Global Banks' Spillovers to Emerging Markets

Macro to Micro Transmission

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Abstract

We study the macroeconomic and microeconomic transmission of global bank credit supply shocks to Emerging Market Economies (EMEs). Using the identification strategy of Ottonello and Song [2022], which exploits high-frequency co-movements between global banks' net worth and credit spreads, we isolate exogenous shifts in global credit supply. Positive shocks ease financial conditions in EMEs, boosting capital inflows, domestic credit, and real activity. These effects are robust across countries, specifications, and alternative estimation methods. Using detailed administrative data from Uruguay, we show that less leveraged and more liquid banks expand lending more aggressively following global credit easing. At the firm level, borrowing responses are systematically smaller for more indebted firms, particularly those with weaker collateral or credit quality. These results suggest that financial heterogeneity shapes the international transmission of global credit supply shocks, with balance sheet strength playing a central role in determining which banks and firms benefit most from favorable global financial conditions.

Keywords: Global Banks; Financial intermediaries; Emerging markets; International Spillovers; Exchange Rate; Firm Transmission;

JEL Codes: F40, F41, E44, E51.

1 Introduction

Global banks play a critical role in transmitting financial conditions across borders, particularly to emerging market economies (EMEs). Shifts in the net worth of global financial intermediaries affect their lending capacity and cross-border exposures, amplifying or dampening capital flows and domestic credit conditions in recipient countries. However, empirically isolating exogenous credit supply shocks originating from global banks remains challenging, as bank stock prices often reflect a combination of supply, demand, and aggregate macroeconomic shocks.

This paper provides new evidence on the transmission of global bank credit supply shocks into EMEs, combining novel high-frequency identification with rich macroeconomic, bank-level, and firm-level data. Our identification strategy builds on Ottonello and Song [2022], who extract exogenous variation in global banks' net worth from intraday stock price reactions during quarterly earnings announcement windows. We focus on the purged component of these stock price surprises that co-moves with the Excess Bond Premium (EBP), thereby isolating credit supply shocks that directly affect financial intermediation capacity, while filtering out shifts in borrower fundamentals or aggregate demand.

Our paper contributes to several strands of the literature. First, we add to the growing literature on the international transmission of financial shocks (e.g., Rey [2015], Bernanke et al. [1994], Miranda-Agrippino and Rey [2020]), by providing direct evidence on the role of global bank balance sheets as an exogenous driver of financial conditions in EMEs. Second, we contribute to the literature on financial intermediaries and credit supply (e.g. Bruno and Shin [2015], Ottonello and Song [2022]) by showing that bank-level and firm-level balance sheet heterogeneity shapes the propagation of global credit supply shocks within domestic financial systems. Third, we build on recent work using credit registry data to study firm-level credit constraints (e.g. Ottonello and Winberry [2020], Di Giovanni et al. [2022]), extending this evidence to the international transmission of global financial shocks.

We document three main findings. First, at the macro level, positive global credit supply shocks lead to persistent improvements in financial conditions, capital inflows, domestic credit growth, and real economic activity across EMEs. Second, at the bank level, we show that less leveraged and more liquid banks expand lending more aggressively in response to improved global financial conditions. Third, at the firm level, we find that more indebted firms exhibit smaller borrowing responses to global credit supply shocks, consistent with borrowing constraints operating along the intensive margin.

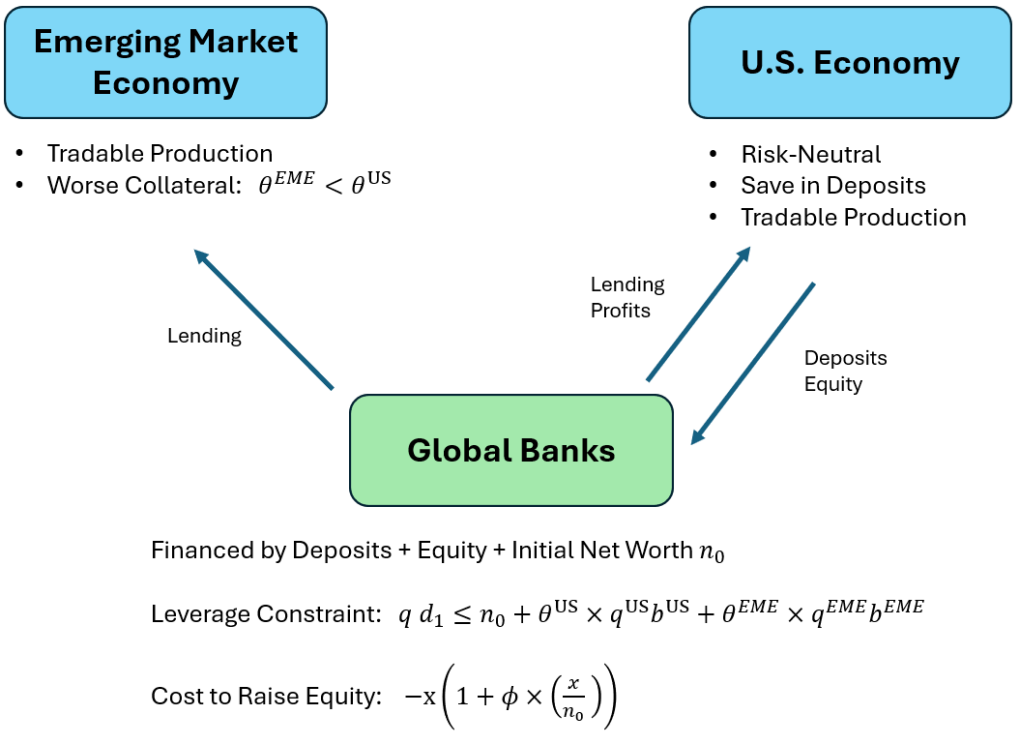
Overall, our findings highlight the importance of global financial intermediaries as an independent source of credit supply shocks for EMEs, and the key role of balance sheet heterogeneity, both across banks and firms, in amplifying or attenuating these shocks within domestic economies.

2 Identification Strategy

2.1 A Stylized Model of U.S. Global Banks

This subsection presents a two-period model that links U.S. intermediaries' net worth to global credit conditions, especially for EMEs. The key object is a leverage (collateral) constraint in which bank net worth relaxes the ability to raise deposits. This delivers the comparative statics that motivate our use of purged credit-supply shocks in the next subsection.

Figure 1: Structure of the Model Economy



Note: The global bank channels funds from U.S. households to firms in the U.S. and in Emerging Market Economies (EMEs). The bank's leverage constraint depends on the pledgeability of assets ($\theta^{US} > \theta^{EME}$) and its own net worth n_0. Higher net worth expands credit supply, particularly toward EMEs.

Environment. Time is $t \in \{0, 1\}$. Regions: the United States (U.S.) and an Emerging Market Economy (EME). U.S. households, nonfinancial firms, and a representative global bank (intermediary). EME firms borrow from the U.S. bank to finance capital. Loans are one-period; goods are tradable.

U.S. households and firms. U.S. households buy deposits d_1 and equity in firms or banks. Standard no-arbitrage implies $q_0^d = \beta$. Nonfinancial firms in both regions $j \in \{\text{U.S.}, \text{EME}\}$

choose k_1^j according to the Euler condition

$$\frac{1}{q_0^j} = \mathbb{E}_0\left[z_1^j\, \alpha (k_1^j)^{\alpha-1}\right],$$

where q_0^j is the loan price (its inverse is the gross borrowing rate).

U.S. global bank. The bank starts with net worth n_0, raises deposits d_1 and new equity x_0, and lends b_1^{US}, b_1^{EME}:

$$q_0^{US} b_1^{US} + q_0^{EME} b_1^{EME} = n_0 + x_0 + d_1.$$

The intermediary faces two frictions: a cost of raising external equity and a leverage (collateral) constraint that limits deposits as a function of asset pledgeability and its own net worth:

$$q_0^d d_1 \leq \theta^{US} q_0^{US} b_1^{US} + \theta^{EME} q_0^{EME} b_1^{EME} + \lambda n_0, \quad \text{with } 0 < \theta^{EME} < \theta^{US} < 1,\ \lambda > 0.$$

The parameters θ^{US} and θ^{EME} capture that U.S. loans are safer collateral (for instance, due to Basel III risk weights), while λn_0 formalizes that higher own capital relaxes the constraint.

Mechanism. When the constraint binds, its shadow cost $\mu > 0$ raises borrowing rates:

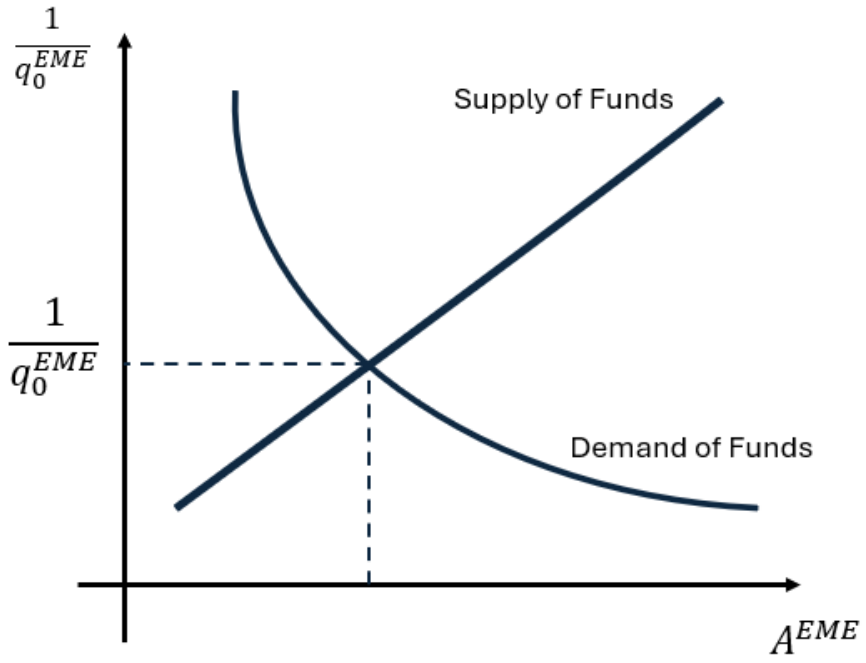
$$\frac{1}{q_0^j} = 1 + \frac{\mu}{\beta}(q_0^d - \theta^j),$$

and the EME–U.S. spread is proportional to the tightness of the constraint:

$$\frac{1}{q_0^{EME}} - \frac{1}{q_0^{US}} = \frac{\mu}{\beta}(\theta^{US} - \theta^{EME}).$$

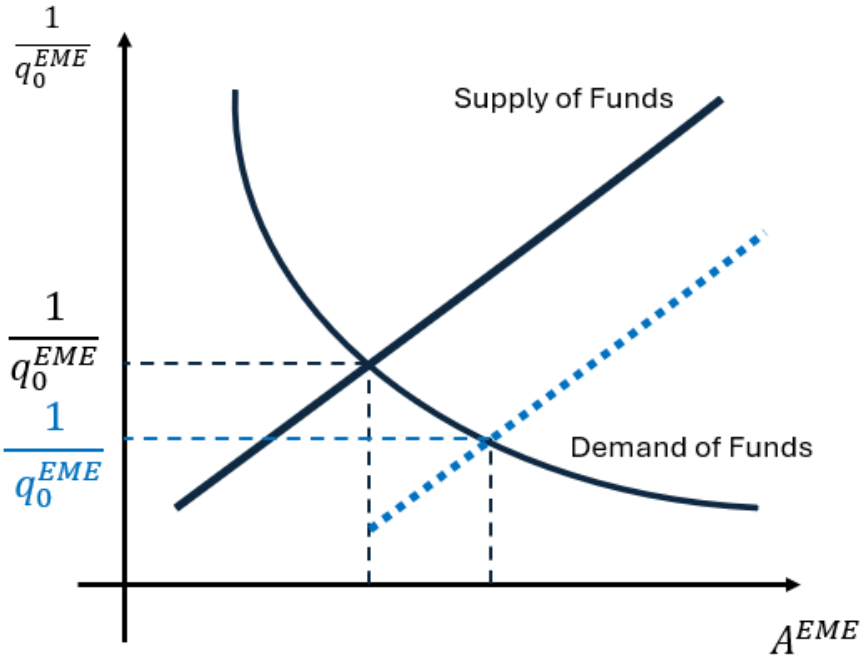
A higher n_0 increases the right-hand side of the leverage constraint, lowering μ and thereby reducing both borrowing rates and their spread. Thus, an increase in global banks' net worth expands the supply of funds to EMEs and lowers the cost of credit.

Figure 2: Equilibrium in the Market for EME Credit



Note: The intersection of credit demand and supply determines the EME borrowing rate $1/q_0^{EME}$. When bank net worth n_0 rises, the supply of funds shifts outward, leading to a higher equilibrium quantity of loans and a lower borrowing rate.

Figure 3: Effect of a Positive Net-Worth (Credit-Supply) Shock



Note: An increase in banks' net worth relaxes the leverage constraint, shifting the supply curve of funds outward. The equilibrium borrowing rate $1/q_0^{EME}$ declines, while credit to EMEs expands. This theoretical prediction motivates our empirical identification based on purged credit-supply shocks.

Interpretation and link to identification. The model clarifies that only shocks that raise the bank's net worth and thereby relax the leverage constraint reduce spreads and expand credit supply. This mechanism corresponds exactly to the purged credit-supply shocks of Ottonello and Song [2022], which isolate innovations in U.S. banks' market value of equity orthogonal to credit demand. Using non-purged shocks mixes these effects, blurring the μ channel and yielding weaker macro and micro responses. The next subsection describes the construction of these purged shocks in detail.

2.2 Measuring Global Bank Credit-Supply Shocks

To identify exogenous shifts in global banks' net worth and credit supply, we follow the high-frequency identification strategy proposed by Ottonello and Song [2022]. Their approach isolates *financial shocks* as unanticipated changes in large U.S. intermediaries' market value of net worth around their earnings announcements. The central idea is that, within a narrow intraday window, movements in intermediaries' stock prices reflect firm-specific information about their balance-sheet conditions rather than contemporaneous macroeconomic or policy news. These shocks therefore capture news about intermediaries' net worth that is orthogonal to the aggregate state of the economy.

Formally, for each intermediary i reporting earnings at time t, Ottonello and Song compute:

$$v_t^F = \theta_{i,q(t)} \cdot \Delta p_{F,i,t},$$

where $\Delta p_{F,i,t}$ is the change in the intermediary's log stock price in a 60-minute window centered on the earnings release, and $\theta_{i,q(t)}$ is its market capitalization share within the set of large financial intermediaries in the S&P 500. The resulting high-frequency financial shock v_t^F measures the weighted innovation to intermediaries' market value of net worth.

Using these shocks, they document that unexpected declines in financial intermediaries' net worth lead to persistent increases in credit spreads, higher excess bond premia, and contractions in output and employment. Crucially, however, the raw (or "non-purged") shocks incorporate information both about credit supply and about changes in credit demand, for example, news about nonfinancial firms' fundamentals contained in the earnings announcements. To focus on exogenous movements in credit supply, Ottonello and Song propose a decomposition that isolates the component of financial shocks that moves in opposite direction to firms' borrowing costs, proxied by the excess bond premium (EBP) of Gilchrist and Zakrajšek [2012].

Specifically, they decompose total financial shocks as:

$$v_t^F = v_t^{CS} + v_t^{CD},$$

where v_t^{CS} captures credit-supply shocks and v_t^{CD} captures credit-demand shocks. The decomposition exploits sign restrictions on the comovement between intermediaries' net-worth surprises and borrowing costs:

$$\text{corr}(v_t^{CS}, \Delta\text{EBP}_t) < 0, \quad \text{corr}(v_t^{CD}, \Delta\text{EBP}_t) > 0,$$

so that shocks that reduce intermediaries' net worth and raise the EBP are classified as adverse credit-supply shocks. The estimation proceeds via a Givens-rotation-based sign-restriction algorithm à la Jarociński and Karadi [2020], ensuring orthogonality between the two components and preserving the total variance of v_t^F:

$$\text{Var}(v^{CS}) + \text{Var}(v^{CD}) = \text{Var}(v^F).$$

The resulting purged credit-supply shocks, v_t^{CS}, represent exogenous shifts in the risk-bearing capacity of large global banks. These shocks are uncorrelated with contemporaneous demand-side news and provide a clean measure of variation in global banks' net worth that affects Emerging Market Economies through external funding channels. When we replicate the analysis below, we find that results using the non-purged shocks are weak and unstable, whereas those based on v_t^{CS} produce sharp and economically meaningful impulse responses. This reinforces the theoretical mechanism: the relevant shocks for global credit flows are those that operate through changes in banks' effective net worth and leverage capacity—i.e., genuine *credit-supply* shocks rather than composite financial shocks.

In the empirical sections that follow, we therefore use the purged credit-supply component of Ottonello and Song [2022] as our baseline measure of global bank net-worth shocks. The shocks are normalized to one standard deviation and aggregated to monthly frequency to match our macro and micro datasets.

3 Macroeconomic Impact

This section quantifies the macroeconomic consequences of changes in global banks' net worth for Emerging Market Economies (EMEs). We estimate how output, investment, trade, and exchange rates in EMEs respond to exogenous shifts in global bank balance-sheet strength, identified as credit-supply shocks following the approach described in Section 2. To capture these dynamic effects in a transparent and flexible manner, we rely exclusively on a panel Local Projection (LP) framework. The LP approach provides a direct mapping between the identified shock and the response of macroeconomic variables at different horizons, without imposing restrictive assumptions on lag structure or cross-country dynamics. The resulting impulse responses can therefore be interpreted as the average effect across EMEs of a positive global credit-supply shock—i.e., an improvement in global banks' net worth that relaxes external financing constraints and eases credit conditions worldwide.

3.1 Data Description

To estimate the macroeconomic effects of global banks' credit-supply shocks on Emerging Market Economies (EMEs), we compile a quarterly panel of macro–financial variables for a broad set of countries, drawing from IMF, OECD, BIS, and U.S. regulatory sources. The sample spans 2002Q3–2019Q4, consistent with the availability of the purged credit-supply shocks and excluding the period affected by the COVID-19 pandemic.

Our empirical analysis focuses on five EME-specific and four U.S.-specific variables. The EME variables are: (i) the nominal exchange rate against the U.S. dollar, (ii) real GDP, (iii) gross fixed capital formation, (iv) total exports, and (v) total imports. The U.S. block includes: (i) the federal funds rate, (ii) industrial production, (iii) the personal consumption expenditure (PCE) price index, and (iv) the excess bond premium (EBP). These variables capture the main channels through which shifts in global financial conditions—proxied by changes in global banks' net worth—propagate to domestic activity, trade, and relative prices.

We retain an unbalanced panel of 18 EMEs based on the availability of the five EME-specific macroeconomic variables and the requirement that each country is present in the sample for at least 40 quarters. This threshold ensures that all countries included in the benchmark panel are observed over a sufficiently long time span to cover both tranquil and stress periods—most importantly, the 2008–2009 Global Financial Crisis—allowing us to capture the full dynamics of credit-supply transmission. Table 1 lists the countries included in the sample and the number of quarterly observations available for each. The subset of countries shown in bold corresponds to those with complete coverage for all 70 quarters (2002Q3–2019Q4); this balanced group is used for baseline estimates, while the full unbalanced panel is employed in robustness exercises.

In addition to these benchmark variables, we incorporate a set of *key financial quantities* that are central to tracing the transmission of global credit-supply shocks through international and domestic financial flows. Specifically, we consider:

(i) U.S. banks' consolidated claims on foreign obligors,[1]

(ii) the private sector's stock of foreign liabilities,[2]

(iii) the public sector's stock of foreign liabilities,[3]

(iv) real domestic credit to the private non-financial sector.[4]

[1]Data on U.S. bank claims are sourced from the FFIEC's *E.16 Country Exposure Lending Survey*. See https://www.ffiec.gov/data/e16. We focus on the series "Claims on Foreign Obligors Held by U.S. Banks on an Ultimate Risk Basis (Adjusted to Reflect Guarantees and Other Risk Transfers) & Off-Balance-Sheet Items" under "Country Risk Claims," available from 2006Q1.

[2]Data on private and public sector foreign liabilities are sourced from Avdjiev et al. [2017].

[3]Data on public sector foreign liabilities are from the same source as in (ii).

[4]Data on domestic credit to the private non-financial sector are obtained from the BIS. See https://

Table 1: Emerging Market Economies in the Macro Panel

Country Name	**Quarters in Sample**
Argentina	64
Bosnia and Herzegovina	**70**
Botswana	56
Brazil	**70**
Bulgaria	**70**
Chile	**70**
China, P.R.: Hong Kong	**70**
Colombia	60
Hungary	**70**
India	**70**
Indonesia	**70**
Mexico	**70**
Montenegro	56
Peru	52
Philippines	**70**
South Africa	**70**
Thailand	68
Türkiye, Rep. of	**70**

Note: The table lists the 18 Emerging Market Economies included in the macroeconomic panel. Countries shown in bold constitute the balanced benchmark sample, available for all 70 quarters (2002Q3–2019Q4). The benchmark unbalanced panel used in the main analysis includes only countries observed for at least 40 quarters, ensuring coverage of major global financial events, including the 2008–2009 Global Financial Crisis.

Availability of these variables is more limited than for the benchmark set. For example, the *E.16* dataset begins only in 2006Q1, and foreign liability data are not consistently reported for all countries. Similarly, the BIS dataset on domestic bank lending covers a narrower group of economies, particularly in the early part of the sample. Consequently, these variables are incorporated in an extended specification that relies on a reduced country sample.

We also compile several additional macro–financial indicators available for subsets of the sample, including EMBI spreads, a trade-weighted multilateral real exchange rate, nominal exchange rates vis-à-vis the euro, equity indexes, and domestic lending rates. All macroeconomic series are drawn from official sources (IMF, OECD, BIS, FFIEC) to ensure consistency in coverage, definitions, and units of measurement.

3.2 Econometric Specification

We estimate the dynamic effects of global banks' credit-supply shocks on Emerging Market Economies (EMEs) using a pooled panel Vector Autoregression (VAR) as our benchmark specification (see Canova and Ciccarelli [2013]). The pooled panel VAR provides a parsimonious and internally consistent framework to capture the joint dynamics of macro–financial variables across EMEs in response to exogenous global shocks.[5]

Given the well-known bias–variance trade-off between VAR and Local Projection (LP) estimators, we also demonstrate that our results are robust to alternative specifications based on local projection regressions (LPs). The VAR imposes greater structure on the dynamics and thus gains efficiency when the model is correctly specified, whereas LPs relax these restrictions at the cost of higher sampling variability (see Jordà [2005], Ramey [2016], Olea et al. [2025]). Showing that both methods yield similar results strengthens the credibility of our findings.

Benchmark pooled panel VAR specification. Our baseline estimates rely on a pooled panel VAR estimated jointly across all countries under the assumption of homogeneous dynamic coefficients and a common variance–covariance matrix. For each country i, the vector

`data.bis.org/topics/TOTAL_CREDIT`.

[5] See Camara et al. [2025] as another application of this model in international macroeconomics.

of endogenous variables includes five EME-specific and four U.S.-specific variables:

$$Y_{i,t} = \begin{bmatrix} \ln \mathrm{NER}_{i,t} \\ \ln \mathrm{GDP}_{i,t} \\ \ln \mathrm{GFC}_{i,t} \\ \ln \mathrm{EXPO}_{i,t} \\ \ln \mathrm{IMPO}_{i,t} \\ \mathrm{FedFunds}_t \\ \ln \mathrm{INDPRO}_t \\ \ln \mathrm{PCEPI}_t \\ \mathrm{EBP}_t \end{bmatrix}.$$

The global bank net-worth shock, $\widehat{\mathrm{Shock}}_t$, enters the system as an exogenous variable capturing changes in global credit-supply conditions. Stacking all countries and periods, the model can be written as:

$$Y = X\beta + \varepsilon, \quad \varepsilon \sim \mathcal{N}(0, \Sigma_c \otimes I_T),$$

where Y is the stacked vector of endogenous variables, X collects their lags and the exogenous global bank shock, β stacks the VAR coefficients, and Σ_c is the cross-sectional covariance matrix. We use two quarterly lags (selected using the Bayesian Information Criterion) and standardize the shock to have unit variance so that impulse responses correspond to a one–standard–deviation improvement in global banks' net worth.

The pooled specification allows the estimation of common dynamic responses across EMEs while filtering out country-level scale differences through demeaning at the country level. This approach strikes a balance between capturing the global nature of the shock and exploiting cross-country variation in responses.

Complementary Local Projection specification. To verify that the results are not driven by parametric restrictions on the lag structure or the pooled estimation approach, we also estimate a panel Local Projection (LP) model as a robustness exercise. For each horizon $h = 0, 1, \ldots, H$, we estimate:

$$y_{i,t+h} = \alpha_q + \sum_{p=1}^{2} \Gamma_p^{\mathrm{EME}} X_{i,t-p}^{\mathrm{EME}} + \sum_{p=1}^{2} \Gamma_p^{\mathrm{US}} X_{t-p}^{\mathrm{US}} + \sum_{p=0}^{2} \theta_p \widehat{\mathrm{Shock}}_{t-p} + u_{i,t+h},$$

where $y_{i,t}$ denotes the macroeconomic variable of interest for country i at time t. The term α_q denotes quarter-of-year fixed effects that control for recurrent seasonal and global components. As in the VAR, two lags of both domestic and U.S. variables are included, and the global bank shock enters contemporaneously and with two lags. The model is estimated by ordinary least squares with standard errors clustered by date to allow for cross-country correlation.

The LP approach provides a flexible alternative that estimates horizon-specific responses directly, at the cost of some efficiency relative to the VAR when the latter is well-

specified. Consistency of the estimated responses across the two approaches serves as a robustness check on the dynamic structure of the results.

Interpretation and robustness. The resulting impulse responses from the pooled panel VAR represent the average dynamic effect across EMEs of an exogenous improvement in global banks' balance-sheet strength. A positive global bank net-worth shock reduces international risk premia, supports credit expansion, and stimulates investment and output in EMEs.

We demonstrate that these results are robust to alternative econometric specifications. We show that results are robust to an alternative panel VAR specification in which demeaned variables are averaged across countries, as in a group-panel VAR. Additionally, the show that the local projection results are robust to estimated as an IV-LP, where the U.S. Excess Bond Premium (EBP) is instrumented with the identified global credit-supply shocks, yielding impulse responses that are qualitatively similar in shape and magnitude. These results confirm that the findings are not driven by modeling assumptions about dynamic structure or the degree of cross-country pooling.

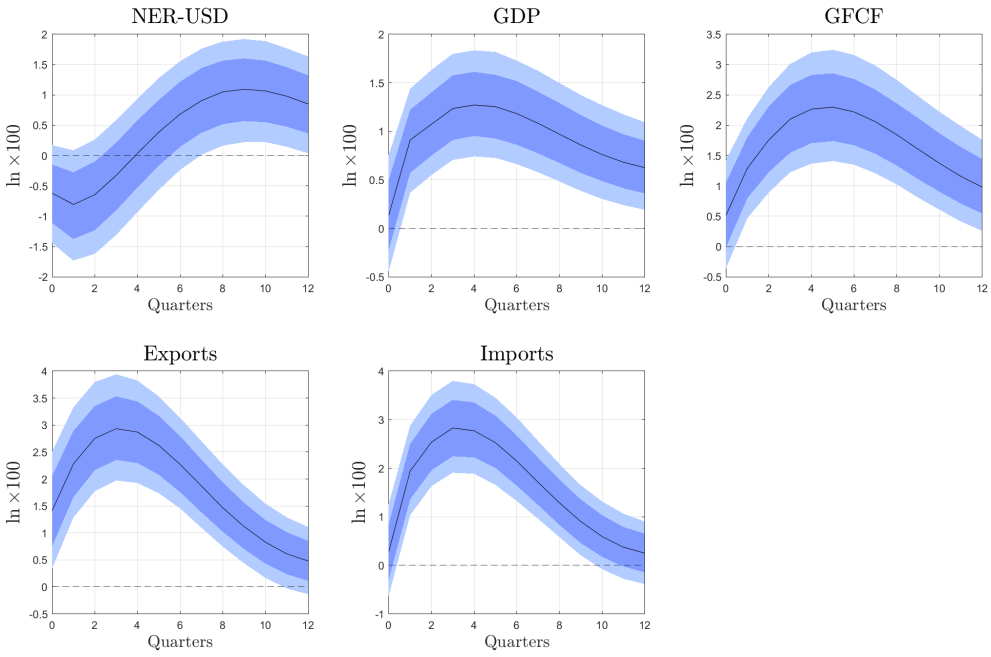
3.3 Macroeconomic Results

This subsection presents the estimated responses of Emerging Market Economies (EMEs) to a one–standard–deviation improvement in global banks' net worth, identified as a positive global credit-supply shock. We begin by examining the dynamic responses of five key macroeconomic variables—the nominal exchange rate against the U.S. dollar, real GDP, gross fixed capital formation, total exports, and total imports—which together capture the main dimensions of external adjustment, domestic activity, and trade. The corresponding impulse responses are obtained from the Bayesian pooled panel VAR and Local Projection (LP) regressions described in Section 3.2.

Figure 4 reports the impulse responses of the five benchmark macroeconomic variables to a one–standard–deviation increase in global banks' net worth. Each row corresponds to a different variable, while the left and right columns display results for the balanced and unbalanced panels of EMEs, respectively. These variables capture the main dimensions of macroeconomic adjustment: external competitiveness, domestic output and investment, and trade activity.

A positive global bank net-worth shock, interpreted as an easing of global credit conditions, leads to a broad and persistent expansion in EME economic activity. The nominal exchange rate, Panel (1,1), exhibits an initial appreciation, followed by a mild and short-lived depreciation after the first year, and then a sustained strengthening over the medium term. This pattern suggests that the transmission of global bank balance-sheet shocks into exchange rate dynamics occurs gradually, likely reflecting the delayed response of capital flows

Figure 4: Macroeconomic Responses of EMEs to a Global Bank Net-Worth Shock



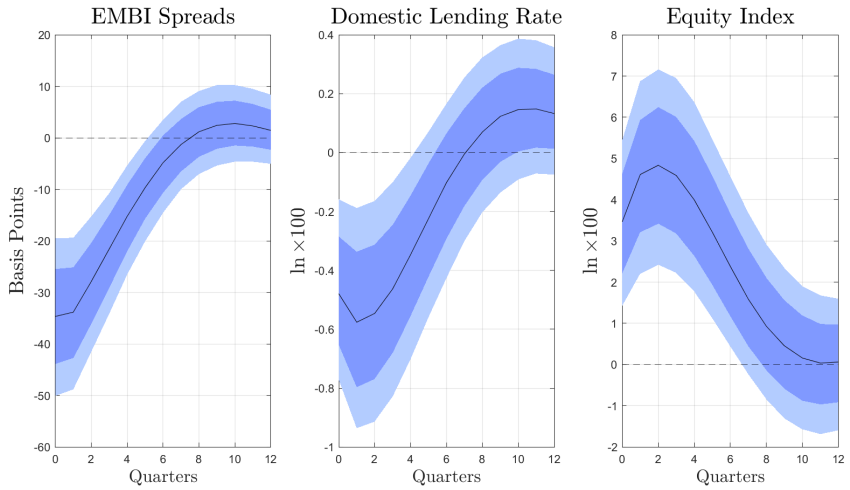
Note: The figure displays impulse responses of five key macroeconomic variables to a one–standard–deviation increase in global banks' net worth, estimated using the pooled panel Bayesian VAR. Each row corresponds to a different variable, and the left and right columns report results for the balanced and unbalanced samples, respectively. The black line shows the *median impulse response function (IRF)*, while the dark and light blue shaded areas denote the 68% and 90% *credible intervals*, respectively. In the text, each panel is referenced as Panel (i,j), where i denotes the row and j the column position in the figure.

and trade adjustments. Real GDP and gross fixed capital formation, Panels (1,2) and (1,3), increase significantly, peaking between four and six quarters after the shock. The investment response is roughly twice as large as that of output, consistent with the higher sensitivity of capital spending to financial conditions. Panels (2,1) and (2,2) show that both exports and imports expand, with imports responding more strongly and persistently—reflecting robust domestic demand and the lagged appreciation of local currencies—while exports rise more gradually. The larger import response also implies a temporary deterioration in the trade balance, consistent with a surge in capital inflows.

Overall, the macroeconomic responses provide strong evidence that improvements in global banks' balance-sheet strength trigger a sustained expansion in EME output, investment, and trade. These effects unfold over multiple quarters and are consistent with the transmission of global credit-supply shocks through both external borrowing costs and domestic financial conditions.

Financial market responses. We next examine how global bank net-worth shocks affect financial prices and quantities, which shed light on the mechanisms through which global credit supply propagates into EMEs. Figure 5 shows the responses of three key financial prices, while Figure 6 presents the responses of four financial quantities.

Figure 5: Responses of Financial Prices in EMEs to a Global Bank Net-Worth Shock

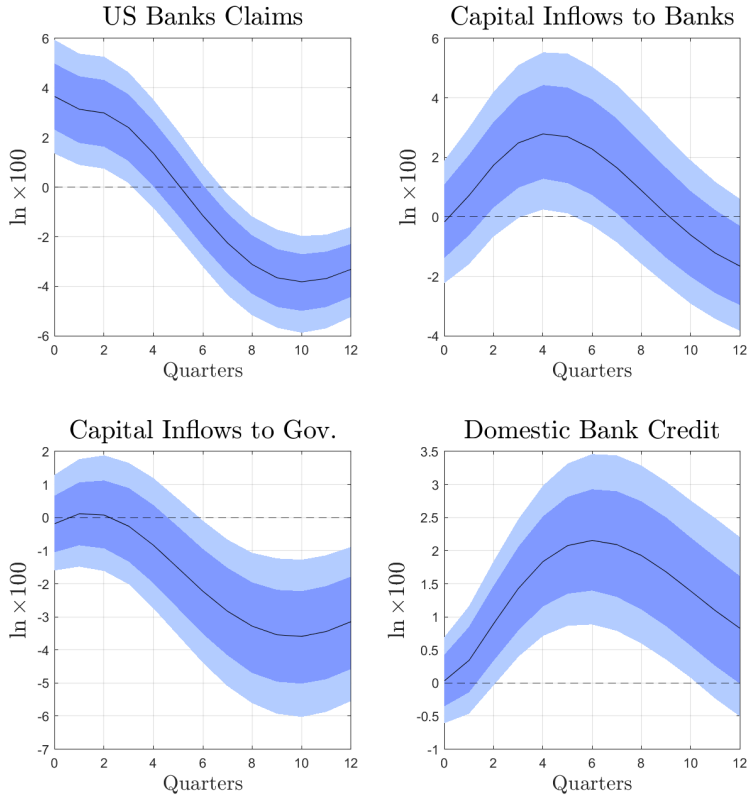


Note: The figure displays impulse responses of three financial price variables—EMBI spreads, an equity index, and a domestic lending rate—to a one–standard–deviation improvement in global banks' net worth, estimated from the pooled panel Bayesian VAR. Each row corresponds to a different variable, and each column reports results for the balanced and unbalanced samples, respectively. The black line shows the *median IRF*, while the dark and light blue shaded areas denote the 68% and 90% *credible intervals*, respectively. In the text, each panel is referenced as Panel (i,j), where i denotes the row and j the column position in the figure.

Panel (1,1) of Figure 5 shows that a positive global bank net-worth shock leads to a persistent decline in EMBI spreads, peaking at a reduction of roughly 30–40 basis points on impact and remaining below pre-shock levels for at least six quarters. This reflects a broad

easing in external financing costs for EMEs. Panel (1,2) shows that domestic lending rates in local currency also fall sharply—by around 150 basis points on impact—and remain low for four to six quarters, indicating that domestic credit conditions ease in tandem with global financial conditions. Finally, Panel (1,3) shows a significant rise in equity prices, consistent with improved global risk appetite, higher firm valuations, and greater access to capital.

Figure 6: Responses of Financial Quantities in EMEs to a Global Bank Net-Worth Shock



Note: The figure displays impulse responses of four financial quantity variables—foreign liabilities of the public sector (public inflows), foreign liabilities of the banking sector (bank inflows), domestic bank credit to the non-financial private sector (banking credit), and U.S. banks' consolidated claims on EMEs (U.S. bank claims)—to a one–standard–deviation improvement in global banks' net worth, estimated using the pooled panel Bayesian VAR. Each row corresponds to a different variable, and each column reports results for the balanced and unbalanced samples, respectively. The black line shows the *median IRF*, while the dark and light blue shaded areas denote the 68% and 90% *credible intervals*, respectively. In the text, each panel is referenced as Panel (i,j), where i denotes the row and j the column position in the figure.

Figure 6 documents how the balance-sheet improvement of global banks translates into real financial flows. Panel (1,1) shows that U.S. banks' claims on EMEs rise sharply on impact—by about 4%—indicating that the increase in global banks' net worth is accompanied by a direct expansion of their exposures to EMEs. However, this increase is not evenly distributed across sectors. Panel (1,2) shows that domestic EME banks experience a hump-shaped increase in capital inflows, consistent with the gradual build-up of cross-border liabilities over time. By contrast, Panel (2,1) shows little short-term response in public-sector

inflows and even a mild decline four to eight quarters after the shock, suggesting that the additional financing primarily targets the private financial sector rather than sovereign borrowers. Finally, Panel (2,2) shows a persistent increase in domestic bank credit to the non-financial private sector, indicating that the easing of global financial conditions translates into greater domestic credit availability.

Taken together, the results show that global bank net-worth shocks lower risk premia and domestic borrowing costs, strengthen local currencies, and trigger a broad and sustained expansion in credit and capital inflows to EMEs. The pattern across both financial prices and quantities supports the interpretation that the international transmission of financial conditions operates primarily through global banks' balance-sheet channel.

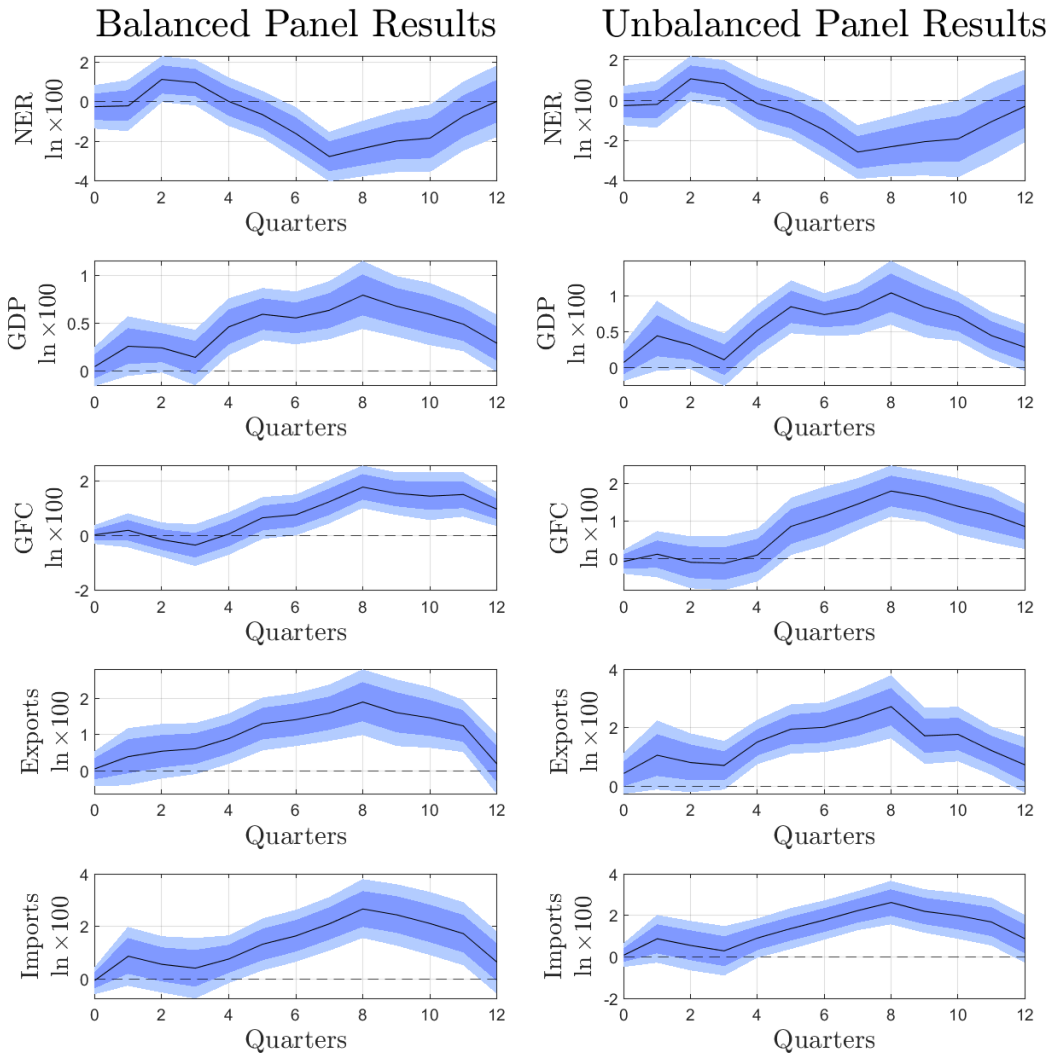
Robustness: Local Projection Estimates. As a robustness exercise, we re-estimate the impulse responses using the panel Local Projection (LP) framework described in Section 3.2. The LP approach provides a flexible alternative to the Bayesian VAR by estimating horizon-specific regressions, allowing for more heterogeneous dynamics across countries at the cost of lower statistical efficiency. Comparing the results from both estimators helps evaluate the robustness of the macro–financial transmission patterns and the bias–variance trade-off inherent in the two approaches.

Additionally, for each variable, we report results estimated using both the balanced panel of EMEs with complete data coverage and the unbalanced panel that includes all available observations. Comparing these two samples allows us to assess the stability of the results to differences in data availability and sample composition before extending the analysis to additional macro–financial indicators.

Figure 7 displays the estimated responses of the same five benchmark macroeconomic variables using the LP approach. Each row corresponds to a different variable, while the left and right columns present results for the balanced and unbalanced panels, respectively. The overall pattern of responses is remarkably consistent with the Bayesian VAR estimates. A positive global bank net-worth shock leads to a gradual appreciation of local currencies (Panel (1,1)), an expansion in real GDP and investment (Panels (2,1)–(3,1)), and an increase in both exports and imports (Panels (4,1)–(5,1)). The magnitude and timing of the responses are closely aligned across the two estimation approaches, confirming that the main results are not driven by modeling choices or sample composition.

While the LP estimates display slightly wider confidence intervals—reflecting their lower efficiency relative to the VAR—the direction and persistence of the responses remain robust. In particular, the investment response remains roughly twice as large as that of output, and imports continue to rise more strongly than exports, consistent with a surge in domestic demand and financial inflows. The similarity of results between the balanced

Figure 7: Macroeconomic Responses of EMEs to a Global Bank Net-Worth Shock
Local Projection Estimates



Note: The figure displays impulse responses of five key macroeconomic variables to a one–standard–deviation increase in global banks' net worth, estimated using panel Local Projections. Each row corresponds to a different variable, while the left and right columns show results for the balanced and unbalanced panels of EMEs, respectively. The black line shows point estimates, while the dark and light blue shaded areas denote 68% and 90% confidence intervals based on standard errors clustered at the date level. In the text, each panel is referenced as Panel (i,j), where i denotes the row and j the column position in the figure.

and unbalanced samples further indicates that data availability or country coverage does not materially affect the conclusions.

Taken together, these findings confirm that the key macroeconomic effects of global bank net-worth shocks—an appreciation of EME currencies, an expansion of output and investment, and an increase in trade volumes—are robust across different estimation frameworks and sample definitions. This consistency reinforces the interpretation that improvements in global banks' balance-sheet strength ease global credit conditions and stimulate economic activity in Emerging Market Economies.

Financial market responses: Local Projection robustness. We further assess robustness by estimating the effects of global bank net-worth shocks on financial prices and quantities using the LP specification. Figures 8 and 9 present the corresponding impulse responses for the balanced and unbalanced panels.

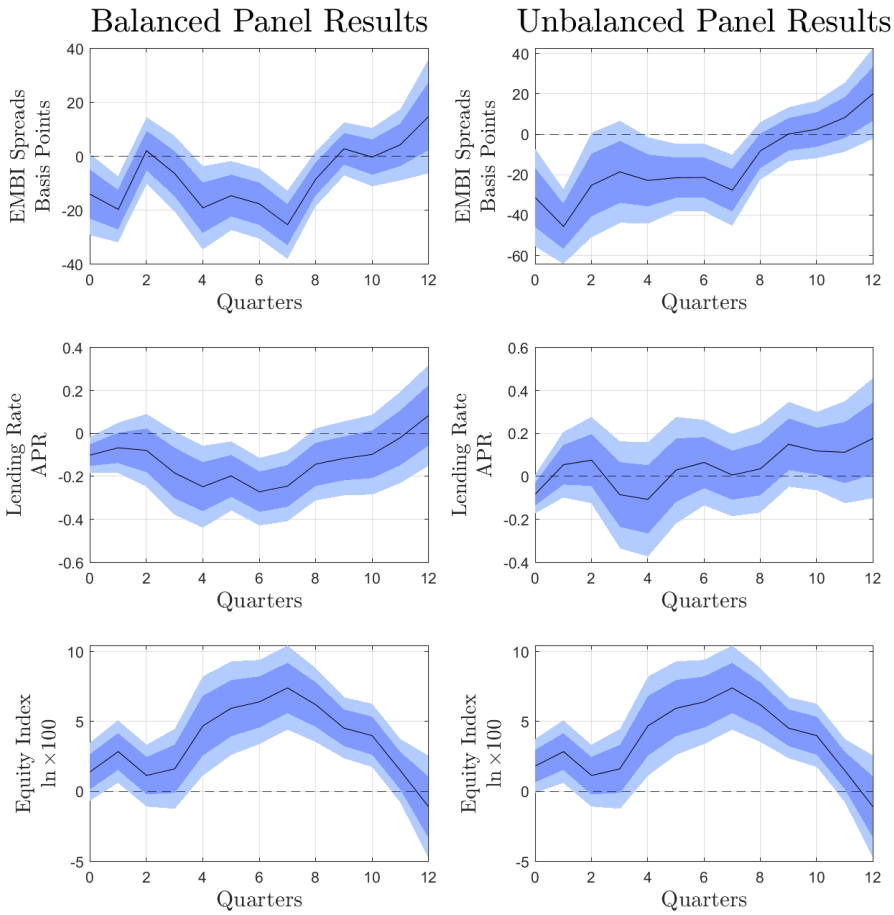
Panel (1,1) of Figure 8 shows that EMBI spreads decline significantly following a positive global bank net-worth shock, consistent with a reduction in external borrowing costs. Panel (2,1) shows a decline in domestic lending rates, indicating that domestic financial conditions also ease, while Panel (3,1) shows a robust and persistent rise in equity prices, reflecting improved valuations and higher global risk appetite. The magnitude and persistence of these responses are in line with those obtained from the VAR, confirming that global financial easing transmits quickly through asset prices and borrowing costs.

The financial quantity responses in Figure 9 also display patterns consistent with those from the pooled VAR. U.S. banks' consolidated claims on EMEs (Panel (1,1)) increase persistently, but less persistently than under the VAR model. Capital inflows to the banking sector (Panel (1,2)) also rise steadily, while inflows to the public sector (Panel (2,1)) show little change or a mild decline over time. Finally, domestic bank credit to the private sector (Panel (2,2)) increases gradually and persistently, confirming that global financial easing is transmitted into domestic lending activity.

Overall, the Local Projection results reinforce the robustness of the main findings: global bank net-worth shocks reduce external and domestic borrowing costs, boost equity prices, and generate sustained expansions in credit and capital inflows. The consistency across methods and samples supports the interpretation that global banks' balance-sheet conditions are a key channel through which international financial shocks affect Emerging Market Economies.

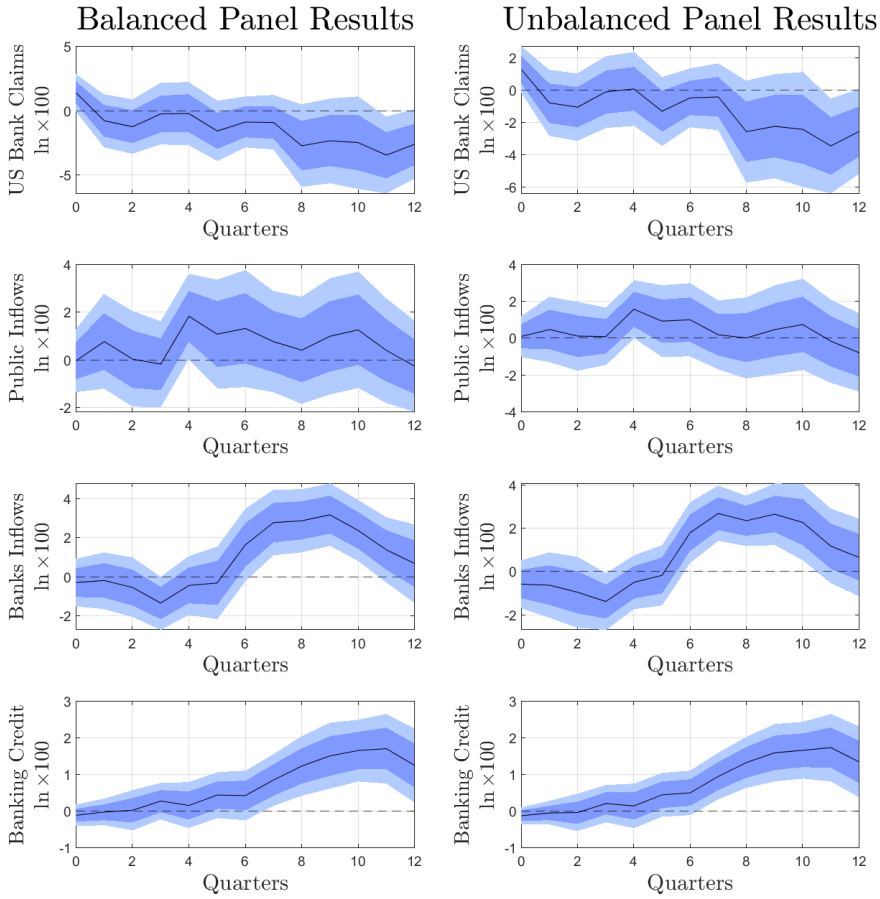
Finally, we verify that these results are robust to several alternative econometric specifications. In particular, the main responses remain virtually unchanged when including country fixed effects to account for time-invariant heterogeneity, when adding linear and quadratic time trends to capture gradual structural changes, and when excluding the lags of the identified global bank net-worth shock from the specification. Additional robustness

Figure 8: Responses of Financial Prices in EMEs to a Global Bank Net-Worth Shock
Local Projection Estimates



Note: The figure displays impulse responses of three financial price variables—EMBI spreads, an equity index, and a domestic lending rate—to a one–standard–deviation improvement in global banks' net worth, estimated using panel Local Projections. Each row corresponds to a different variable, and each column reports results for the balanced and unbalanced samples, respectively. The black line shows point estimates, while the dark and light blue shaded areas denote 68% and 90% confidence intervals based on standard errors clustered at the date level. In the text, each panel is referenced as Panel (i,j), where i denotes the row and j the column position in the figure.

Figure 9: Responses of Financial Quantities in EMEs to a Global Bank Net-Worth Shock
Local Projection Estimates



Note: The figure displays impulse responses of four financial quantity variables—foreign liabilities of the public sector (public inflows), foreign liabilities of the banking sector (bank inflows), domestic bank credit to the non-financial private sector (banking credit), and U.S. banks' consolidated claims on EMEs (U.S. bank claims)—to a one–standard–deviation improvement in global banks' net worth, estimated using panel Local Projections. Each row corresponds to a different variable, and each column reports results for the balanced and unbalanced samples, respectively. The black line shows point estimates, while the dark and light blue shaded areas denote 68% and 90% confidence intervals based on standard errors clustered at the date level. In the text, each panel is referenced as Panel (i,j), where i denotes the row and j the column position in the figure.

checks using alternative lag structures and control sets also yield consistent results. Taken together, these exercises confirm that the documented macro–financial responses are not sensitive to specification choices and reflect a stable and robust transmission of global bank balance-sheet shocks to Emerging Market Economies.

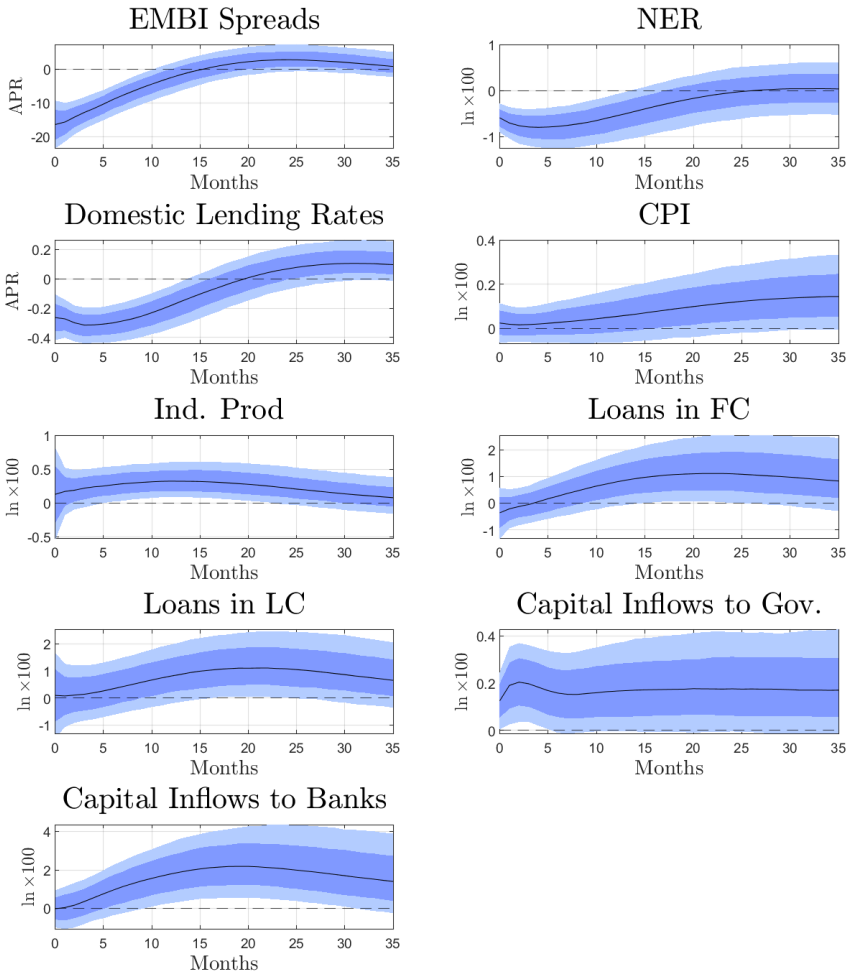
Macro evidence for Uruguay. Before turning to the firm-level evidence, it is useful to verify that Uruguay—our case-study economy for the micro analysis—displays aggregate responses consistent with those documented for the broader group of Emerging Market Economies. Uruguay is not included in the cross-country macro panel due to data limitations in international sources such as the IMF–IFS and OECD. However, the Central Bank of Uruguay publishes high-quality national accounts and financial statistics that allow us to construct a monthly macro–financial dataset covering the period from April 2003 onward. This dataset combines information from the national accounts, balance of payments, and domestic financial sector indicators, ensuring consistency with the variables used in the cross-country analysis.

Quarterly variables, including capital inflows to the public and banking sectors, were interpolated to monthly frequency using a cubic spline method, following the approach used in other macro–financial studies (e.g., Miranda-Agrippino and Rey, 2020, Camara et al., 2025). The cubic spline interpolation preserves the smooth dynamics of the original quarterly data while providing sufficient temporal resolution to estimate the model at monthly frequency without introducing artificial volatility.

Figure 10 displays the impulse responses of key Uruguayan macro and financial variables—industrial production, domestic credit to the private sector, the nominal exchange rate against the U.S. dollar, EMBI spreads, and lending rates—to a one–standard–deviation improvement in global banks' net worth, identified using the same global credit-supply shock series as in the cross-country analysis. The results show that Uruguay's macroeconomic responses closely mirror those of other EMEs: a positive global bank net-worth shock leads to an appreciation of the peso, a decline in EMBI spreads and lending rates, an expansion of domestic credit, and a significant rise in industrial production and investment.

These findings confirm that Uruguay's aggregate dynamics are qualitatively consistent with the benchmark EME results, reinforcing the interpretation that global bank balance-sheet shocks relax external financing constraints and stimulate economic activity. Establishing this consistency at the macro level provides an essential backdrop for interpreting the firm-level evidence presented in the next section.

Figure 10: Macroeconomic Responses of Uruguay to a Global Bank Net-Worth Shock

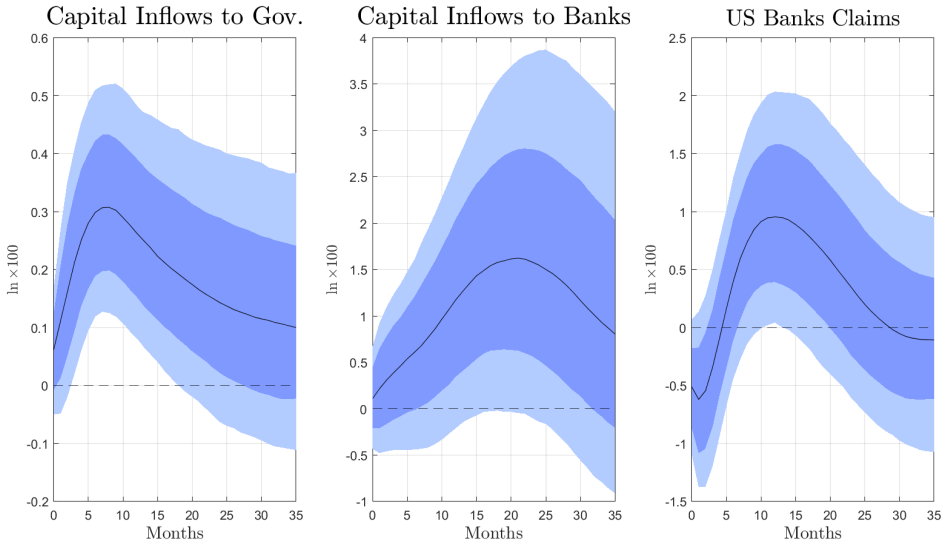


Note: The figure shows impulse responses of key Uruguayan macro and financial variables to a one–standard–deviation improvement in global banks' net worth, estimated using a Bayesian VAR on monthly data (2003–2019). The black line shows the median impulse response, and the shaded areas denote 68% and 90% credible intervals. The estimated model is a standard Bayesian VAR with Minnesota priors and six monthly lags, corresponding to two quarters as in the benchmark quarterly VAR. Capital inflow series were interpolated to monthly frequency using cubic spline interpolation, consistent with methodologies adopted in related macro–financial studies.

To further examine the transmission of global bank net-worth shocks through cross-border financial flows, we re-estimate the model over the 2006–2019 period, when data on U.S. banks' consolidated claims on Uruguay become available. Figure 11 focuses on three key flow variables: capital inflows to the government, capital inflows to the domestic banking sector, and U.S. banks' claims on Uruguay. The responses highlight the distinctive allocation of external funding following a positive global bank net-worth shock.

Capital inflows to the banking sector rise strongly and persistently, peaking after roughly one year, while inflows to the government sector exhibit only a short-lived and modest increase. In parallel, U.S. banks' claims on Uruguay also rise significantly, although the effect is somewhat less persistent. Together, these patterns indicate that the additional liquidity generated by stronger global bank balance sheets is primarily directed toward the domestic financial sector rather than the public sector, reinforcing the evidence that the transmission operates through cross-border banking channels.

Figure 11: Financial Flow Response of Uruguay to a Global Bank Net-Worth Shock



Note: The figure shows impulse responses of capital inflows to the government and banking sectors, and of U.S. banks' consolidated claims on Uruguay, to a one–standard–deviation improvement in global banks' net worth, estimated using a Bayesian VAR on monthly data (2006–2019). The black line shows the median impulse response, and the shaded areas denote 68% and 90% credible intervals. The estimated model is a standard Bayesian VAR with Minnesota priors and six monthly lags, corresponding to two quarters as in the benchmark quarterly VAR. Capital inflow series were interpolated to monthly frequency using cubic spline interpolation, consistent with methodologies adopted in related macro–financial studies.

Summary and transition to micro-level evidence. In summary, the macro-level analysis reveals that improvements in global banks' balance-sheet strength act as powerful external financial shocks for Emerging Market Economies. A positive global bank net-worth shock appreciates local currencies, lowers external and domestic borrowing costs, boosts equity valuations, and triggers a sustained expansion in credit and real activity. These results are robust across methodologies—Bayesian VARs and Local Projections—and remain stable when introducing country fixed effects, time trends, and alternative lag structures.

The next section turns to firm- and bank-level evidence to examine the microeconomic transmission of these shocks. Using detailed credit registry data, we investigate whether the observed macro-financial expansions operate primarily through a relaxation of

borrowing constraints or through changes in the cost of external finance, and whether these effects differ systematically across firms with varying leverage and balance-sheet strength.

4 Microeconomic Transmission

To study how global bank credit supply shocks are transmitted within an emerging market, we draw on two high-frequency administrative datasets from Uruguay that provide detailed information on loans, banks, and firms. Both datasets are maintained by the Central Bank of Uruguay, which regulates and supervises the domestic financial system. The data span from April 2003 to December 2019 and offer comprehensive coverage of all formal lending activity in the country.

4.1 Bank-Level Analysis

Data description. The bank level dataset contains monthly balance sheet and income statement information for all financial institutions operating in Uruguay. These data are publicly available through the Central Bank of Uruguay's website.[6] We use this dataset in two ways. First, we document that banks with lower leverage and higher liquidity respond more strongly to positive global bank credit supply shocks, underscoring the role of balance sheet strength in shock transmission. Second, we incorporate bank-level characteristics as controls in the firm-level analysis to account for heterogeneity in intermediary behavior.

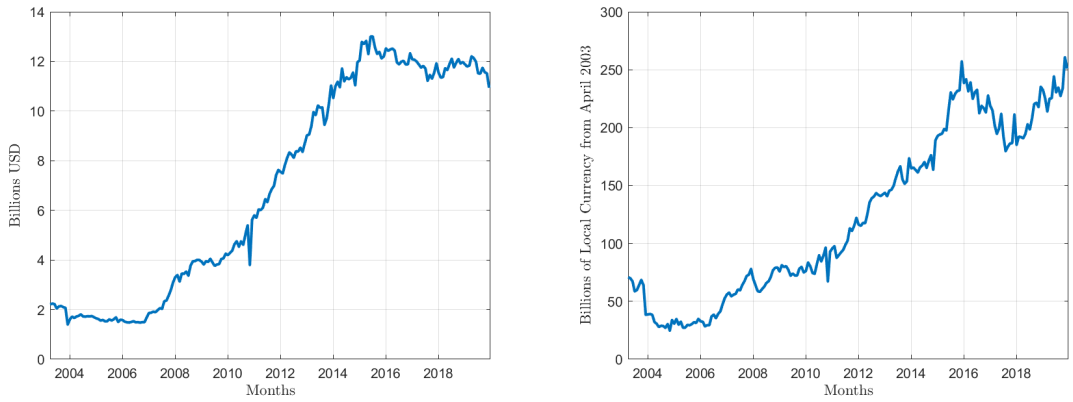
Figure 12 displays the evolution of aggregate firm borrowing between 2003 and 2019, distinguishing between loans denominated in foreign and local currencies. Both series exhibit a pronounced upward trend, interrupted by two notable slowdowns coinciding with episodes of global financial stress—the 2008–2010 Global Financial Crisis and the 2016–2018 period associated with the Federal Reserve's monetary tightening cycle. These aggregate dynamics suggest a substantial sensitivity of Uruguay's financial system to global credit conditions.

Uruguay's banking sector consists of 14 institutions. On average, foreign-owned banks account for roughly two-thirds of total firm credit, while domestically owned banks account for the remaining third, see Figure 13 for evidence of the role of domestic and foreign capital banks from 2003 to 2019. Table 2 reports descriptive statistics that highlight key differences between these two groups.

Foreign banks are significantly more leveraged than domestic banks, as reflected in their higher liabilities-to-assets and liabilities-to-net-worth ratios. They also extend a

[6] https://www.bcu.gub.uy/Servicios-Financieros-SSF/Paginas/Boletin-SSF.aspx

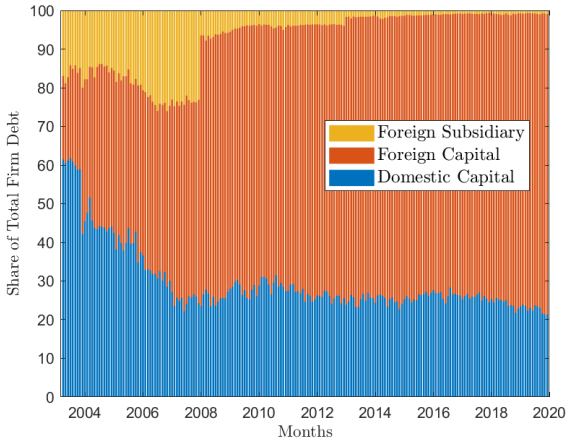
Figure 12: Evolution of Firm Bank Loans in Uruguay (2003–2019)



(a) Foreign-Currency Loans (b) Local-Currency Loans

Note: The left panel reports foreign-currency loans, converted to U.S. dollars using the monthly exchange rate. The right panel shows local-currency loans deflated by a domestic price index and expressed in December 2019 purchasing power.

Figure 13: Share of Firm Debt by Type of Bank



markedly larger share of credit in foreign currency (78% versus 28%), indicating tighter integration with global capital markets. While both groups rely similarly on demand deposits, foreign banks report substantially lower non-performing loan ratios (4% versus 18%), suggesting better asset quality. These patterns point to distinct business models: foreign banks operate with greater international orientation and capitalization, whereas domestic banks maintain smaller financial buffers and higher credit risk exposure.

The structural differences across banks motivate the empirical analysis that follows. Specifically, we test whether banks with stronger balance sheets, those with lower leverage or higher liquidity, react more strongly to positive global credit supply shocks. In addition to this cross-sectional heterogeneity, we exploit within-bank time variation in leverage and liquidity to examine whether changes in a bank's financial position shape its responsiveness

Table 2: Bank-Level Summary Statistics

	All Banks				Foreign	Domestic
	p10	Median	p90	Mean	Mean	Mean
Liabilities to Assets	0.764	0.918	0.940	0.894	0.920	0.779
Liabilities to Net Worth	3.435	10.594	12.674	9.820	11.010	6.970
Share of Dollar Credit	0.024	0.774	0.886	0.675	0.780	0.280
Share of Non-Performing Loans	0.030	0.053	0.277	0.084	0.040	0.180
Share of Demand Deposits	0.617	0.736	0.892	0.745	0.740	0.730

Note: All statistics are computed as averages over the full sample period. The columns labeled $p10$ and $p90$ report the 10th and 90th percentiles, respectively. Group means are unweighted averages across institutions.

to external shocks. This two-dimensional approach provides a richer understanding of how intermediary balance-sheet health conditions the domestic transmission of global financial shocks.

Econometric specification. Our benchmark empirical specification is a local-projection regression that relates future loan growth to the global bank credit supply shock and its interaction with banks' leverage:

$$\begin{aligned}\Delta \ln(\text{Loan}_{i,c,t+h}) = \beta_h \, \text{Shock}_t^{\text{Supply}} + \delta_h \, \text{Shock}_t^{\text{Supply}} \times \text{Leverage}_{i,t-1} \\ + \mu_{i,h} + \mu_{c,h} + \Gamma_{i,t-1}^{\text{Bank}} + \Gamma_{i,t-1}^{\text{Macro}} + \epsilon_{i,c,t+h},\end{aligned} \tag{1}$$

where $\Delta \ln(\text{Loan}_{i,c,t+h})$ denotes the log change in total loans extended by bank i in currency c, h months after the shock ($h \in \{0, \ldots, 36\}$). The term $\mu_{i,h}$ represents bank fixed effects, while $\mu_{c,h}$ denotes currency fixed effects. $\Gamma_{i,t-1}^{\text{Bank}}$ is a vector of lagged bank-level controls, and $\Gamma_{i,t-1}^{\text{Macro}}$ includes both domestic and global macro-financial variables.

Equation 1 includes three sets of controls:

1. *Bank-level controls:* lagged values of (i) log total assets, (ii) log total liabilities, (iii) the share of dollar-denominated loans, (iv) the leverage ratio of interest, and (v) the ratio of liquid assets (maturity under 30 days) to total assets.

2. *Uruguay-level macro controls:* (i) EMBI spreads as a proxy for the sovereign borrowing cost, (ii) log industrial production index, (iii) log nominal exchange rate vis-à-vis the U.S. dollar, and (iv) log CPI.

3. *Global controls:* (i) the Excess Bond Premium (EBP), (ii) the Federal Funds Rate, (iii) log U.S. PCE price index, and (iv) log U.S. industrial production.

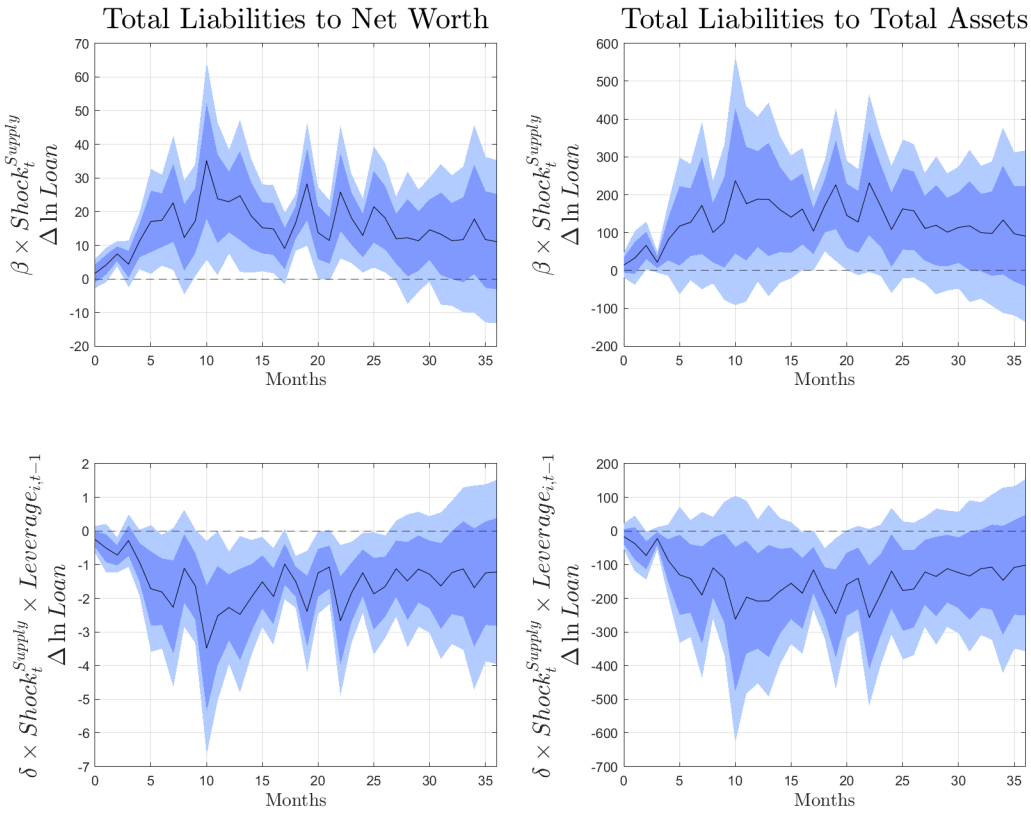
Standard errors are two-way clustered at the bank and date levels. All regressions are weighted

by each bank's average size across the sample period, following standard practice in the literature.[7]

The coefficient β_h captures the average response of bank lending to a global bank credit supply shock, while δ_h measures how this response varies with bank leverage. A negative δ_h indicates that less-leveraged (better-capitalized) banks expand credit more following a positive global credit supply shock. To verify robustness, we estimate Equation 1 using alternative definitions of leverage—namely, total liabilities to net worth and total liabilities to total assets.

Bank level results. Figure 14 presents the estimated coefficients β_h and δ_h from Equation 1, which capture, respectively, the average and differential responsiveness of bank lending to global bank credit supply shocks as a function of leverage.

Figure 14: Bank-Level Responses to Global Credit Supply Shocks by Leverage



Note: The figure consists of four panels, organized in two columns and two rows. The left column reports results using leverage defined as total liabilities to net worth; the right column uses total liabilities to total assets. The first row plots the average coefficient β_h, and the second row the differential coefficient δ_h. The solid black line denotes point estimates, while the dark and light blue shaded areas represent the 68% and 90% confidence intervals, respectively.

[7] See Di Giovanni et al. [2022] for a similar weighting approach.

The first row of Figure 14 shows that a positive global credit supply shock leads to a significant and persistent expansion in lending by Uruguayan banks. The response is hump-shaped, peaking between 10 and 24 months after the shock, and remains statistically significant over an extended horizon. This pattern mirrors the macro-level findings in Section 3, where aggregate credit and output increase markedly following improvements in global financial conditions.

The second row turns to the differential coefficient δ_h, which measures how the lending response varies with banks' leverage. We find that banks with higher leverage expand lending less in response to global credit supply shocks. The interaction coefficients are positive and statistically significant across several horizons, indicating that less-leveraged (better-capitalized) banks are more responsive to favorable global credit conditions. This relationship holds across both leverage definitions and displays a dynamic profile similar to the average response.

To gauge the economic magnitude of this effect, consider the response 16 months after the shock. The average estimated increase in loan growth is approximately 14.8%. Based on the estimated interaction coefficient of 1.95 and the observed leverage distribution, a bank at the 10th percentile of leverage (3.4) increases lending by about 21.5%, whereas a bank at the 90th percentile (12.7) expands lending by only 0.1%. These results underscore the importance of financial slack: banks with stronger balance sheets can amplify external credit expansions substantially more than their highly leveraged peers.

Robustness: Controlling for Time Fixed Effects. The benchmark specification in Equation 1 includes bank and currency fixed effects, together with lagged controls, but does not account for time-varying shocks that may simultaneously affect all banks. Aggregate developments—such as domestic monetary policy changes, fluctuations in commodity prices, or shifts in global risk sentiment—could influence the lending behavior of all institutions, potentially biasing the estimated interaction coefficient.

To address this concern, we estimate a more restrictive specification that includes time fixed effects:

$$\begin{aligned}\Delta \ln(\text{Loan}_{i,c,t+h}) = \tilde{\delta}_h \, \text{Shock}_t^{\text{Supply}} \times \text{Leverage}_{i,t-1} \\ + \mu_{i,h} + \mu_{c,h} + \tau_t + \Gamma_{i,t-1}^{\text{Bank}} + \epsilon_{i,c,t+h},\end{aligned} \tag{2}$$

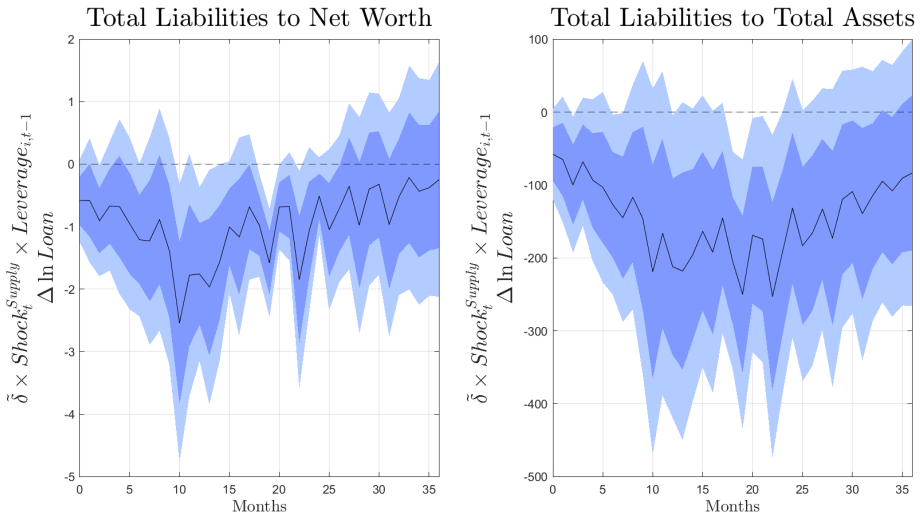
where τ_t denotes time fixed effects that absorb all contemporaneous macroeconomic and financial shocks—both global and domestic. In this specification, identification relies exclusively on cross-bank differences in leverage within each month.

Figure 15 plots the estimated coefficients $\tilde{\delta}_h$. The results closely mirror the baseline estimates: less-leveraged banks expand lending more strongly in response to positive global credit supply shocks. The interaction coefficients remain statistically significant across several

horizons and display a familiar hump-shaped profile, peaking between 10 and 24 months after the shock.

These findings reinforce our main conclusion: the strength of bank balance sheets conditions the domestic transmission of global financial shocks. Even after fully controlling for common time shocks, better-capitalized banks continue to amplify global credit easing, highlighting the central role of intermediary health in shaping the pass-through of international credit conditions.

Figure 15: Bank-Level Responses to Global Credit Supply Shocks
Time Fixed Effects Specification



Note: The figure reports the estimated coefficients $\tilde{\delta}_h$ from Equation 2. The left panel uses leverage defined as total liabilities to net worth, and the right panel as total liabilities to total assets. The solid black line denotes point estimates; dark and light blue shaded areas represent the 68% and 90% confidence intervals, respectively.

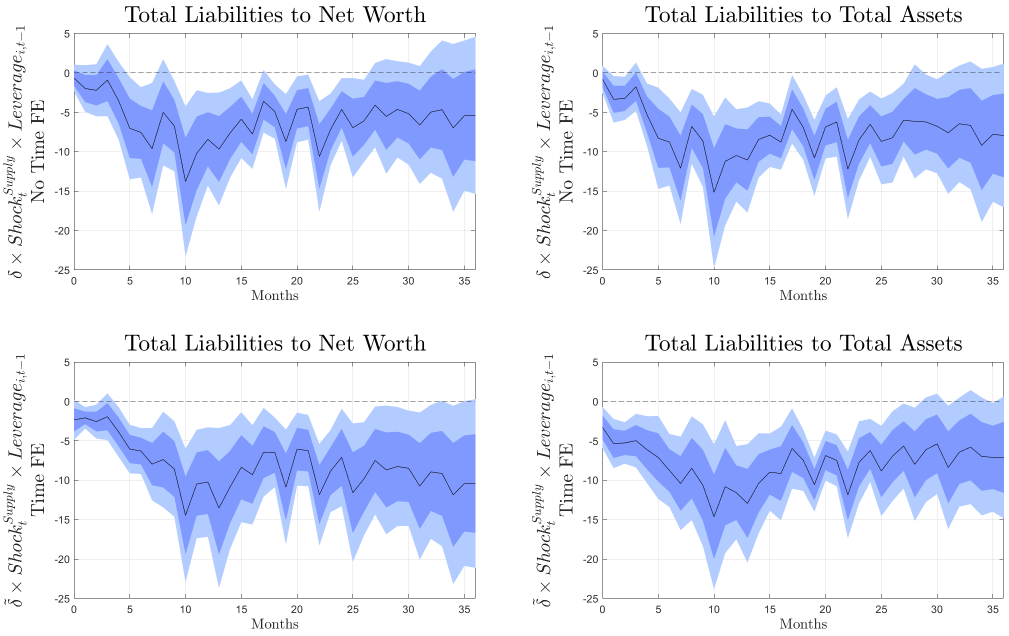
Within-bank normalized leverage. As a further robustness exercise, we test whether our main leverage result holds when exploiting within-bank variation over time rather than relying solely on cross-sectional differences across banks. To do so, we normalize each bank's leverage ratio relative to its own historical distribution. Specifically, we standardize the leverage ratio at the bank level by subtracting the bank-specific mean and dividing by the bank-specific standard deviation, thereby focusing on deviations from each bank's average leverage position over time.

Figure 16 presents the results from estimating both the benchmark specification in Equation 1 and the time fixed effects specification in Equation 2, replacing the raw leverage ratio with the within-bank normalized measure. In both cases, the interaction coefficient δ_h remains negative and statistically significant across multiple horizons, consistent with our baseline findings. This result confirms that even when focusing exclusively on within-bank fluctuations in leverage, banks that enter a global credit supply shock episode with temporarily

elevated leverage exhibit a more muted lending response to improvements in global credit supply.

By exploiting within-bank variation, this exercise alleviates concerns that our baseline leverage results might be driven by persistent unobserved heterogeneity across institutions—such as differences in business models, client composition, or risk appetite. Instead, the findings indicate that leverage acts as a dynamic constraint on credit supply: even transitory increases in leverage weaken a bank's ability to transmit favorable global financial conditions to domestic borrowers, regardless of its long-run structural characteristics.

Figure 16: Bank-Level Responses Using Within-Bank Normalized Leverage



Note: The figure reports estimates of δ_h from Equations 1 and 2, replacing the raw leverage ratio with its within-bank standardized counterpart. The solid black line denotes point estimates; dark and light blue shaded areas represent the 68% and 90% confidence intervals, respectively.

To gauge the magnitude of this effect, consider again the response 16 months after the shock. The estimated interaction coefficients in the within-bank specification range between 2.5 and 4 across leverage definitions. Given the sample variation in normalized leverage, this implies that a bank operating one standard deviation below its historical average leverage expands lending by roughly 4–6 percentage points more than a bank operating one standard deviation above its average. In other words, even temporary improvements in a bank's balance-sheet position substantially enhance its capacity to transmit global credit easing to domestic borrowers.

In Section 5 we present several robustness exercises that reinforce the validity of our main bank-level findings. First, we show that alternative bank-level characteristics related to

liquidity, capitalization, funding structure, and credit risk are fully consistent with our main results: banks that are less leveraged, less indebted, or more liquid exhibit stronger lending responses to global credit supply shocks. Second, we demonstrate that the role of leverage remains robust even when these alternative dimensions are considered jointly. Finally, we examine the sign dependence of the transmission mechanism, documenting that expansionary credit supply shocks play a particularly prominent role in driving bank-level lending dynamics.

4.2 Firm Level Analysis

Data description. We use administrative data from Uruguay's credit registry covering the period from April 2003 to December 2019. The dataset provides monthly loan-level information for all formal financial institutions operating in the country. For each loan, we observe the amount, currency of denomination, maturity at origination, collateral usage and characteristics (including type, currency, and liquidity), credit quality, loan status, and the identities of both the borrower and the lender. This rich coverage allows us to construct detailed measures of firm-level financial conditions, including leverage, currency exposure, and access to short-, medium-, and long-term credit.

Table 3 reports firm-level summary statistics averaged over the full sample period.

The average share of foreign-currency debt is 53%, with a median of 56%, indicating that dollar-denominated borrowing is widespread across Uruguayan firms. The ratio of total debt to total collateral averages 1.24, with substantial dispersion across the distribution: while some firms maintain high collateral coverage, others operate with relatively thin buffers of pledged assets. When we disaggregate this ratio by debt maturity and currency, short-term debt accounts for the largest portion of debt secured by collateral (mean: 0.77), followed by long-term and medium-term debt. Foreign-currency debt is also highly collateralized (mean: 0.63), suggesting that lenders require more security when extending credit in foreign currency—consistent with higher perceived default or exchange-rate risk.

The average firm holds a large share of short-term liabilities, with short-term debt representing 61% of total borrowing on average. Non-performing loans are relatively low, with a median of zero and a 90th percentile of just 6%. Finally, firms overwhelmingly pledge collateral in foreign currency (mean: 94%) and frequently use illiquid assets as collateral, with 80% of firms reporting some illiquid component in their pledged assets.

We also report firm-level loan growth rates over both monthly and annual horizons, separately for local- and foreign-currency loans. On average, firms experience month-ahead growth of 2.7% in local-currency credit and 1.2% in foreign-currency credit. Year-ahead growth rates are higher, averaging 17.4% and 16.2%, respectively. These statistics exhibit considerable heterogeneity, with some firms contracting sharply while others expand rapidly. This variation highlights the diverse borrowing dynamics across firms and serves as the foun-

dation for our empirical analysis of how firm-level credit growth responds to global bank credit supply shocks.

Econometric specification. To examine how firm-level borrowing responds differentially to global credit supply shocks, we estimate a series of local projection regressions at the firm–bank–currency level. Each specification interacts the global credit supply shock with a pre-determined firm- or loan-level characteristic. Specifically, we estimate:

$$\Delta \ln(\text{Loan}_{i,b,c,t+h}) = \delta_h \left(\text{Shock}_t^{\text{Supply}} \times X_{i,b,c,t-1}\right) + \mu_c + \mu_{i,t} + \mu_{b,t} + \Gamma_{i,b,c,t-1} + \varepsilon_{i,b,c,t+h}, \quad (3)$$

where $\Delta \ln(\text{Loan}_{i,b,c,t+h})$ denotes the log change in outstanding credit between firm i and bank b, in currency c, at horizon h. The variable $\text{Shock}_t^{\text{Supply}}$ is the global bank credit supply shock, normalized such that positive values correspond to easing episodes—i.e., increases in global banks' net worth that expand international credit availability. The interaction term $\text{Shock}_t^{\text{Supply}} \times X_{i,b,c,t-1}$ captures heterogeneous credit responses based on lagged characteristics $X_{i,b,c,t-1}$, which include measures such as firm leverage, collateral liquidity, loan maturity, and currency denomination. Each of these margins of heterogeneity is analyzed in turn below.

The specification includes a currency fixed effect (μ_c), firm–time fixed effects ($\mu_{i,t}$), which absorb all contemporaneous firm-specific demand shocks and borrower-level macroeconomic exposures, and bank–time fixed effects ($\mu_{b,t}$), which flexibly control for time-varying differences in banks' lending behavior and funding conditions. Because the global credit supply shock is common across all firms in a given month, its direct effect is absorbed by the fixed effects. Identification of δ_h therefore comes solely from cross-sectional heterogeneity in firm–bank–currency exposures. Lagged controls, denoted by $\Gamma_{i,b,c,t-1}$, include firm- and bank-level variables that may jointly influence credit outcomes, ensuring that the interaction coefficient is not confounded by concurrent shifts in borrower fundamentals or intermediary balance sheets. Standard errors are two-way clustered at the firm and time levels.

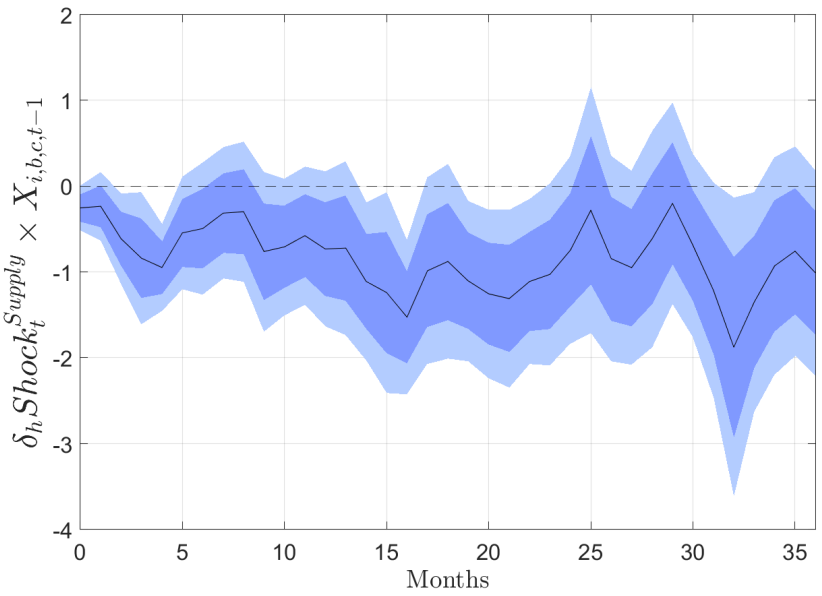
Firm-level results.

Result #1: The role of total leverage.
More leveraged firms benefit less from global credit supply expansions.

We begin by analyzing firm-level heterogeneity in the transmission of global credit supply shocks as a function of firms' ex-ante leverage positions. Figure 17 presents the estimated heterogeneous response of firms' borrowing according to their total leverage, measured as the ratio of total loans to total collateral.

The figure shows that more leveraged firms respond significantly less to a positive global credit supply shock compared to less leveraged firms. The estimated differential effects are statistically significant across multiple horizons and exhibit a hump-shaped pattern, peaking between 15 and 30 months after the shock. Quantitatively, the heterogeneity is sizable:

Figure 17: Firm-Level Results – Role of Total Leverage



Note: The figure presents the estimated differential coefficient δ_h from Equation 3, using total leverage (defined as total loans to total collateral) as the firm-level interaction term. The solid black line represents the point estimate; the dark and light blue shaded areas denote the 68% and 90% confidence intervals, respectively.

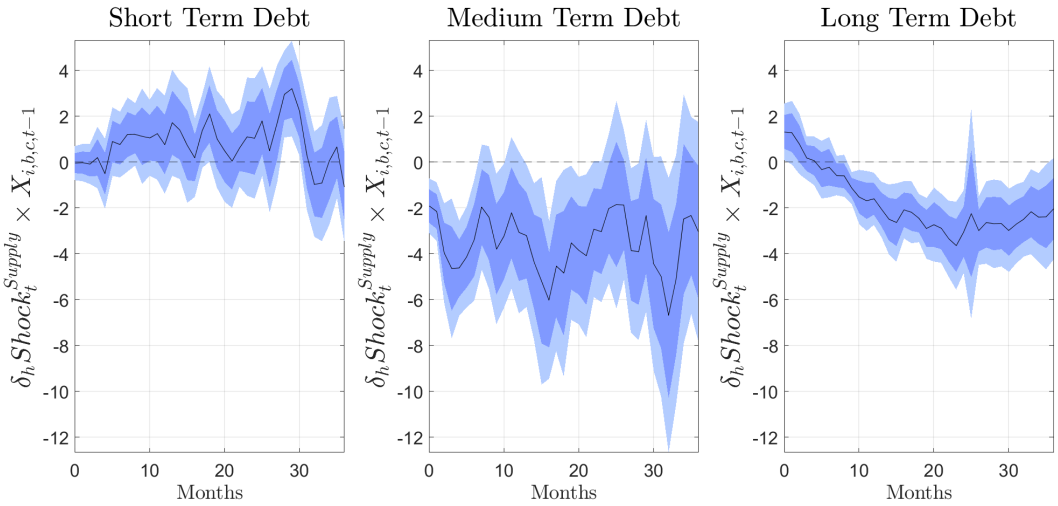
sixteen months after the shock, the estimated interaction coefficient ranges between 2.3 and 3.1 across specifications. Based on the sample leverage distribution, a firm at the 10th percentile of leverage (0.25) increases its borrowing by roughly 20%, whereas a firm at the 90th percentile (0.85) expands by less than 3%. A one-standard-deviation reduction in leverage raises credit growth by about 5–6 percentage points following a positive global credit supply shock. These findings suggest that firms with lower ex-ante leverage are better positioned to expand borrowing when global credit conditions improve. Notably, this result mirrors the evidence documented at the bank level, where banks with stronger balance sheets were more responsive to global financial easing.

Result #2: Maturity structure of leverage.
Medium-term debt appears most sensitive to credit supply shocks.

Next, we disaggregate total leverage into short-, medium-, and long-term leverage ratios, defined as the ratio of outstanding loans at each maturity bucket to total collateral.

Across maturities, the interaction coefficient remains negative and significant, confirming that leverage constrains credit responses across the board. The effect is strongest and most persistent for medium-term debt, somewhat weaker for short-term loans, and moderate for long-term credit. These differences likely reflect rollover and refinancing risks that are most acute at intermediate maturities.

Figure 18: Firm-Level Results – Role of Total Leverage
Heterogeneity across Loan Maturity



Note: Each panel plots the estimated differential coefficient δ_h from Equation 3, using (from left to right) short-term, medium-term, and long-term leverage ratios. The solid black line represents the point estimate; the dark and light blue shaded areas denote the 68% and 90% confidence intervals, respectively.

Result #3: Currency composition of debt.
Leverage constraints apply to both local and foreign currency borrowing.

We now examine whether the currency denomination of firms' debt influences the heterogeneous response to global credit supply shocks. Figure 19 presents the results of splitting total leverage into local- and foreign-currency components.

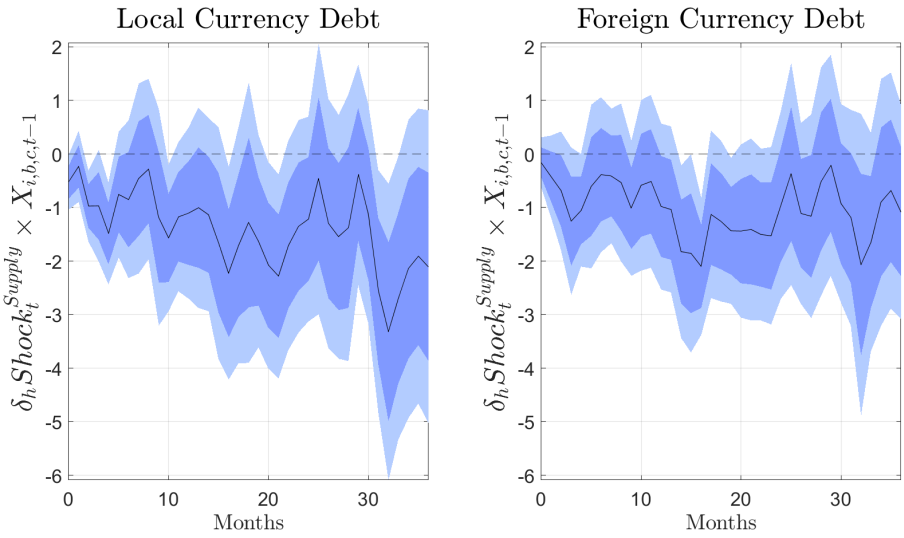
The estimated coefficients are negative and statistically significant for both currency denominations. The magnitudes are broadly similar, indicating that the leverage channel operates robustly across currencies. In other words, the degree of firm indebtedness—not the currency composition of debt—drives the heterogeneous credit response to global financial shocks. Currency mismatches therefore play a limited role once leverage is accounted for.

Result #4: Within-firm leverage fluctuations.
Leverage effects hold even within firms over time.

Finally, we exploit within-firm variation in leverage over time by standardizing each firm's leverage ratio relative to its own historical mean and standard deviation. This design isolates whether firms that are more leveraged than usual at the time of the shock exhibit different borrowing responses.

Results show that firms with relatively higher leverage—compared to their own historical average—are significantly less responsive to credit supply shocks. The coefficients are consistently negative and statistically significant at multiple horizons, displaying a dynamic profile similar to the cross-sectional results. At a 16-month horizon, the estimated interac-

Figure 19: Firm-Level Results – Role of Total Leverage
Heterogeneity across Loan Currency



Note: Each panel plots the estimated differential coefficient δ_h from Equation 3, using (from left to right) local- and foreign-currency leverage ratios. The solid black line represents the point estimate; the dark and light blue shaded areas denote the 68% and 90% confidence intervals, respectively.

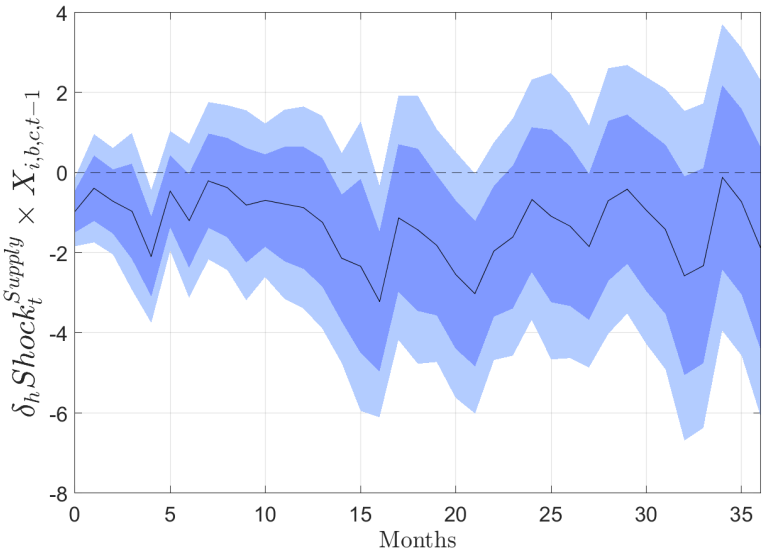
tion coefficient lies between 2.5 and 4, implying that a firm operating one standard deviation below its average leverage expands credit by roughly 5–7 percentage points more than when operating one standard deviation above its mean. Even conditional on firm fixed effects, temporary increases in leverage reduce a firm's ability to benefit from global credit easing. Leverage thus acts as a dynamic constraint on borrowing capacity during periods of external financial expansion.

Summary of firm-level findings. Taken together, the firm-level evidence highlights that financial heterogeneity—captured most clearly by leverage—plays a central role in transmitting global credit supply shocks. Across definitions, maturities, and currencies, firms with stronger balance sheets expand borrowing substantially more in response to positive shocks, while highly indebted firms remain constrained even during periods of abundant global liquidity. The leverage mechanism operates consistently across levels of aggregation, mirroring the bank-level findings and aligning closely with the mechanism formalized in our theoretical framework: balance-sheet strength determines who can translate global financial easing into real credit growth.

5 Additional Results & Robustness Checks

Additional interactions at the bank level. We complement our benchmark bank-level analysis by studying the interaction between the credit supply shock and other bank-specific

Figure 20: Firm-Level Results – Role of Total Leverage
Exploiting Within-Firm Variation



Note: The figure plots the estimated differential coefficient δ_h from Equation 3, using a standardized measure of total leverage (defined as total loans to total collateral) as the firm-level interaction term. The solid black line represents the point estimate; the dark and light blue shaded areas denote the 68% and 90% confidence intervals, respectively.

characteristics. We focus on four indicators that capture different dimensions of banks' financial liquidity and balance sheet strength: (i) the ratio of liquid assets to total assets, (ii) the ratio of net worth to required regulatory capital, (iii) the ratio of demand deposits to total deposits, and (iv) the share of non-performing loans.

Figure 21 presents the results of estimating Equation 1, where the leverage interaction term is replaced with an interaction between the credit supply shock and each of the four alternative variables described above. Panels (1) through (4) show that banks with relatively higher liquidity, stronger capitalization, a greater share of demand deposits, and higher non-performing loan ratios exhibit more pronounced lending responses to a positive credit supply shock. These results reinforce the central role of financial heterogeneity in shaping the transmission of global financial conditions: banks that are more liquid or better capitalized respond more strongly to credit supply expansions, while those that are more indebted or financially constrained exhibit more muted responses. This pattern is fully consistent with our earlier results on leverage and highlights the importance of financial flexibility in amplifying international spillovers.

Joint interaction effects. To further evaluate the importance of leverage relative to these additional bank-level characteristics, we estimate a richer specification that includes two in-

teraction terms:

$$\begin{aligned}\Delta \ln \text{Loan}_{i,c,t+h} = \beta_h \times \text{Shock}_t^{\text{Supply}} + \delta_h^{\text{Leverage}} \times \text{Shock}_t^{\text{Supply}} \times \text{Leverage}_{i,t-1} \\ + \delta_h^{\text{Other}} \times \text{Shock}_t^{\text{Supply}} \times \text{Other}_{i,t-1} \\ + \mu_{i,h} + \mu_{c,h} + \Gamma_{i,t-1}^{\text{Bank}} + \Gamma_{i,t-1}^{\text{Macro}} + \epsilon_{i,c,t}, \end{aligned} \tag{4}$$

where we simultaneously interact the shock with both leverage and each of the alternative bank-level characteristics.

Figure 22 presents the estimated coefficients. Across specifications, the interaction coefficient on leverage, $\delta_h^{\text{Leverage}}$, remains remarkably stable and statistically significant, closely resembling the magnitudes reported in Figures 14 and 15. We interpret this as evidence that leverage is not only a robust predictor of differential credit supply responses but also a key margin through which global financial shocks are transmitted into domestic lending, even after controlling for other dimensions of bank balance sheet strength.

Bank-level sign dependency. We next explore whether the bank-level transmission is asymmetric depending on the sign of the credit supply shock. In particular, we test whether credit expansions (positive shocks) and credit contractions (negative shocks) are transmitted with different intensity.

We modify our benchmark regression in Equation 1 to allow for separate coefficients for expansions and contractions:

$$\begin{aligned}\Delta \ln \text{Loan}_{i,c,t+h} = \beta_h^{Exp} \times \text{Shock}_t^{\text{Supply}} \times \mathbb{1}[\text{Shock}_t^{\text{Supply}} > 0] \\ + \beta_h^{Con} \times \text{Shock}_t^{\text{Supply}} \times \mathbb{1}[\text{Shock}_t^{\text{Supply}} < 0] \\ + \delta_h^{Exp} \times \text{Shock}_t^{\text{Supply}} \times \text{Leverage}_{i,t-1} \times \mathbb{1}[\text{Shock}_t^{\text{Supply}} > 0] \\ + \delta_h^{Con} \times \text{Shock}_t^{\text{Supply}} \times \text{Leverage}_{i,t-1} \times \mathbb{1}[\text{Shock}_t^{\text{Supply}} < 0] \\ + \mu_{i,h} + \mu_{c,h} + \Gamma_{i,t-1}^{\text{Bank}} + \Gamma_{i,t-1}^{\text{Macro}} + \epsilon_{i,c,t}. \end{aligned} \tag{5}$$

Figures 23 and 24 present the results for leverage measured as total liabilities to net worth and total liabilities to total assets, respectively. In both cases, we find that expansionary credit supply shocks are the primary drivers of the estimated effects. The interaction coefficients for expansions are positive and statistically significant at multiple horizons, while the interaction coefficients for contractions are smaller in magnitude and not statistically different from zero at conventional confidence levels. These results suggest that the transmission of global bank credit supply shocks at the bank level is primarily driven by positive (expansionary) shocks.

We test the robustness of this sign-dependency finding using a more stringent spec-

ification that includes time fixed effects:

$$\begin{aligned}\Delta \ln \text{Loan}_{i,c,t+h} = &\tilde{\delta}_h^{Exp} \times \text{Shock}_t^{\text{Supply}} \times \text{Leverage}_{i,t-1} \times \mathbb{1}[\text{Shock}_t^{\text{Supply}} > 0] \\ &+ \tilde{\delta}_h^{Con} \times \text{Shock}_t^{\text{Supply}} \times \text{Leverage}_{i,t-1} \times \mathbb{1}[\text{Shock}_t^{\text{Supply}} < 0] \\ &+ \mu_{i,h} + \mu_{c,h} + \tau_t + \Gamma_{i,t-1}^{\text{Bank}} + \epsilon_{i,c,t}. \end{aligned} \tag{6}$$

Figures 25 and 26 present the results for both leverage definitions. Consistent with the previous results, expansionary shocks generate strong, positive, and statistically significant interaction effects across most horizons. In contrast, contractionary shocks generate weaker and statistically insignificant interaction effects across all horizons. These results confirm that heterogeneity in lending responses primarily operates during episodes of global credit supply expansion.

Overall, the evidence consistently supports the view that global financial expansions, rather than contractions, are the primary channel through which global bank net worth shocks are transmitted to domestic credit markets. The degree of leverage critically determines which banks can capitalize on favorable global financial conditions and expand lending to firms.

Additional interaction terms at the firm level. As a robustness exercise, we allow for multiple sources of heterogeneity in firm-level responses to global credit supply shocks by introducing a second interaction term in addition to leverage. Specifically, we extend our benchmark specification to include both firm leverage and an additional firm- or loan-level characteristic. The estimated specification is:

$$\begin{aligned}\Delta \ln \text{Loan}_{i,b,c,t+h} = &\delta_h^{(1)} \cdot \left(\text{Shock}_t^{\text{Supply}} \times X_{i,b,c,t-1}^{(1)}\right) + \delta_h^{(2)} \cdot \left(\text{Shock}_t^{\text{Supply}} \times X_{i,b,c,t-1}^{(2)}\right) \\ &+ \mu_c + \mu_{i,t} + \mu_{b,t} + \Gamma_{i,b,c,t-1} + \epsilon_{i,b,c,t+h}, \end{aligned} \tag{7}$$

where $X_{i,b,c,t-1}^{(1)}$ denotes the firm leverage ratio (total loans to total collateral), and $X_{i,b,c,t-1}^{(2)}$ represents the additional firm- or loan-level characteristic such as share of non-performing loans, collateral liquidity, or currency denomination. The coefficients $\delta_h^{(1)}$ and $\delta_h^{(2)}$ capture the differential firm-level responses to the global credit supply shock along these two dimensions of heterogeneity. The remaining controls, fixed effects, and clustering structure remain identical to the benchmark specification. This specification allows us to assess whether the heterogeneous effects of leverage remain robust after controlling for additional firm-level or contractual features that may also shape firms' sensitivity to global financial conditions.

Role of non-performing loans. We start by studying the role of non-performing loans (NPLs) as an additional source of heterogeneity in the transmission of credit supply shocks. The NPL ratio captures the quality of firms' outstanding debt portfolios and serves as a proxy for ex-ante financial distress or credit risk. Firms with higher shares of non-performing loans may face tighter borrowing constraints and more limited access to external financing, even when global financial conditions improve. Thus, studying NPLs provides an additional margin of firm-level vulnerability beyond leverage.

Figure 27 presents the results. The left column reports the estimated interaction coefficient obtained by estimating Equation 3, where total leverage is replaced with the share of non-performing loans as the interacting variable. The middle and right columns present results from estimating the double interaction specification in Equation 7, where both NPLs and total leverage interact with the credit supply shock.

The results are broadly consistent across specifications. In all cases, the interaction coefficients are negative and statistically significant at multiple horizons, suggesting that firms with higher shares of non-performing loans respond less strongly to positive global credit supply shocks. Importantly, once controlling for both leverage and NPLs jointly, the leverage interaction remains negative and robust, reinforcing the view that both ex-ante indebtedness and credit quality serve as relevant constraints on firms' ability to take advantage of improved external credit conditions. These findings further corroborate our main result that relatively more indebted or financially constrained firms are less reactive to global financial easing.

Currency Exposures and Dollarization. We next examine whether the currency denomination of firms' debt and collateral introduces additional heterogeneity in the transmission of global credit supply shocks. A priori, firms more exposed to foreign currency liabilities or foreign currency collateral could face different balance sheet sensitivities to global financial conditions, particularly if exchange rate movements affect debt service costs or collateral valuations. Moreover, dollarization may alter firms' access to funding depending on the structure of domestic banking systems and the currency composition of external financing.

To test for such effects, we estimate three alternative interaction terms: (i) a dummy variable that takes the value of one if the loan is denominated in foreign (dollar) currency and zero if in domestic currency; (ii) the share of total debt denominated in foreign currency; and (iii) the share of collateral denominated in foreign currency. For each specification, we estimate both a single interaction model (replacing leverage) and a double interaction model (including both the new currency interaction and total leverage jointly).

Figure 28 presents the results. The first column shows results for each new interaction term estimated individually; the second column shows results for the new interaction terms jointly with leverage; and the third column reports the leverage interaction from the corresponding double interaction specification.

Across all three currency indicators, the estimated interaction coefficients are generally small in magnitude and statistically indistinguishable from zero across most horizons. We find no robust evidence that currency denomination, whether at the loan, debt portfolio, or collateral level, significantly alters the transmission of global credit supply shocks at the firm level. This absence of heterogeneity across currency exposures aligns with our previous findings, which used domestic and foreign currency leverage ratios in the main results, suggesting that dollarization plays a limited role in conditioning firms' responsiveness to external

credit supply shocks in this context.

Importantly, across all specifications, the interaction coefficients on total leverage remain negative, stable, and statistically significant. This further reinforces the robustness of our core finding: firm-level indebtedness is a central margin of heterogeneity in the transmission of global bank credit supply shocks, even after controlling for cross-currency exposures.

Collateral Liquidity and Transmission. Finally, we explore whether the liquidity of firms' collateral plays a role in shaping the transmission of global credit supply shocks. Theory suggests that collateral liquidity may affect firms' borrowing capacity, as more liquid assets can be more easily pledged to obtain financing, especially when external credit conditions improve.[8] In contrast, firms holding illiquid collateral may face tighter borrowing constraints even during episodes of global credit expansions.

To test for this channel, we construct a measure of collateral liquidity based on the share of collateral deemed illiquid on each firm's balance sheet. We then interact this variable with the global credit supply shock, following both the single interaction specification and the double interaction specification that jointly includes total leverage.

Figure 29 presents the results. The first column reports the interaction coefficient from the single interaction specification where the share of illiquid collateral replaces leverage. The middle column reports the coefficient for the share of illiquid collateral in the double interaction model, while the third column reports the corresponding coefficient on total leverage.

The results indicate that firms with higher shares of illiquid collateral exhibit a significantly weaker borrowing response to positive credit supply shocks. The interaction coefficient is negative and statistically significant across multiple horizons, suggesting that collateral liquidity indeed matters for firms' ability to benefit from improved international credit supply conditions. In particular, firms holding relatively illiquid collateral are less able to expand borrowing when global financial conditions loosen, potentially reflecting lower collateral values or weaker pledgability during such episodes.

Importantly, as in previous robustness exercises, the interaction terms for total leverage remain strongly negative and statistically significant even after controlling for collateral liquidity. This confirms that firm-level leverage remains a robust and central determinant of firms' differential sensitivity to global credit supply shocks, with collateral liquidity acting as an additional but complementary margin of heterogeneity.

Overall, these results underscore that while balance sheet indebtedness is the primary driver of firms' differential borrowing responses, collateral characteristics also shape the extent

[8] See, for example, Brunnermeier and Sannikov [2014] for the role of collateral liquidity in global financial amplification.

to which firms can capitalize on improved global financial conditions.

Firm-Level Sign Dependency. We assess whether the heterogeneous firm-level leverage effects documented in Section 4.2 display asymmetries depending on the sign of the global credit supply shock. To do so, we modify our benchmark specification in Equation 3 to allow the interaction coefficients to differ between expansionary and contractionary shocks. In particular, we estimate the following specification

$$\begin{aligned}\Delta \ln \text{Loan}_{i,b,c,t+h} = &\delta_h^{Exp} \times \text{Shock}_t^{\text{Supply}} \times X_{i,b,c,t-1} \times \mathbb{1}\left[\text{Shock}_t^{\text{Supply}} > 0\right] \\ &+ \delta_h^{Con} \times \text{Shock}_t^{\text{Supply}} \times X_{i,b,c,t-1} \times \mathbb{1}\left[\text{Shock}_t^{\text{Supply}} < 0\right] \\ &+ \mu_c + \mu_{i,t} + \mu_{b,t} + \Gamma_{i,b,c,t-1} + \epsilon_{i,b,c,t+h}. \end{aligned} \tag{8}$$

The results are presented in Figure 31. Across both panels, we find that more leveraged firms consistently exhibit a smaller response to global credit supply shocks, regardless of the sign of the shock. The interaction coefficient remains negative and statistically significant at multiple horizons for both contractionary and expansionary shocks. While the magnitude of the effect is slightly larger for contractionary shocks, the difference is modest, and the dynamic patterns remain broadly similar across both cases. These results suggest that, unlike the more pronounced asymmetries observed at the bank level, firm-level heterogeneity in leverage operates in a largely symmetric fashion for both tightening and easing episodes in global credit supply conditions.

Results after the Great Financial Crisis. As an additional robustness check, we examine whether the leverage-dependent transmission mechanism identified in our main results remains present in the more recent post-crisis period. To do so, we re-estimate the benchmark specification in Equation 3 restricting the sample to start in January 2010, after the end of the Great Financial Crisis (GFC).

Figure 30 presents the results. The left panel reproduces our baseline estimates using the full sample, while the right panel shows the results for the post-GFC subsample. The estimated interaction coefficient remains negative and statistically significant across both samples, confirming the robustness of our main finding that more indebted firms are less able to expand borrowing in response to positive global credit supply shocks. Importantly, the estimated effects appear somewhat larger in magnitude during the post-GFC period, with wider confidence intervals reflecting the shorter sample size. This suggests that the relevance of firm balance sheet heterogeneity may have become even more pronounced in the years following the GFC, potentially reflecting changes in global banking regulation, cross-border lending practices, and the composition of international capital flows over the past decade.

Overall, these results reinforce the conclusion that firm leverage constitutes a persistent and quantitatively significant margin of heterogeneity in the transmission of global credit supply shocks to emerging market borrowers.

6 Concluding Remarks

This paper studies the international transmission of credit supply shocks originating from global banks to Emerging Market Economies (EMEs). We combine cross-country macro-financial data with granular micro-level evidence from administrative datasets in Uruguay to provide a comprehensive analysis of both aggregate effects and underlying transmission mechanisms.

At the macro level, we show that positive credit supply shocks—proxied by improvements in global banks' net worth—lead to a persistent easing of financial conditions in EMEs, characterized by lower sovereign spreads, higher equity prices, expanding capital inflows, and a sustained acceleration in real activity. These effects are robust across countries, econometric specifications, and alternative identification strategies that isolate true credit supply shifts from confounding macroeconomic shocks.

At the micro level, we document that the domestic banking system serves as a key amplification channel. Less leveraged and more liquid banks expand their lending more aggressively when global credit supply conditions improve. Importantly, these balance sheet effects remain robust even after controlling for alternative bank-level characteristics such as capitalization, funding structure, and credit risk. Further, the transmission is primarily driven by expansionary credit supply shocks, with limited evidence of sign dependency for contractions.

Turning to firms, we show that credit supply expansions are absorbed differentially across borrowers depending on their ex-ante financial conditions. Firms with higher leverage, larger shares of non-performing loans, more illiquid collateral, and weaker balance sheets exhibit significantly smaller borrowing responses to positive credit supply shocks. These leverage-dependent effects remain robust across multiple specifications, including when controlling for currency exposures, firm fixed effects, and alternative loan characteristics. Notably, unlike the bank-level findings, firm-level heterogeneity appears largely symmetric across expansions and contractions, and the effects remain even more pronounced in the post-GFC period.

Taken together, our results highlight the central role of financial heterogeneity in shaping the international transmission of global credit supply shocks. Improvements in global financial conditions do not translate uniformly into domestic credit expansions; instead, both financial intermediaries and firms with stronger balance sheets are better positioned to take advantage of global credit easing. These findings underscore the importance of balance sheet constraints in amplifying or dampening external financial spillovers, with implications for both macroeconomic stabilization policies and the design of prudential regulation in emerging markets.

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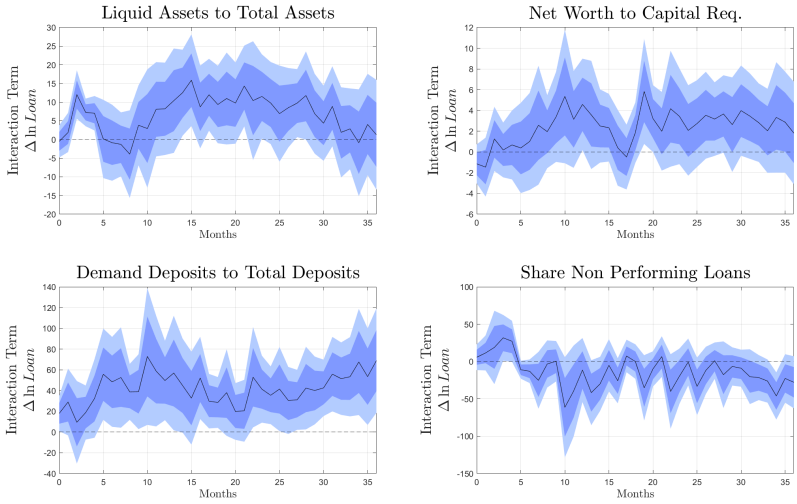
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A Microeconomic Transmission - Additional Results

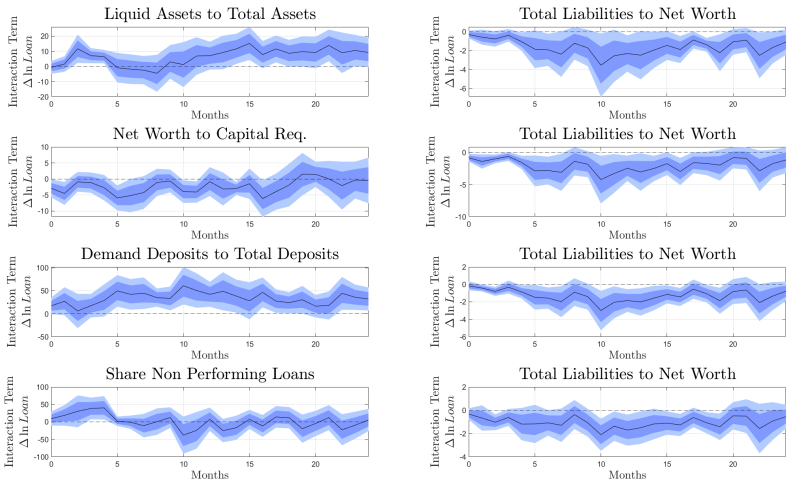
Additional interactions at the bank level. Figures that present the interaction coefficients between the negative credit supply shock and four variables that reflect banks' financial liquidity: (i) ratio of liquid assets to total assets, (ii) ratio of net worth capitalization to required regulatory capital, (iii) ratio of demand deposits to total deposits, and, (iv) share of non-performing loans.

Figure 21: Bank Level Results - Additional Interactions



Note: The panel is comprised of four panels ordered in two rows and two columns, which present the estimated coefficient δ_h from estimating Equation 1, replacing leverage with each of the following variables: share of liquid assets under 30 day maturity to total assets (top-left panel); net worth to regulatory capital requirements (top-right panel); share of demand deposits to total deposits (bottom-left panel); share of non performing loans to total loans (bottom-right panel). The solid black line presents the point estimate, the dark blue shaded area represents the 68% confidence interval and the light blue shaded area represents the 90% confidence interval.

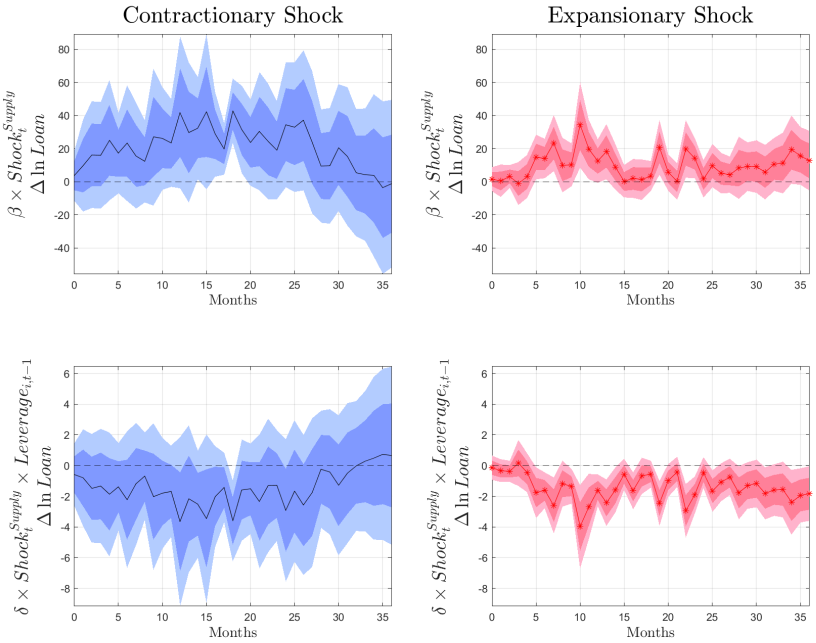
Figure 22: Bank Level Results - Leverage & Additional Interactions



Note: The panel is comprised of eight panels ordered in four rows and two columns, which present the estimated coefficient δ_h from estimating Equation 1, replacing leverage with each of the following variables: share of liquid assets under 30 day maturity to total assets (top-left panel); net worth to regulatory capital requirements (top-right panel); share of demand deposits to total deposits (bottom-left panel); share of non performing loans to total loans (bottom-right panel). The solid black line presents the point estimate, the dark blue shaded area represents the 68% confidence interval and the light blue shaded area represents the 90% confidence interval.

Bank-level sign dependency results. We present the results for the sign-dependent bank-level results. We argue that the resulting responses are greater in magnitude and with relatively tighter confidence intervals for expansionary shocks. This is particularly evident for the more stringent econometric regression with time fixed effects, in Equation 6

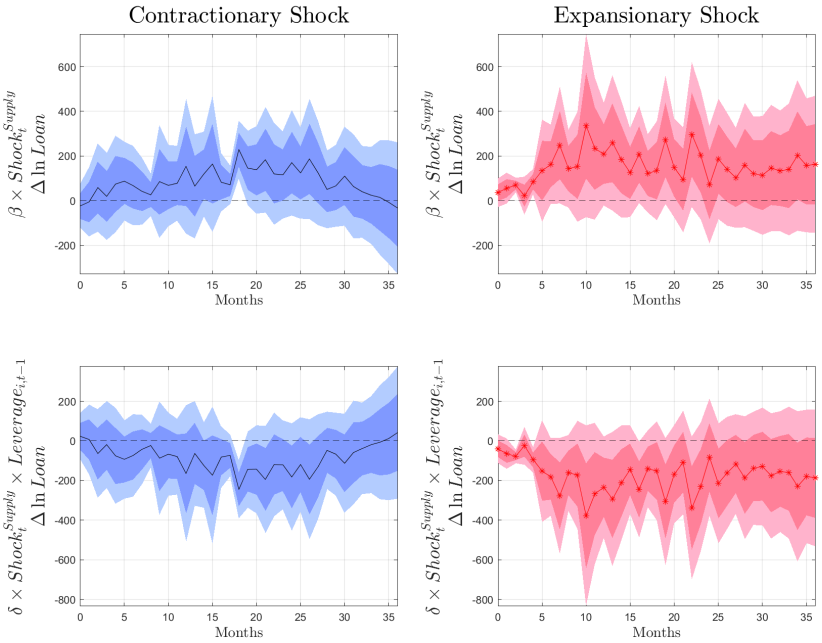
Figure 23: Bank Level Results - Sign Dependency
Total Liabilities to Net Worth



Note: The panel is comprised of four panels ordered in two rows and two columns, which present the estimated coefficient δ_h from estimating Equation 5 using the measure of leverage as the ratio of total liabilities to net worth. The left column presents the results for a negative or contractionary credit supply shock. The solid black line presents the point estimate, the dark blue shaded area represents the 68% confidence interval and the light blue shaded area represents the 90% confidence interval. The right column presents the results for a positive or expansionary credit supply shock. The red-starred line presents the point estimate, the dark red shaded area represents the 68% confidence interval and the light red shaded area represents the 90% confidence interval.

Results for the role of Non Performing Loans at the firm level.

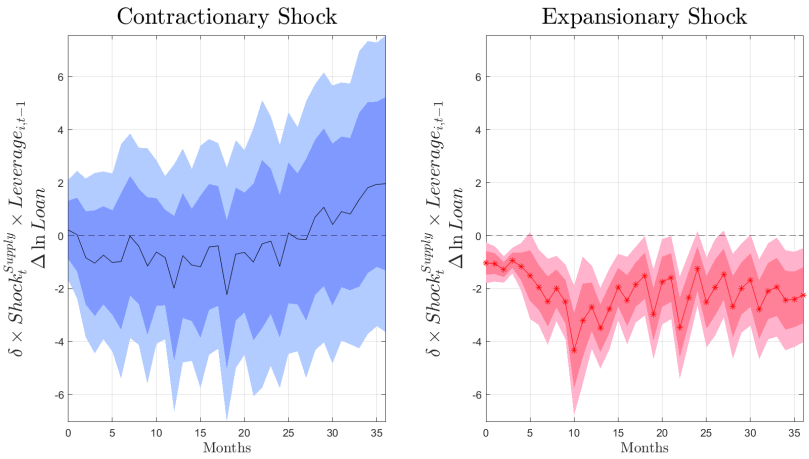
Figure 24: Bank Level Results - Sign Dependency
Total Liabilities to Total Assets



Note: The panel is comprised of four panels ordered in two rows and two columns, which present the estimated coefficient δ_h from estimating Equation 5 using the measure of leverage as the ratio of total liabilities to net worth. The left column presents the results for a negative or contractionary credit supply shock. The solid black line presents the point estimate, the dark blue shaded area represents the 68% confidence interval and the light blue shaded area represents the 90% confidence interval. The right column presents the results for a positive or expansionary credit supply shock. The red-starred line presents the point estimate, the dark red shaded area represents the 68% confidence interval and the light red shaded area represents the 90% confidence interval.

Results for other currency indicators.

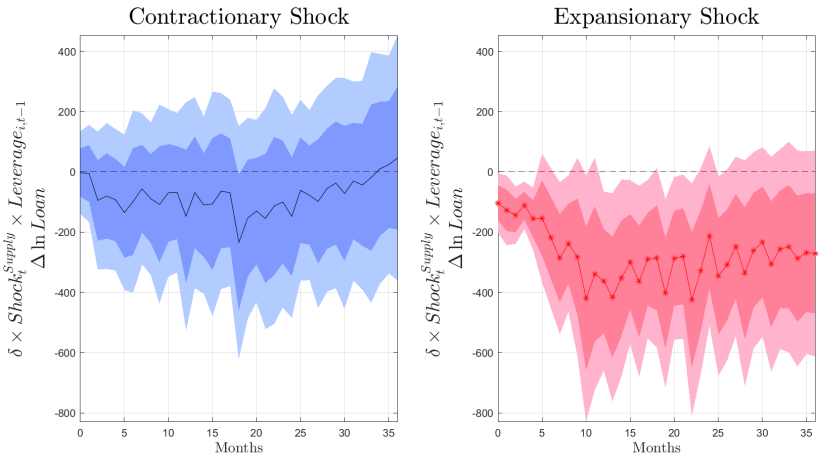
Figure 25: Bank Level Results - Sign Dependency
Total Liabilities to Net Worth



Note: The panel is comprised of two panels ordered in one row and two columns, which present the estimated coefficient δ_h from estimating Equation 6 using the measure of leverage as the ratio of total liabilities to net worth. The left column presents the results for a negative or contractionary credit supply shock. The solid black line presents the point estimate, the dark blue shaded area represents the 68% confidence interval and the light blue shaded area represents the 90% confidence interval. The right column presents the results for a positive or expansionary credit supply shock. The red-starred line presents the point estimate, the dark red shaded area represents the 68% confidence interval and the light red shaded area represents the 90% confidence interval.

Results for the share of illiquid collateral.

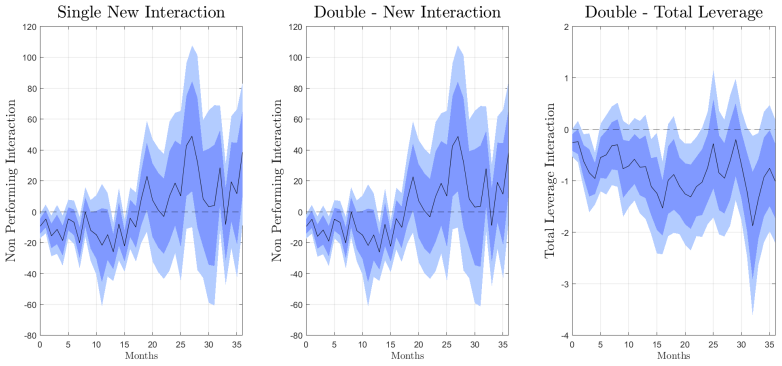
Figure 26: Bank Level Results - Sign Dependency
Total Liabilities to Total Assets



Note: The panel is comprised of two panels ordered in one row and two columns, which present the estimated coefficient δ_h from estimating Equation 6 using the measure of leverage as the ratio of total liabilities to net worth. The left column presents the results for a negative or contractionary credit supply shock. The solid black line presents the point estimate, the dark blue shaded area represents the 68% confidence interval and the light blue shaded area represents the 90% confidence interval. The right column presents the results for a positive or expansionary credit supply shock. The red-starred line presents the point estimate, the dark red shaded area represents the 68% confidence interval and the light red shaded area represents the 90% confidence interval.

Results after the Great Financial Crisis.

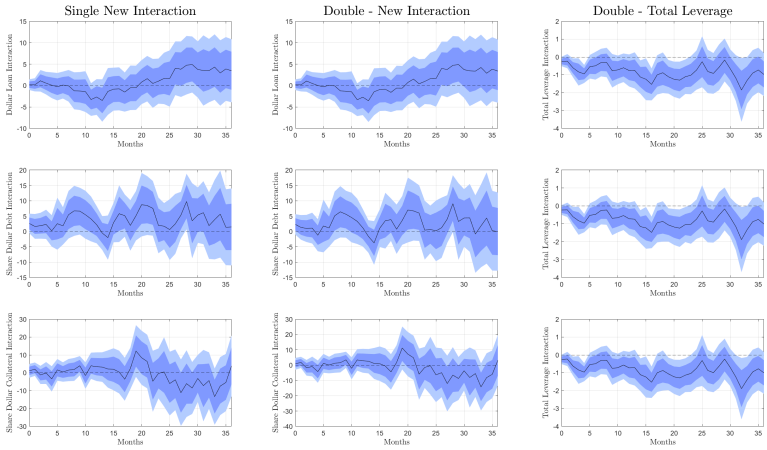
Figure 27: Firm Level Results - Role of Non-Performing Loans



Note: The panel is comprised of three panels ordered in one row and three columns. The left column presents the estimated interaction coefficient of estimating Equation 3 replacing total leverage with the share of non-performing loans. The middle and right columns present the results for the share of non-performing loans and total leverage, as estimated by Equation 7. The solid black line presents the point estimate, the dark blue shaded area represents the 68% confidence interval and the light blue shaded area represents the 90% confidence interval. The right column presents the results for a positive or expansionary credit supply shock. The red-starred line presents the point estimate, the dark red shaded area represents the 68% confidence interval and the light red shaded area represents the 90% confidence interval.

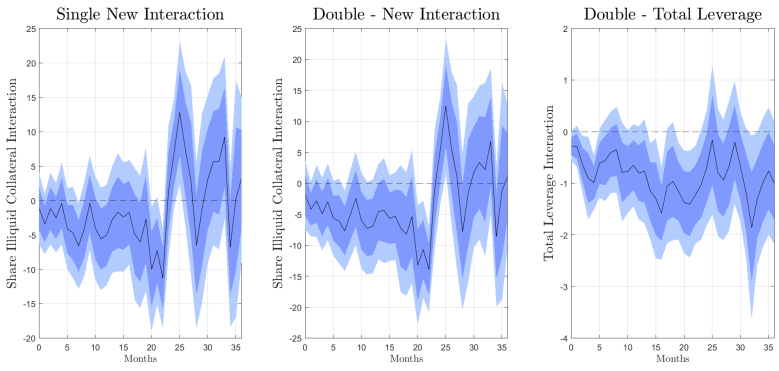
Results for the role of sign dependency at the firm level.

Figure 28: Firm Level Results - Role of Other Currency Indicators



Note: The panel is comprised of nine panels, organized in three rows and three columns. The left column presents the estimated interaction coefficient of estimating Equation 3 replacing total leverage. The middle and right columns present the results for the new interaction and total leverage, as estimated by Equation 7. The first row presents the results for an interaction with dollar currency loans, the second row presents the results for the share of dollar debt and the third row presents the results for the share of collateral priced in dollars. The solid black line presents the point estimate, the dark blue shaded area represents the 68% confidence interval and the light blue shaded area represents the 90% confidence interval. The right column presents the results for a positive or expansionary credit supply shock. The red-starred line presents the point estimate, the dark red shaded area represents the 68% confidence interval and the light red shaded area represents the 90% confidence interval.

Figure 29: Firm Level Results - Role of Illiquid Collateral



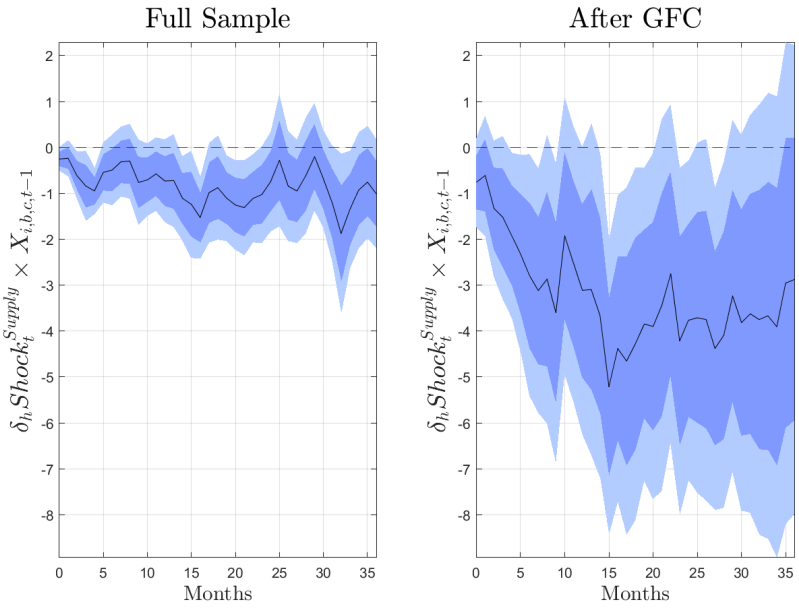
Note: The panel is comprised of three panels ordered in one row and three columns. The left column presents the estimated interaction coefficient of estimating Equation 3 replacing total leverage with the share of illiquid collateral. The middle and right columns present the results for the share of illiquid collateral and total leverage, as estimated by Equation 7. The solid black line presents the point estimate, the dark blue shaded area represents the 68% confidence interval and the light blue shaded area represents the 90% confidence interval. The right column presents the results for a positive or expansionary credit supply shock. The red-starred line presents the point estimate, the dark red shaded area represents the 68% confidence interval and the light red shaded area represents the 90% confidence interval.

Table 3: Firm-Level Summary Statistics

	Mean	p10	Median	p90
Share of Foreign-Currency Debt	0.53	0.03	0.56	0.98
Total Debt to Total Collateral	1.24	0.26	0.89	2.66
Short-Term Debt to Collateral	0.77	0.11	0.50	1.72
Medium-Term Debt to Collateral	0.21	0.00	0.07	0.59
Long-Term Debt to Collateral	0.26	0.00	0.11	0.69
Foreign-Currency Debt to Collateral	0.63	0.02	0.40	1.53
Share of Short-Term Debt	0.61	0.29	0.58	0.96
Share of Non-Performing Loans	0.03	0.00	0.00	0.06
Share of Collateral in Foreign Currency	0.94	0.76	1.00	1.00
Share of Illiquid Collateral	0.80	0.00	1.00	1.00
Month-Ahead Growth in LC Loans (%)	2.74	-13.58	1.01	14.53
Month-Ahead Growth in FC Loans (%)	1.19	-4.43	1.32	6.68
Year-Ahead Growth in LC Loans (%)	17.36	-51.32	17.00	79.17
Year-Ahead Growth in FC Loans (%)	16.20	-25.41	17.56	56.53

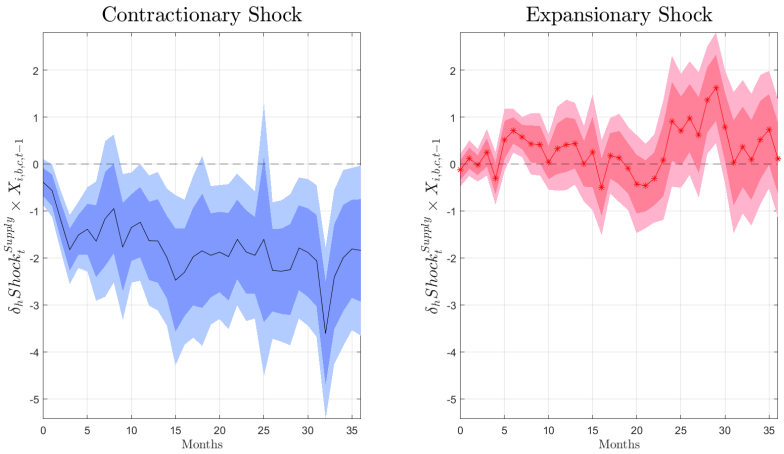
Note: Each observation represents the time-averaged value of the variable at the firm level over the April 2003–December 2019 period. "FC" denotes foreign currency, while "LC" refers to local currency. "ST", "MT", and "LT" correspond to short-term (maturity less than 90 days), medium-term (90 days to 1 year), and long-term (more than 1 year) debt, respectively. All ratios are computed as averages across time for each firm before summarizing the distribution across firms. Growth rates are calculated as log differences in debt over 1-month and 12-month intervals, averaged over time for each firm and then summarized across the firm distribution.

Figure 30: Firm Level Results - After the GFC



Note: The panel is comprised of two panels ordered in one row and two columns, which present the estimated coefficient δ_h from estimating Equation 3. The left column presents our benchmark results for the full sample. The right column presents the results for a sample starting after the Great Financial Crisis, in January 2010. The solid black line presents the point estimate, the dark blue shaded area represents the 68% confidence interval and the light blue shaded area represents the 90% confidence interval.

Figure 31: Firm Level Results - Sign Dependency
Total Liabilities to Total Assets



Note: The panel is comprised of two panels ordered in one row and two columns, which present the estimated coefficient δ_h from estimating Equation 8. The left column presents the results for a negative or contractionary credit supply shock. The solid black line presents the point estimate, the dark blue shaded area represents the 68% confidence interval and the light blue shaded area represents the 90% confidence interval. The right column presents the results for a positive or expansionary credit supply shock. The red-starred line presents the point estimate, the dark red shaded area represents the 68% confidence interval and the light red shaded area represents the 90% confidence interval.