diff. w.r.t. Baseline	.	-0.18	-0.05	-0.50
Min. diff. w.r.t. Baseline	.	-4.00	-1.00	-4.00
Max. diff. w.r.t. Baseline	.	1.00	0.00	2.00

Notes: This table presents the summary statistics of the number of factors selected for each model after removing the average growth rate. The columns *Crisis*, *Constant sample* and *Parallel analysis* present the statistics for the robustness scenarios described in Section 6. The mininum (maximum) difference with respect to the baseline compute the minimum (maximum) difference of factors selected by the models across individual countries. For instance, the value of -4.00 in the second to last row for the *Parallel analysis* column implies that there is at least one country for which this method selects four factors less than the benchmark method. Similarly, the last row indicates that there is at least one country for which this method selects two factors more than the baseline.

Table 10: GIV and alternative IVs for international banking flows and the global financial cycle

VARIABLES	(1) *GIV*	(2) *Host*	(3) *BOGC*	(4) *Common*	(5) *BD*
$GFCy$	-0.000183	-0.700***	0.0394***	6.066***	4.490***
	(0.00154)	(0.151)	(0.00339)	(0.614)	(0.864)
$PC1$	-0.000350	0.438***	0.0131***	0.112	2.461***
	(0.00120)	(0.117)	(0.00264)	(0.479)	(0.675)
VIX	-7.39e-05	-0.0831***	-0.00363***	0.246***	0.287***
	(0.000122)	(0.0120)	(0.000269)	(0.0487)	(0.0684)
Observations	2,435	2,355	2,435	111	116
R-squared	0.000	0.025	0.303	0.689	0.592
Country FE	YES	YES	YES	NO	NO
Countries	22	22	22		

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

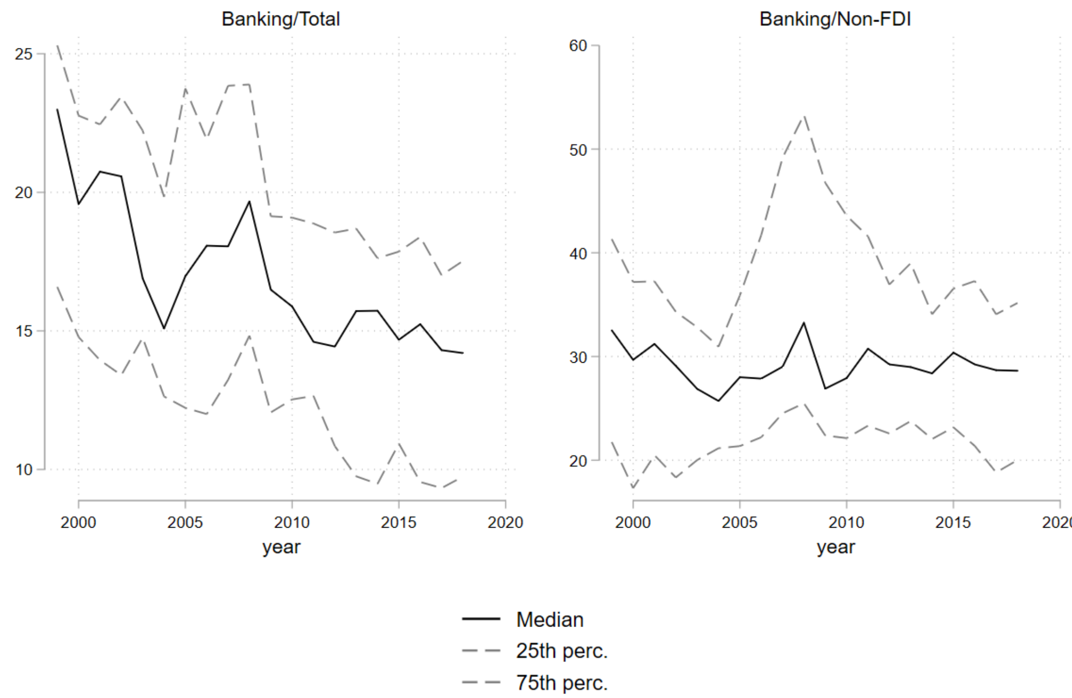
Notes: This table shows the results of regressing different IVs for international banking flows on measures of the global financial cycle: $GFCy$ stands for the global financial cycle as computed by Miranda-Agrippino and Rey (2015) and updated in Miranda-Agrippino et al. (2020). $PC1$ stands for the first principal component of capital flows to all countries (constructed as in Cerutti et al. (2019)). VIX stands for the CBOE Volatility Index. The IVs correspond to out GIV, a Blanchard et al. (2016)-type of instrument ($BOGC$), US broker-dealers' leverage (used by Cesa-Bianchi et al. (2018)), and the "common" component from Avdjiev et al. (2020).

Table 11: Domestic crises and GIV

Country	Year	Standardized Banking Flows	Standardized GIV
Argentina	2014	-0.719	-2.254
Brazil	1990	-0.569	-2.054
Bulgaria	1996	0.533	-2.832
Chile	1990	-1.345	-2.128
Colombia	1998	-0.984	-2.154
Czech Republic	1996	0.414	-3.683
Malaysia	1997	-1.657	-3.370
Turkey	2000	1.052	-2.064
Ukraine	2015	-0.794	-2.504

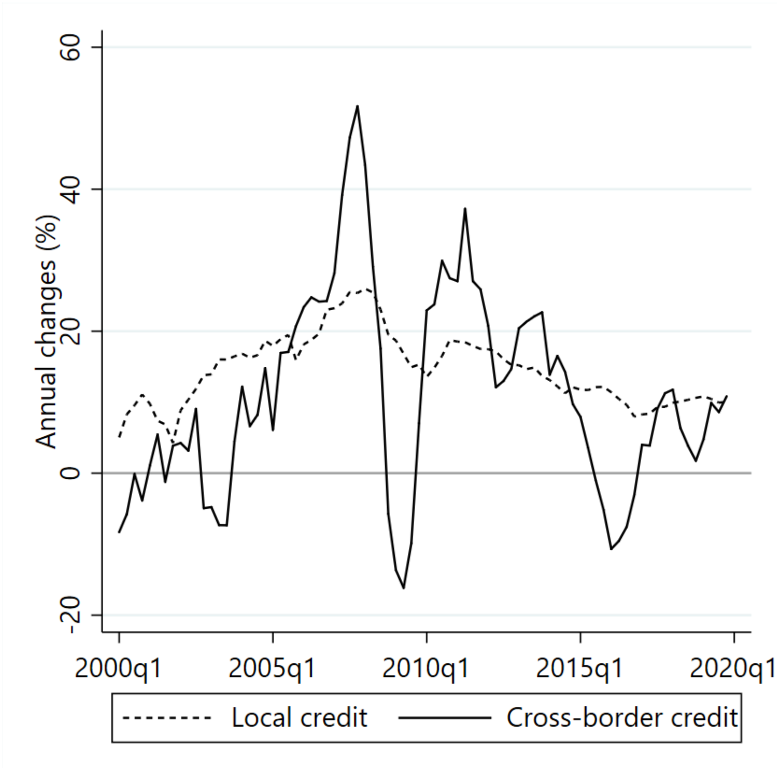
Notes: This table presents the events identified as a domestic crises as in Laeven and Valencia (2020) where the GIV is two standard deviations or more below the average.

Figure 1: Importance of cross-border bank claims over time



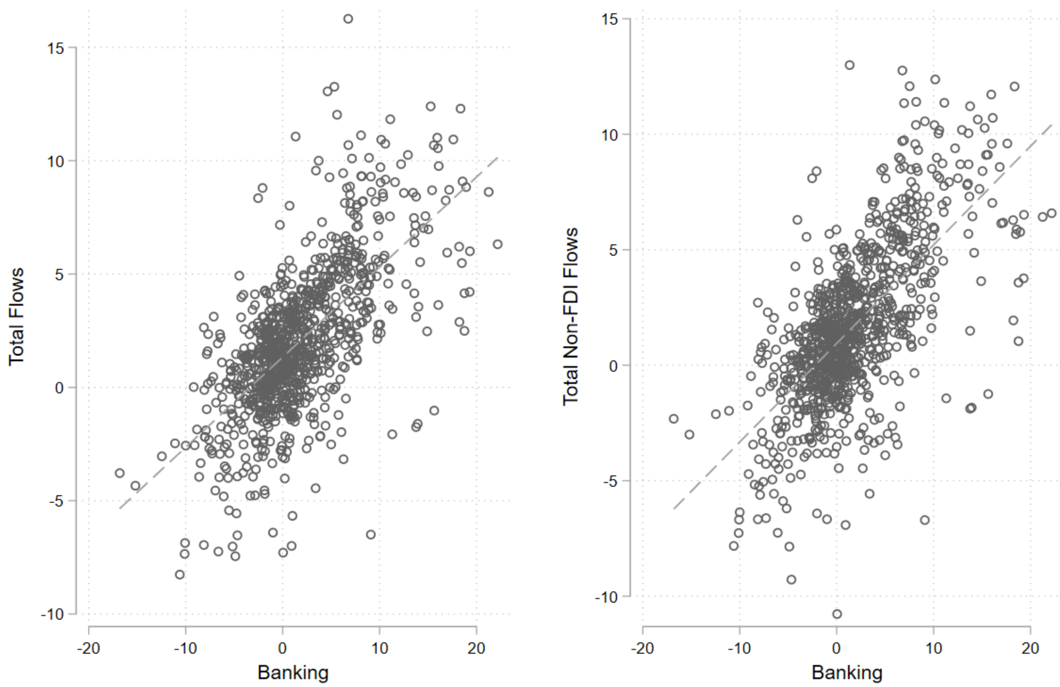
Notes: This figure shows the median, 25th, and 75th percentiles of the ratios of international bank claims ("Banking") to total gross international liabilities ("Total") from the IIP, and Total excluding Foreign Direct Investment liabilities ("Non-FDI") over time. The sample comprises 22 EMEs, as presented in Table 1.

Figure 2: Cross-border bank claims on EMEs show larger swings than local claims



Notes: This figure shows the growth rate in cross-border claims of LBS-reporting banks to the non-bank sector in EMEs plus local claims of all banks to the private non-financial sector of the same EMEs. Weighted averages, based on four-quarter moving sums of GDP. For the list of countries see the BIS Global Liquidity Indicators.

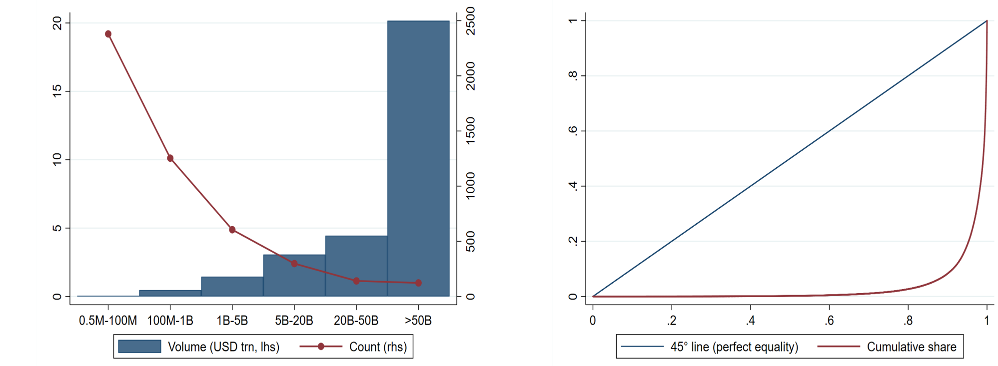
Figure 3: Growth in cross-border bank claims and international liabilities are strongly correlated



Notes: This figure plots the correlation between the growth in cross-border bank claims versus that in total external liabilities from the IIP with (left-hand panel) and without (right-hand panel) FDI. The sample comprises 22 EMEs, as presented in Table 1.

Figure 4: Cross-border banking: Small (large) number of large (small) links

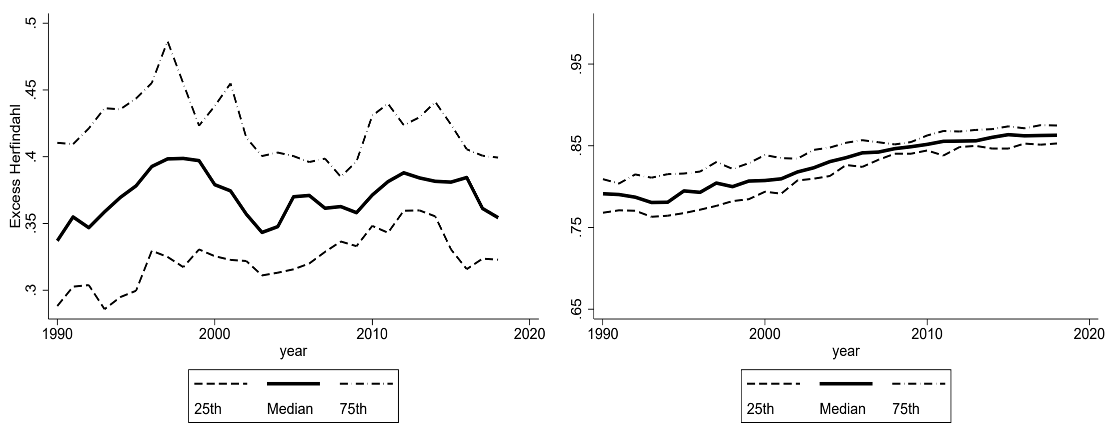
(a) Count and volumes by link size (b) Lorenz curve



Notes: BIS locational banking statistics. Data as of end-Q1 2019.

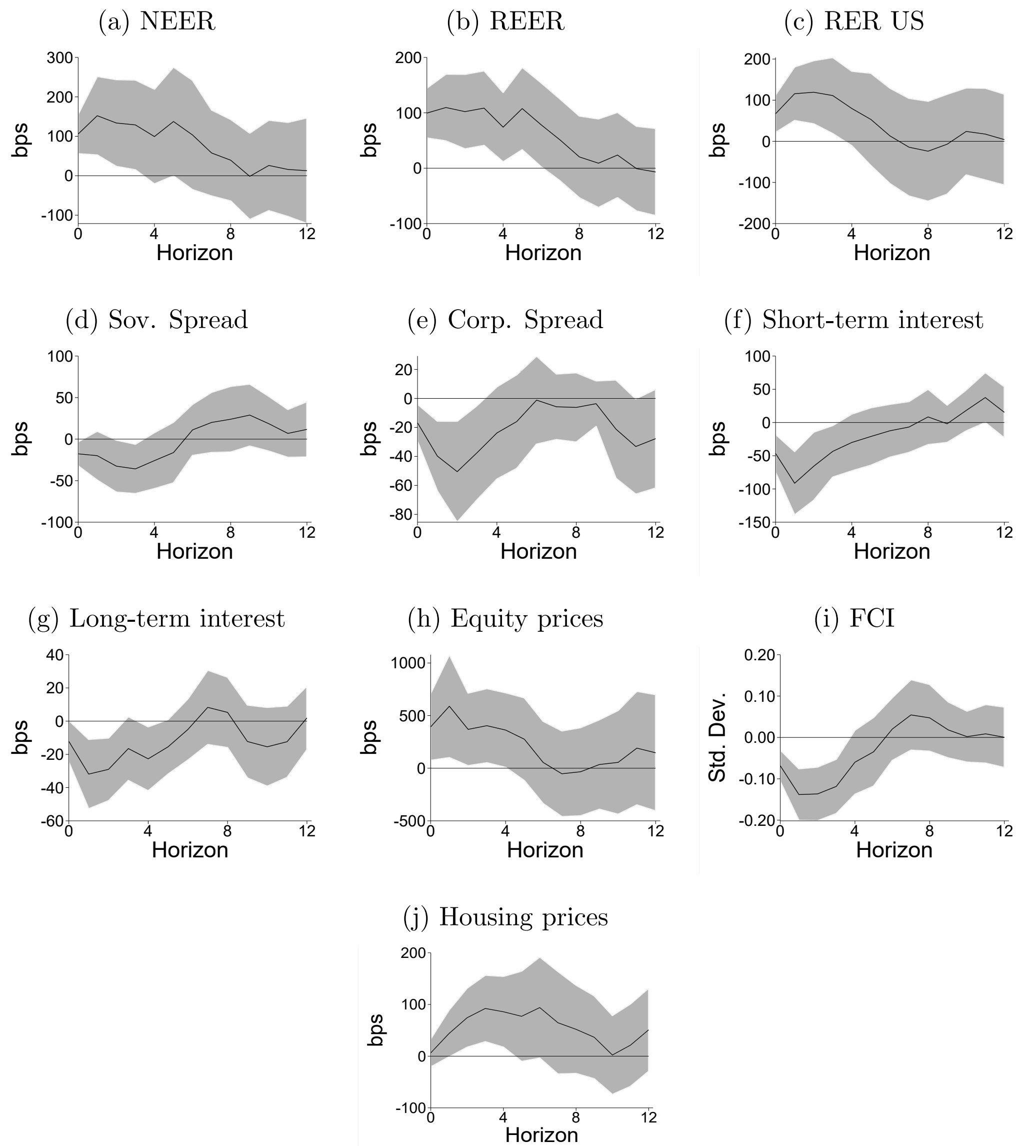
Figure 5: Concentration in cross-border banking

(a) Excess Herfindahl (b) Gini



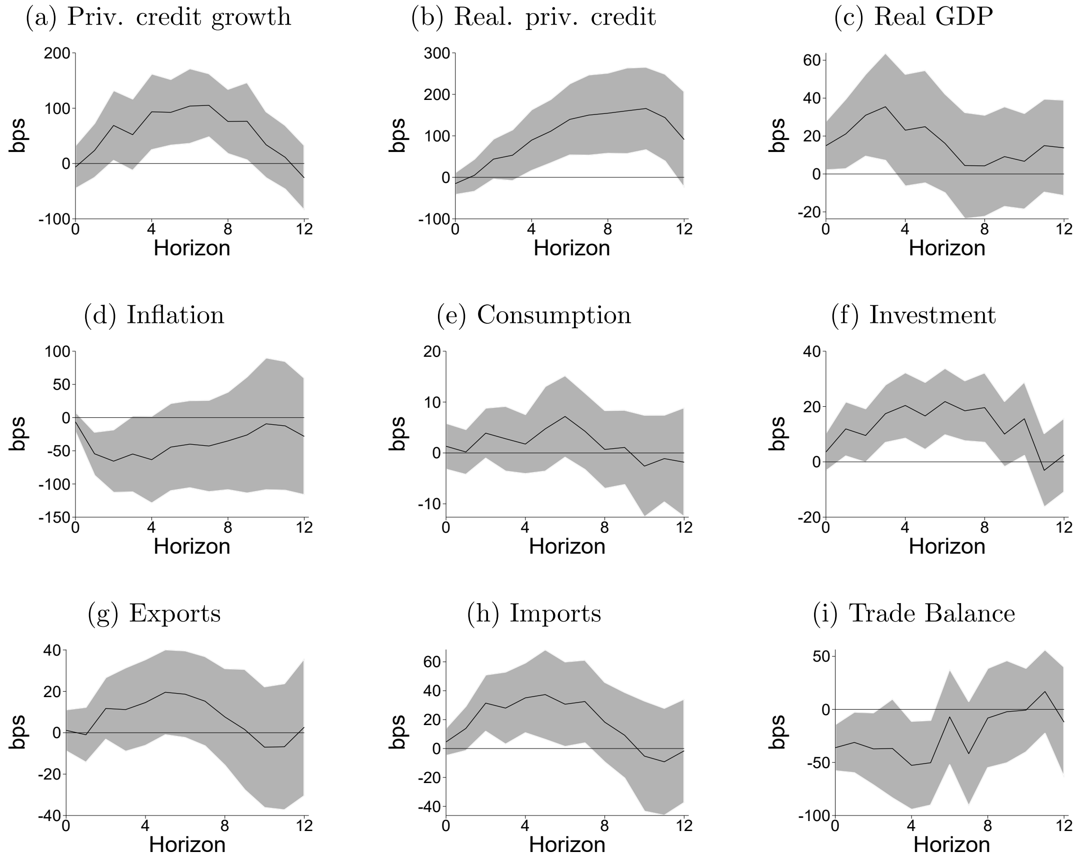
Notes: This figure shows the median, 25th, and 75th percentiles of the excess Herfindahl index (left-hand panel) and the Gini coefficient (right-hand panel) for cross-border bank claims on EMEs. Excess Herfindahl is computed as $h_{i,t} = \sqrt{-\frac{1}{N} + \sum_j^N S_{j,t}^2}$, where i, t and j index the recipient country, year and lender country respectively. The sample of recipient countries comprises 22 EMEs, as presented in Table 1.

Figure 6: Cumulative causal effect of international bank lending on financial variables



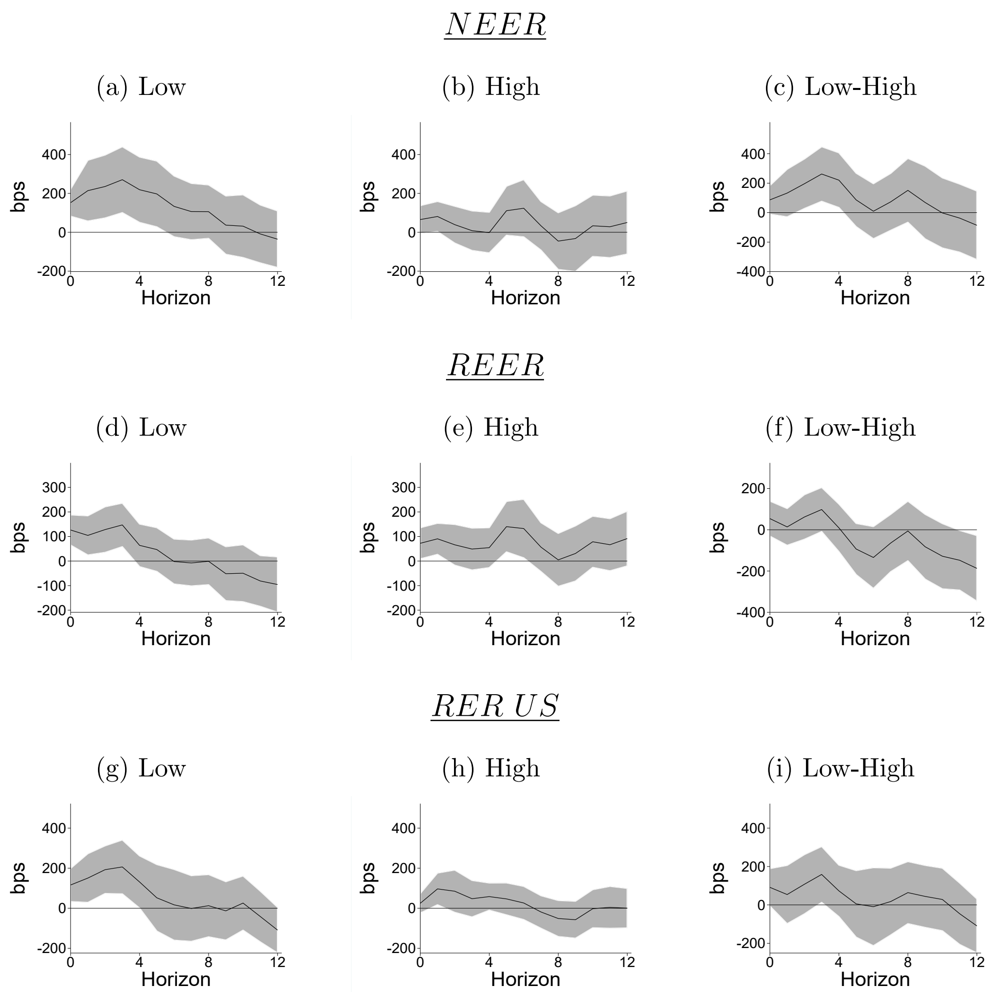
Notes: This panel shows the cumulative impact of a one standard deviation exogenous international banking lending (black like) and its 90% confidence interval (grey area) on: the log of the nominal effective exchange rate ($NEER$), log of real effective exchange rate ($REER$), log of the bilateral real exchange rate vis-à-vis the US dollar ($RER\,US$), domestic short-term interest rates, domestic long-term interest rates, sovereign spread (in USD), corporate spread (in USD), equity prices measured by the price-to-earnings ratio, a standarized financial conditions index (FCI) which decreases when financial conditions are looser, and the log of real housing price index. The country sample is presented in Table 1, with data from 1990Q1 to 2018Q4. The estimation is done by 2SLS using our GIV as instrument. Standard errors are robust to heteroskedasticity and autocorrelation.

Figure 7: Cumulative causal effect of international bank lending on macro variables



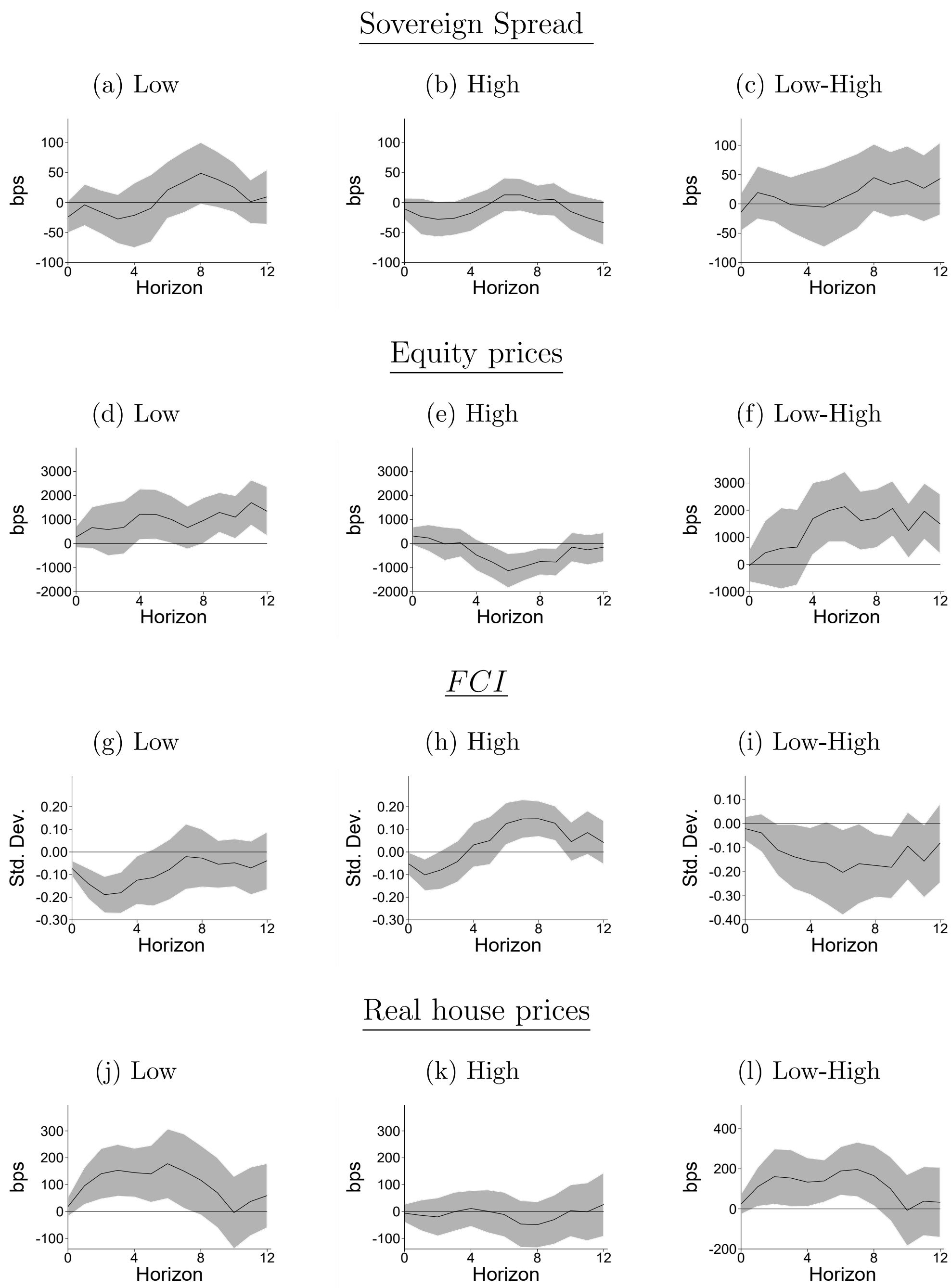
Notes: This panel shows the cumulative impact of a one standard deviation exogenous international banking lending (black like) and its 90% confidence interval (grey area) on the log real private domestic credit, private domestic credit quarterly growth, log real gross domestic product ($RGDP$), log change (year-on-year) in consumption price index, log real private consumption, log real investment, log real imports, and log real exports, and the trade balance as a share of GDP. The country sample is presented in Table 1, with data from 1990Q1 to 2018Q4. The estimation is done by 2SLS using our GIV as instrument. Standard errors are robust to heteroskedasticity and autocorrelation.

Figure 8: Cumulative causal effect of international bank lending on selected financial variables (rows) for low, high capital controls, and their difference (columns)



Notes: This Figure shows the total cumulative impact of a one standard deviation exogenous international bank lending on selected financial variables for “low” and “high” levels of controls to capital inflows (measured with the index in Fernández et al. (2016) and groups defined as in Section 4), and the differential cumulative effect of “high” relative to “low” levels of capital controls. The country sample corresponds to Table 1, with data from 1990Q1 to 2018Q4. The estimation is done by 2SLS using our GIV as instrument. Standard errors are robust to heteroskedasticity and autocorrelation.

Figure 9: Cumulative causal effect of international bank lending on selected financial variables (rows) for low, high capital controls, and their difference (columns)

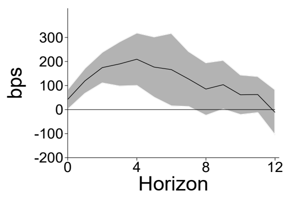


Notes: This Figure shows the total cumulative impact of a one standard deviation exogenous international bank lending on selected financial variables for "low" and "high" levels of controls to capital inflows (measured with the index in Fernández et al. (2016) and groups defined as in Section 4), and the differential cumulative effect of "high" relative to "low" levels of capital controls. The country sample corresponds to Table 1, with data from 1990Q1 to 2018Q4. The estimation is done by 2SLS using our GIV as instrument. Standard errors are robust to heteroskedasticity and autocorrelation.

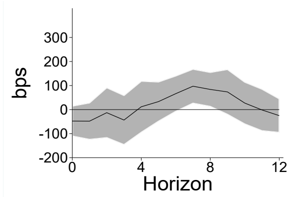
Figure 10: Cumulative causal effect of international bank lending on selected macro variables (rows) for low , high capital controls, and their difference (columns)

Credit growth

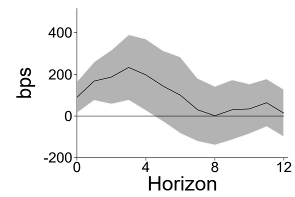
(a) Low



(b) High

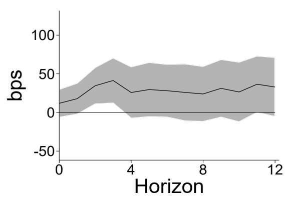


(c) Low-High

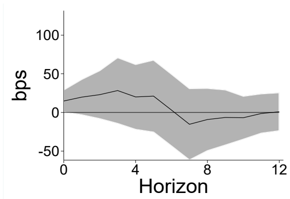


Real GDP

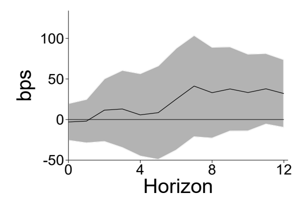
(d) Low



(e) High

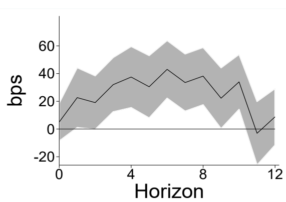


(f) Low-High

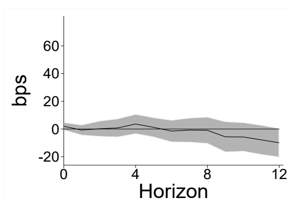


Investment

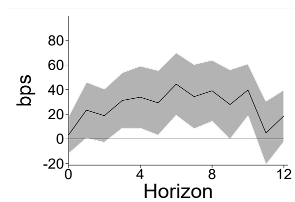
(g) Low



(h) High

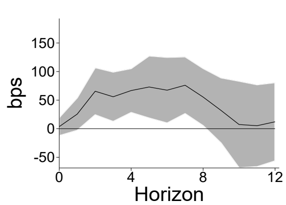


(i) Low-High

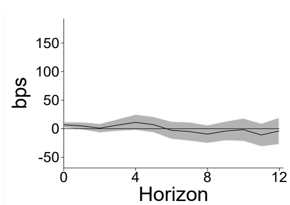


Imports

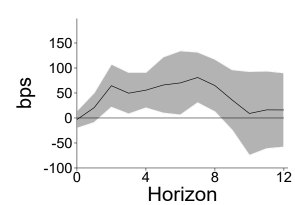
(j) Low



(k) High

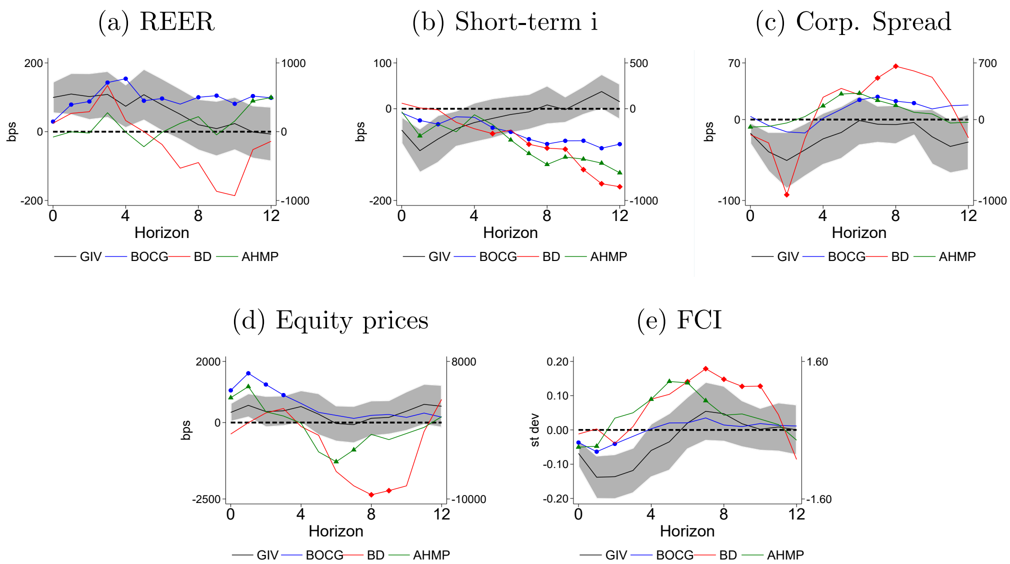


(l) Low-High



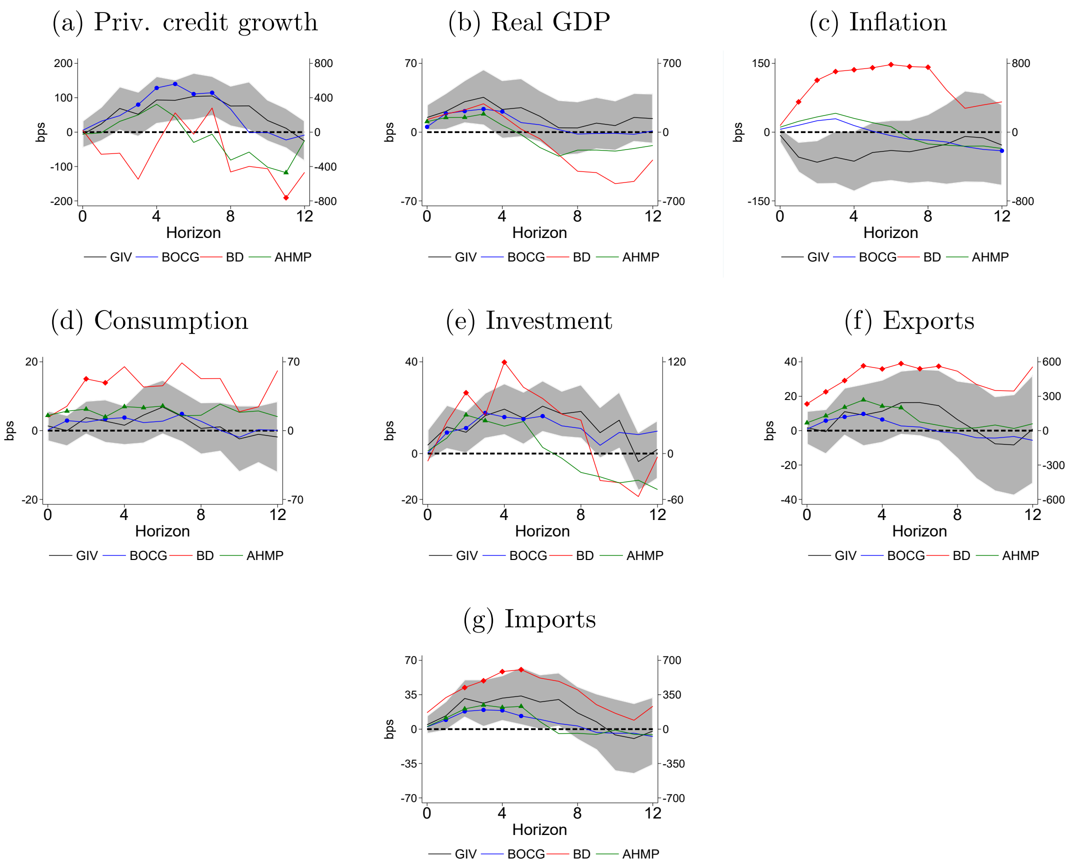
Notes: This Figure shows the total cumulative impact of a one standard deviation exogenous international bank lending on selected macro variables for "low" and "high" levels of controls to capital inflows (measured with the index in Fernández et al. (2016) and groups defined as in Section 4), and the differential cumulative effect of "high" relative to "low" levels of capital controls. The country sample corresponds to Table 1, with data from 1990Q1 to 2018Q4. The estimation is done by 2SLS using our GIV as instrument. Standard errors are robust to heteroskedasticity and autocorrelation.

Figure 11: Cumulative causal effect of international bank lending using GIV (left-hand axis) and alternative instrumental variables (right-hand axis) for selected financial variables



Notes: This Figure compares the cumulative impact of a one standard deviation exogenous international bank lending shock with three instruments on selected variables. The black line and grey area shows the point estimate and 90% confidence interval of our GIV as in Figures 6 and 7. The colored lines show the estimated effect of alternative IVs and have markers when it is significative at a 90%. The blue line shows the estimated effect of constructing an IV as Blanchard et al. (2016) ($BOCG$) using the LBSR data, the red line shows the estimated effect of using US broker-dealers' leverage (BD) as IV, and the green line shows the estimated effect of using the "common" component of Avdjiev et al. (2020). The selected variables are the log of real effective exchange rate ($REER$), domestic short-term interest rates, corporate spread (in USD), equity prices measured by the price-to-earnings ratio, and a standardized financial conditions index (FCI) which decreases when financial conditions are looser. The country sample is presented in Table 1, with data from 1990Q1 to 2018Q4. The estimation is done by 2SLS using each of the four IVs. Standard errors are robust to heteroskedasticity and autocorrelation.

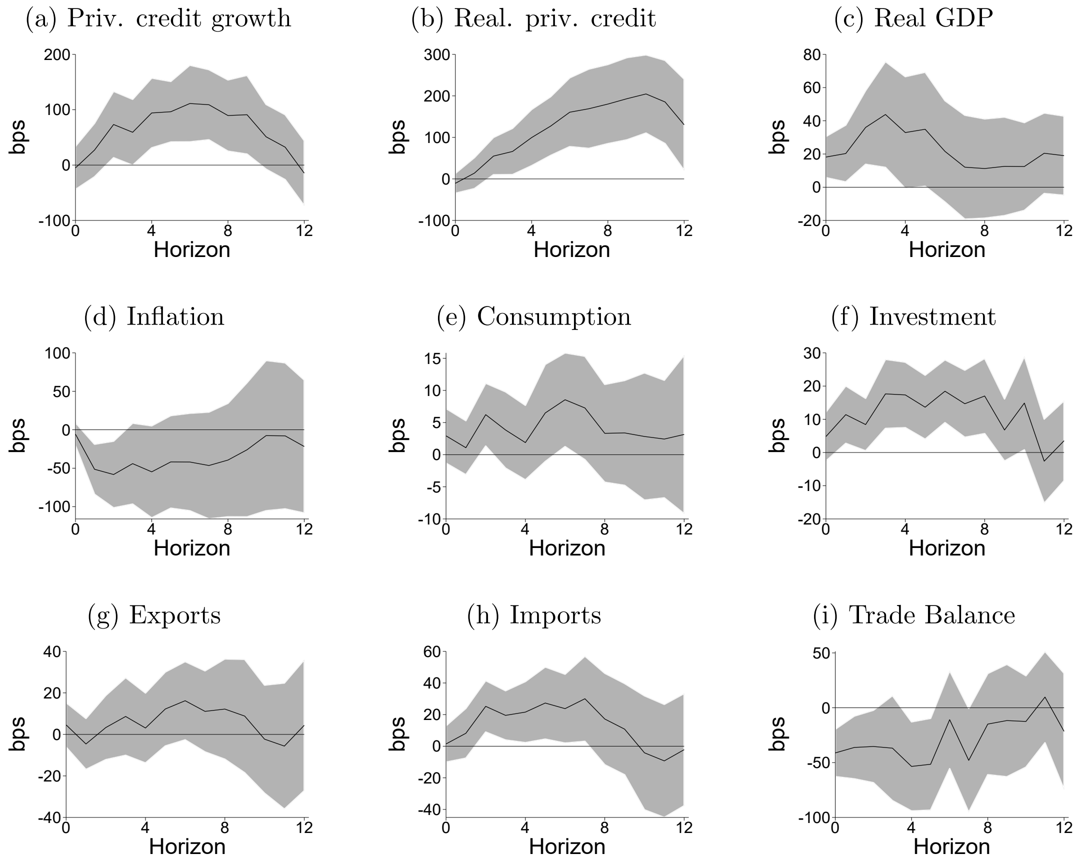
Figure 12: Cumulative causal effect of international bank lending using GIV (left-hand axis) and alternative instrumental variables (right-hand axis) for selected macro variables



Notes: This Figure compares the cumulative impact of a one standard deviation exogenous international bank lending shock with three instruments on selected variables. The black line and grey area shows the point estimate and 90% confidence interval of our GIV as in Figures 6 and 7, the blue line shows the point estimate (with markers when it is significative at a 90%) corresponding to using an IV constructed as in Blanchard et al. (2016) (*BOCG*) but with LBSR data, the red line shows the point estimate (with markers when it is significative at a 90%) corresponding to using US Broker Dealers' leverage (*BD*) as IV, and the green line shows the estimated effect of using the "common" component of Avdjiev et al. (2020). The selected variables are domestic private credit growth, real GDP growth, inflation, investment, consumption exports and imports. The country sample is presented in Table 1, with data from 1990Q1 to 2018Q4. The estimation is done by 2SLS using each of the four IVs. Standard errors are robust to heteroskedasticity and autocorrelation.

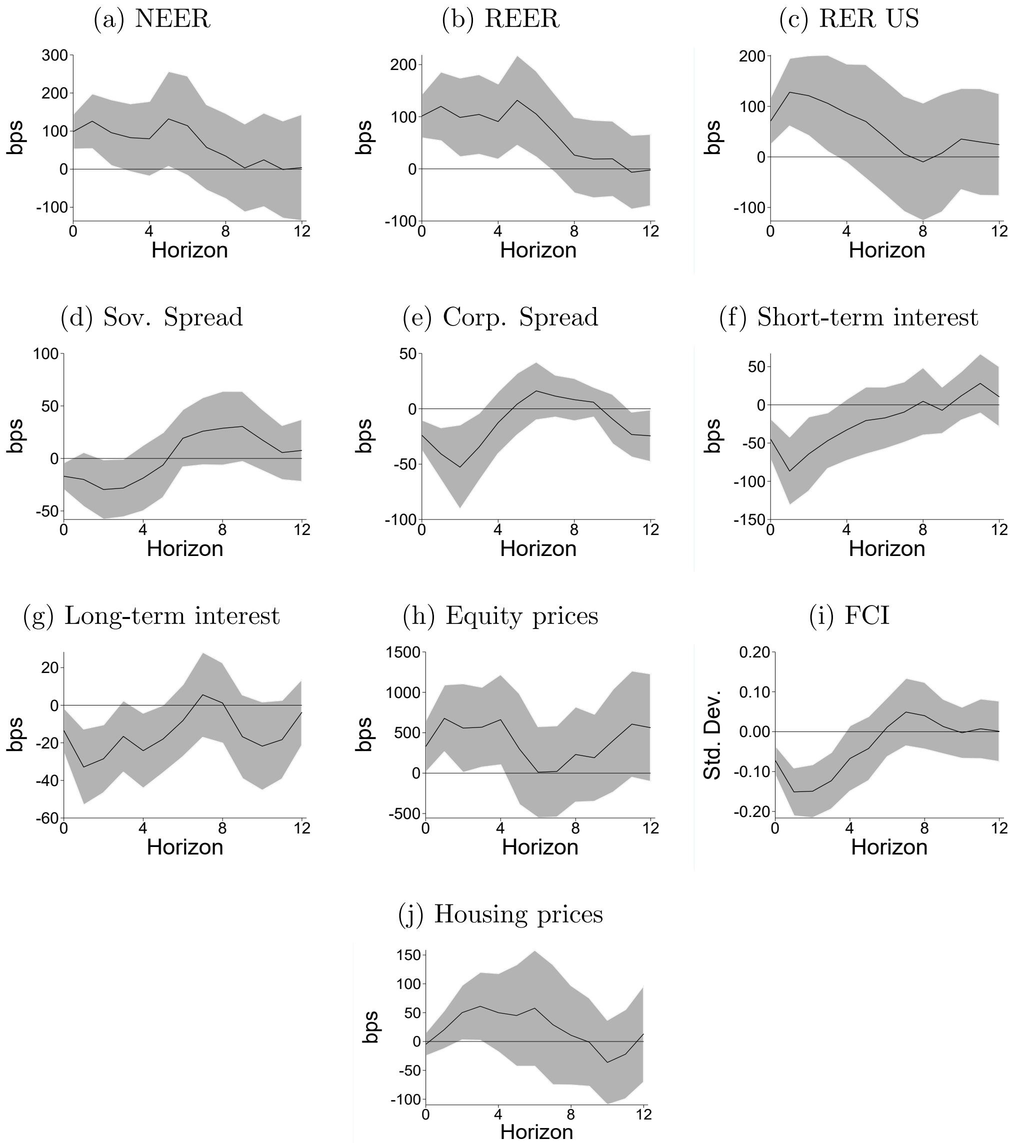
B Robustness checks – Figures

Figure 14: Effect of international bank lending on macro variables – constant sample



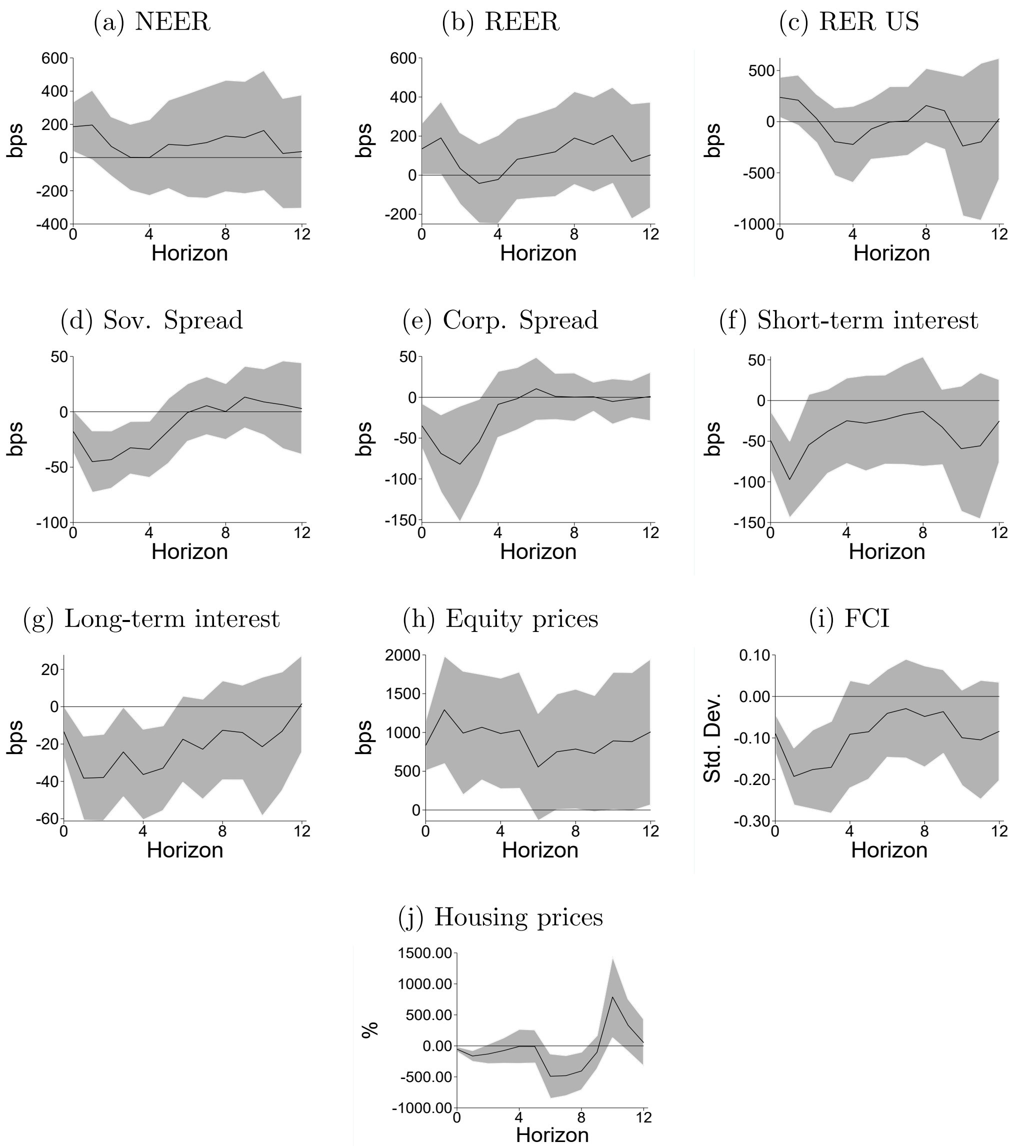
Notes: Robustness check: constant sample of reporting countries. The Figure shows the cumulative impact of a one standard deviation exogenous international banking lending (black like) and its 90% confidence interval (grey area) on the log real private domestic credit, private domestic credit quarterly growth, log real gross domestic product ($RGDP$), log change (year-on-year) in consumption price index, log real private consumption, log real investment, log real imports, and log real exports, and the trade balance as a share of GDP. The borrower country sample is presented in Table 1, with data from 1990Q1 to 2018Q4. The estimation is done by 2SLS using our GIV as instrument. Standard errors are robust to heteroskedasticity and autocorrelation.

Figure 13: Effect of international bank lending on financial variables – constant sample



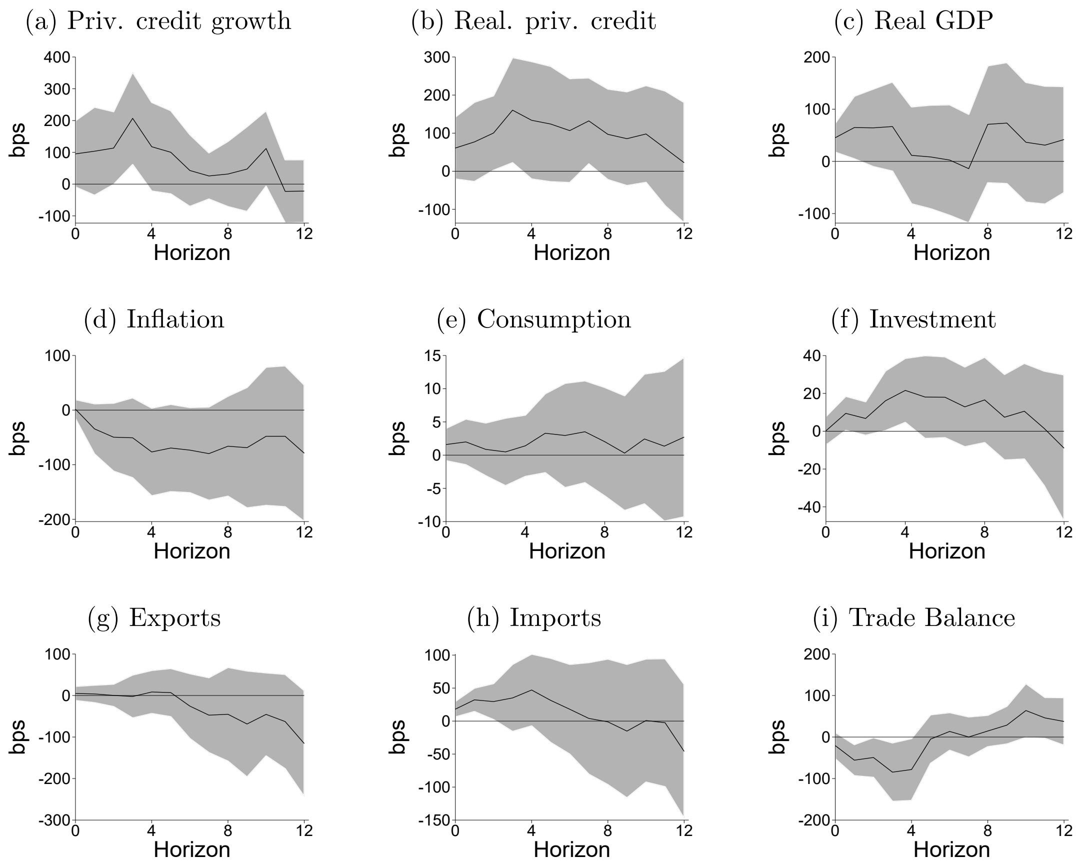
Notes: Robustness check: constant sample of reporting countries. The Figure shows the cumulative impact of a one standard deviation exogenous international banking lending (black like) and its 90% confidence interval (grey area) on: the log of the nominal effective exchange rate ($NEER$), log of real effective exchange rate ($REER$), log of the bilateral real exchange rate vis-à-vis the US dollar ($RER\ US$), domestic short-term interest rates, domestic long-term interest rates, sovereign spread (in USD), corporate spread (in USD), equity prices measured by the price-to-earnings ratio, a standarized financial conditions index (FCI) which decreases when financial conditions are looser, and the log of real housing price index. The borrower country sample is presented in Table 1, with data from 1990Q1 to 2018Q4. The estimation is done by 2SLS using our GIV as instrument. Standard errors are robust to heteroskedasticity and autocorrelation.

Figure 15: Effect of international bank lending on financial variables – alternative method for extracting factors



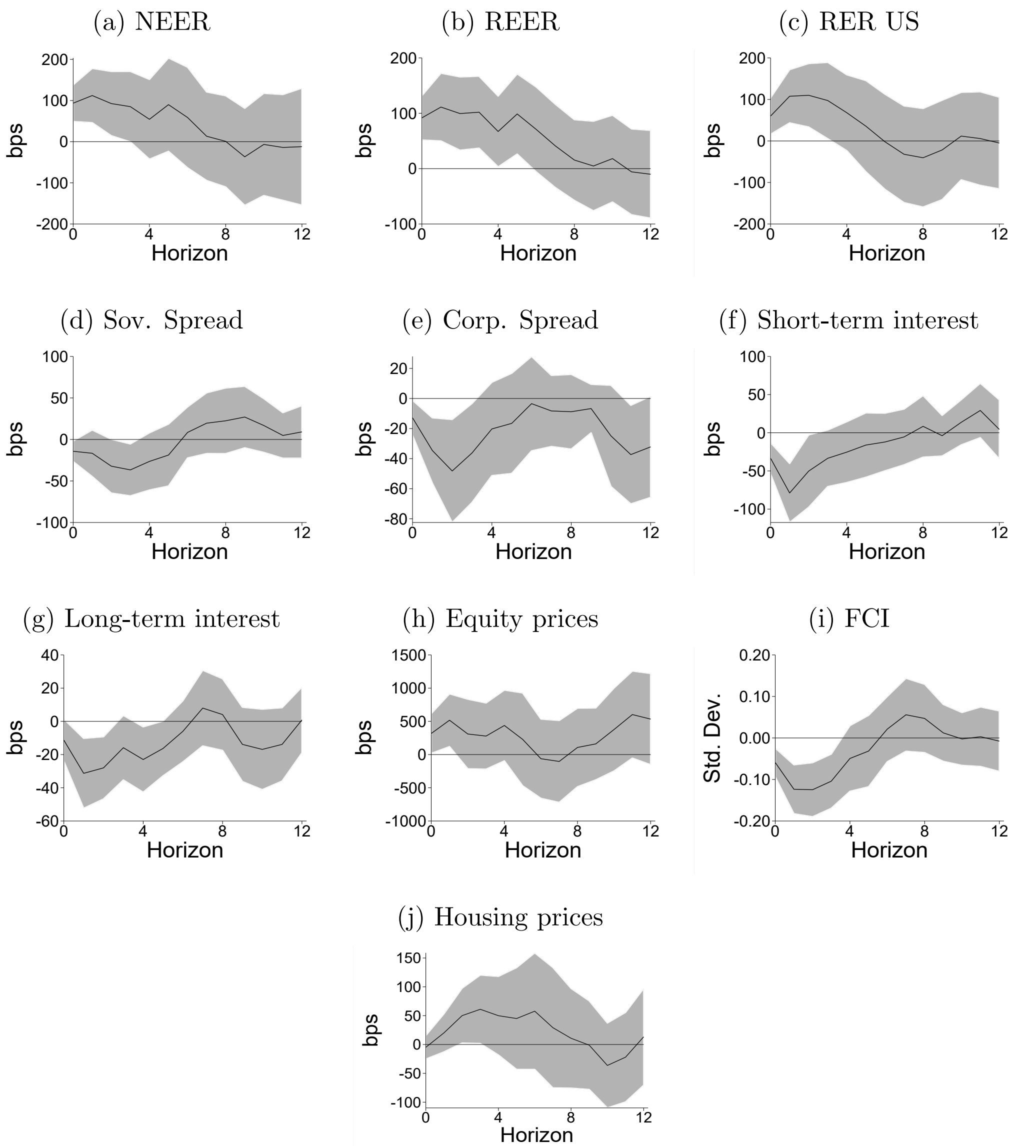
Notes: Robustness check: endogenous factors are extracted using the parallel analysis method as in Horn (1965) instead of the method of Bai and Ng (2002). The Figure shows the cumulative impact of a one standard deviation exogenous international banking lending (black like) and its 90% confidence interval (grey area) on: the log of the nominal effective exchange rate ($NEER$), log of real effective exchange rate ($REER$), log of the bilateral real exchange rate vis-à-vis the US dollar ($RER\ US$), domestic short-term interest rates, domestic long-term interest rates, sovereign spread (in USD), corporate spread (in USD), equity prices measured by the price-to-earnings ratio, a standarized financial conditions index (FCI) which decreases when financial conditions are looser, and the log of real housing price index. The borrower country sample is presented in Table 1, with data from 1990Q1 to 2018Q4. The estimation is done by 2SLS using our GIV as instrument. Standard errors are robust to heteroskedasticity and autocorrelation.

Figure 16: Effect of international bank lending on macro variables – alternative method for extracting factors



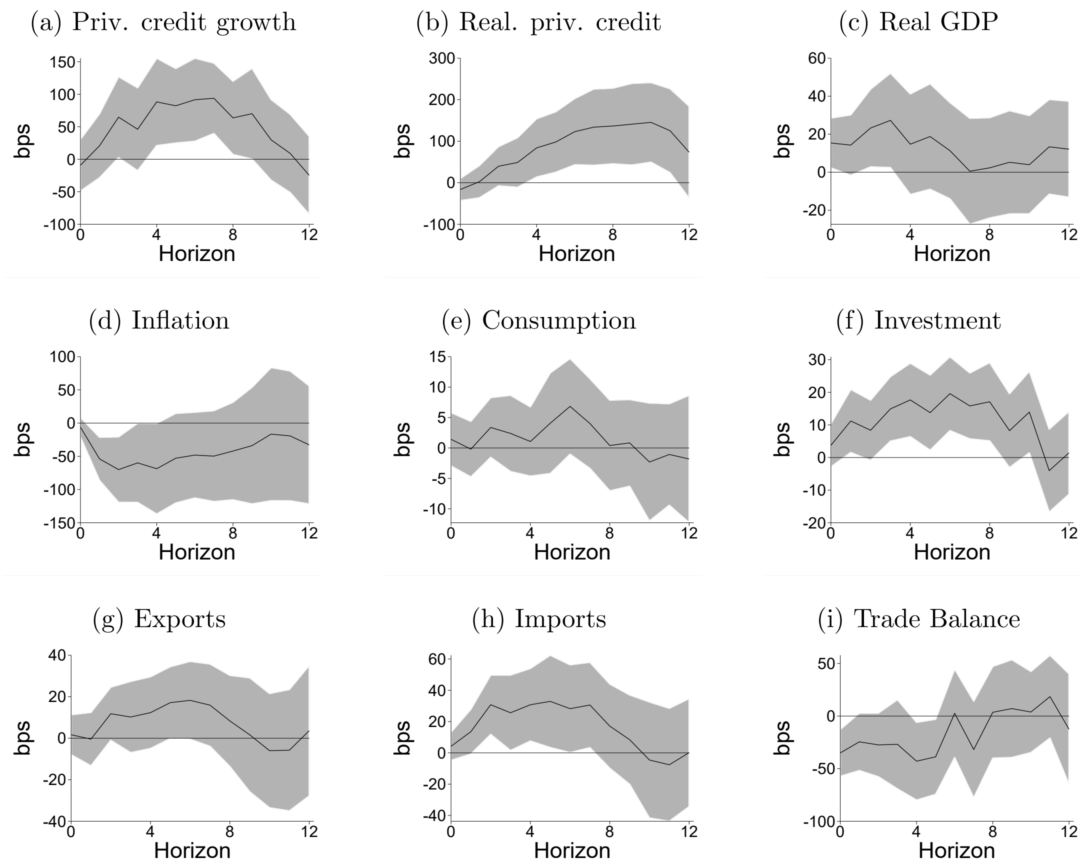
Notes: Robustness check: endogenous factors are extracted using the parallel analysis method as in Horn (1965) instead of the method of Bai and Ng (2002). The Figure shows the cumulative impact of a one standard deviation exogenous international banking lending (black like) and its 90% confidence interval (grey area) on the log real private domestic credit, private domestic credit quarterly growth, log real gross domestic product ($RGDP$), log change (year-on-year) in consumption price index, log real private consumption, log real investment, log real imports, and log real exports, and the trade balance as a share of GDP. The borrower country sample is presented in Table 1, with data from 1990Q1 to 2018Q4. The estimation is done by 2SLS using our GIV as instrument. Standard errors are robust to heteroskedasticity and autocorrelation.

Figure 17: Effect of international bank lending on financial variables – excluding crises



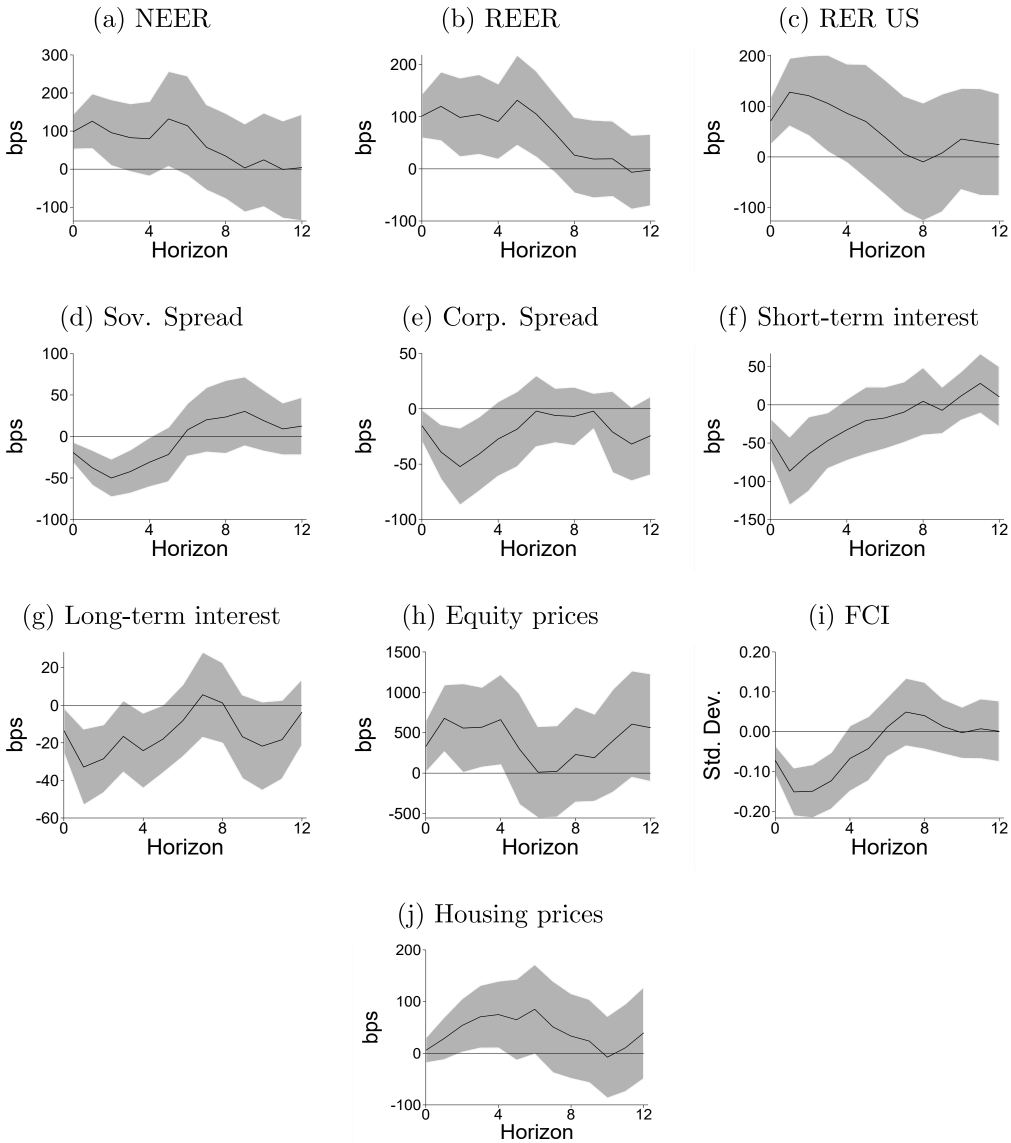
Notes: Robustness check: excluding crises (see Table 11). The Figure shows the cumulative impact of a one standard deviation exogenous international banking lending (black like) and its 90% confidence interval (grey area) on: the log of the nominal effective exchange rate ($NEER$), log of real effective exchange rate ($REER$), log of the bilateral real exchange rate vis-à-vis the US dollar ($RER\ US$), domestic short-term interest rates, domestic long-term interest rates, sovereign spread (in USD), corporate spread (in USD), equity prices measured by the price-to-earnings ratio, a standarized financial conditions index (FCI) which decreases when financial conditions are looser, and the log of real housing price index. The borrower country sample is presented in Table 1, with data from 1990Q1 to 2018Q4. The estimation is done by 2SLS using our GIV as instrument. Standard errors are robust to heteroskedasticity and autocorrelation.

Figure 18: Effect of international bank lending on macro variables – excluding crises



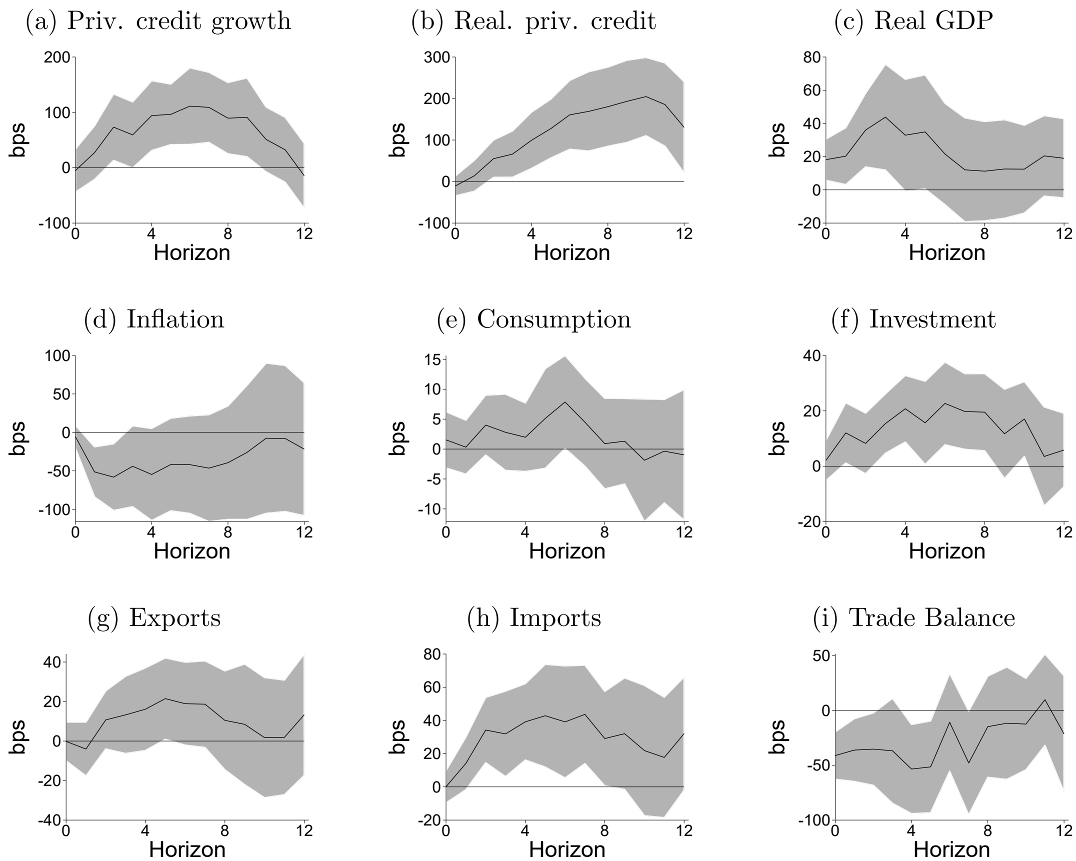
Notes: Robustness check: excluding crises (see Table 11). The Figure shows the cumulative impact of a one standard deviation exogenous international banking lending (black like) and its 90% confidence interval (grey area) on the log real private domestic credit, private domestic credit quarterly growth, log real gross domestic product ($RGDP$), log change (year-on-year) in consumption price index, log real private consumption, log real investment, log real imports, and log real exports, and the trade balance as a share of GDP. The borrower country sample is presented in Table 1, with data from 1990Q1 to 2018Q4. The estimation is done by 2SLS using our GIV as instrument. Standard errors are robust to heteroskedasticity and autocorrelation.

Figure 19: Effect of international bank lending on financial variables – excluding potentially problematic lenders around crises



Notes: Robustness check: manually excluding potentially problematic lenders in crises episodes (see Table 11). The Figure shows the cumulative impact of a one standard deviation exogenous international banking lending (black like) and its 90% confidence interval (grey area) on: the log of the nominal effective exchange rate ($NEER$), log of real effective exchange rate ($REER$), log of the bilateral real exchange rate vis-à-vis the US dollar ($RER\ US$), domestic short-term interest rates, domestic long-term interest rates, sovereign spread (in USD), corporate spread (in USD), equity prices measured by the price-to-earnings ratio, a standarized financial conditions index (FCI) which decreases when financial conditions are looser, and the log of real housing price index. The borrower country sample is presented in Table 1, with data from 1990Q1 to 2018Q4. The estimation is done by 2SLS using our GIV as instrument. Standard errors are robust to heteroskedasticity and autocorrelation.

Figure 20: Effect of international bank lending on macro variables – excluding potentially problematic lenders around crises



Notes: Robustness check: manually excluding potentially problematic lenders in crises episodes (see Table 11). The Figure shows the cumulative impact of a one standard deviation exogenous international banking lending (black like) and its 90% confidence interval (grey area) on the log real private domestic credit, private domestic credit quarterly growth, log real gross domestic product ($RGDP$), log change (year-on-year) in consumption price index, log real private consumption, log real investment, log real imports, and log real exports, and the trade balance as a share of GDP. The borrower country sample is presented in Table 1, with data from 1990Q1 to 2018Q4. The estimation is done by 2SLS using our GIV as instrument. Standard errors are robust to heteroskedasticity and autocorrelation.

C GIVs and bank lending growth decompositions

In this Appendix we compare our approach with a decomposition based on the seminal contribution by Amiti and Weinstein (2018). The original methodology in Amiti and Weinstein (2018) was devised to separate firm demand shocks from bank supply shocks in the context of bank-firm lending data.[52] The method was subsequently applied to BIS Consolidated Banking Statistics in Amiti et al. (2019), who decompose bank lending growth rates into common, idiosyncratic supply and idiosyncratic demand factors.

Recently, Avdjiev et al. (2020) (AHMP henceforth) apply the method to the three banking datasets of the BIS, including the one we focus on here (LBSR). They decompose US dollar-denominated cross-border bank claims from the LBSR into three components: a "common" component that can be thought of capturing the global financial cycle, a "host" component that captures developments that affect lender countries' claims, and a "borrower" component captures developments on the recipient country end. This last component captures both developments that are specific to each recipient country but also the idiosyncratic shocks to the bilateral lending relationship between that recipient country and each lender country.[53] Put differently, a particular EME can be exposed to a shock to the international bank lending it receives, that simultaneously affects all other EMEs. That would be a "common" shock. This EME could also be affected by a shock that is specific to one of its sources of lending (e.g. a regulation change in a given lender country that does not spillover to other lender countries); that would be captured by "host". Lastly, international bank lending to this EME could change due to some shock within its borders (e.g. a policy change) or some change specific to a bilateral lending relationship such as one source country changing its lending to that particular EME.

The validity of our GIVs could be questioned if they were to be correlated with the "common" or "host" component.[54] Given that "borrower" captures a domestic "factor" and the idiosyncratic bilateral shocks, this exercise is not sufficient to ensure the excludability of our GIVs. For that, we trust that our conservative approach to estimate factors and extract truly idiosyncratic bilateral shocks grants us a clean identification strategy.

We compare our GIVs with the decomposition in AHMP in three ways. As a first pass, we test whether the endogenous factors we remove from the data (see section 3.2) to extract idiosyncratic

[52] The method is a variation on weighted least squares that can also accommodate the appearance of new lending relationships. It therefore can exactly decompose macro moments in the data into the contributions of lenders, borrowers and a common factor.

[53] The goal of the exercise in Avdjiev et al. (2020) is entirely different from the one pursued here. They use the decomposition as part of a larger regression exercise to disentangle the effect of home versus host country prudential and monetary policies, as well as the spillovers generated by them.

[54] In the main body of the paper we also consider these two as alternative instruments for cross-border bank lending shocks.

bilateral lending shocks are indeed capturing global shocks ("common"), shocks to lender countries ("host"), and/or aggregate shocks in recipient EMEs ("borrower"). To do so, we build a measure of the endogenous factors as follows:

$$E_{i,t} = \sum_k \hat{\hat{\lambda}}_{k,i} \hat{F}^i_k \tag{16}$$

where $\hat{\hat{\lambda}}_{k,i}$ is the estimated aggregate exposure to the estimated factor $\hat{F}^i_k$ (with k being the number of factors). This measure captures the aggregate growth of claims that is explained by the estimated endogenous factors.

We then estimate the following regression:

$$E_{i,t} = \beta_b borrower_{i,t} + \beta_h host_{i,t} + \beta_c common_t + \delta_i + \nu_{i,t}, \tag{17}$$

where *borrower*, *host*, and *common* come from AHMP,[55] δ_i is a country fixed effect and $\nu_{i,t}$ is an unobservable variable.

Columns (1) to (3) in Table 12 shows the results for different time periods (full sample, pre- and post-GFC). Overall, the three components from AHMG are highly significant and positively correlated with the endogenous factors we extract with our methodology.[56]

Our second test consists of analyzing the correlation of our GIVs with the three components in the AHMP decomposition. Columns (4) to (6) in Table 12 presents the results. Our instrumental variable is not correlated with the common shock, which is consistent with the findings in section 7.1. It is not correlated with the "host" shock either. Instead, it exhibits a stronger correlation with the "borrower" factors. Our interpretation is that our instrument captures shocks that are specific to the bilateral credit relationships that are not correlated to other confounding factors specific to the lending country. For instance, monetary policy shocks in the US might disproportionately affect lending from the US to all the destination countries. At the same time, US monetary policy affects domestic conditions through other channels. The evidence provided in Table 12 captures the fact that our filtering process cleans these confounding factors.

[55] Avdjiev et al. (2020) decompose cross-border bank lending in USD. We apply their methodology to lending in all currencies.

[56] The significance of the host and common factors depends on the sample considered. In particular, post great financial crisis, these factors become more important when explaining the commonality of bilateral flows across countries, which is consistent with Amiti et al. (2019).

Table 12: Avdjiev et al. (2020) decomposition, endogenous factors and GIVs

VARIABLES	(1) $E_{i,t}$	(2) $E_{i,t}$	(3) $E_{i,t}$	(4) GIV	(5) GIV	(6) GIV
Host	0.0862*	0.225***	-0.0255	0.0137	-0.00240	0.0133
	(0.0453)	(0.0684)	(0.0393)	(0.0150)	(0.0277)	(0.0161)
Borrower	0.196***	0.214***	0.169***	0.0285***	0.0233***	0.0397***
	(0.00754)	(0.00850)	(0.0149)	(0.00656)	(0.00775)	(0.00842)
Common	0.182***	0.188***	-0.0827	-0.0226	-0.0261	-0.0288
	(0.0245)	(0.0237)	(0.0948)	(0.0153)	(0.0163)	(0.0343)
Observations	2,371	1,579	880	2,371	1,579	880
R-squared	0.2397	0.3388	0.0977	0.0193	0.0137	0.0401
Countries	22	22	22	22	22	22
Sample Period	Full	Pre-GFC	Post-GFC	Full	Pre-GFC	Post-GFC

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

Notes: This table shows the results of regressing our measure of estimated endogenous factors in columns (1) to (3) (see equation 16) and our GIV ($z_{i,t}^{GIV}$) in columns (4) to (6) on Avdjiev et al. (2020) exact decomposition of international bank lending growth rates into "common", "borrower", and "host" components in Columns (1) to (3), including country fixed effects.

Our third test consists of analyzing how our estimated idiosyncratic shocks correlate with the decomposition in AHMP. We show that only for large lenders there is a positive correlation with "borrower" factors. We regress all the idiosyncratic shocks (alternatively, those from the most important regions – whose bilateral share is higher than 20% – or the largest lender only) on the three components from AHMP's decomposition. Columns 1 to 3 in Table 13 present the results. We find that the estimates are statistically significant only for large lenders. This gives us some reassurance, as on average all the shocks are not correlated – only through those countries that can have an aggregate effect on banking flows. As a final test, column 4 in Table 13 shows that the average shock $\bar{u}_{i,t}$ (see equation (4)) is not correlated with any measure from AHMP's decomposition.

Table 13: Avdjiev et al. (2020) decomposition and idiosyncratic shocks

VARIABLES	(1) Id. Shocks	(2) Id. Shocks	(3) Id. Shocks
Common	0.0271	0.170	0.0706
	(0.0651)	(0.235)	(0.248)
Host	0.0104	-0.0910	0.113
	(0.0825)	(0.138)	(0.157)
Borrower	-0.00276	0.206*	0.203*
	(0.0188)	(0.118)	(0.0979)
Observations	38,098	2,245	2,724
R-squared	0.000	0.007	0.006
Lender Sample	All	Top 1	Top 20

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

Notes: This table shows the results of regressing our standardized bilateral shocks ($u_{i,j,t}$) on Avdjiev et al. (2020) exact decomposition of international bank lending growth rates into "common", "borrower", and "host" components.

Taken together, the findings from this section suggest that: (i) the filtered factors capture information that should be excluded from a valid instrument, as they are correlated with the global shocks and aggregate shocks to lenders; (ii) our GIVs are uncorrelated with global and aggregate shocks to lenders, and somewhat correlated with the partition of the data ("borrower") that partly captures idiosyncratic bilateral shocks; and (iii) only the largest idiosyncratic shocks are correlated with the "borrower" factor, thus in line with the size-based identification strategy we pursue.

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