Does Foreign Borrowing Lift Growth?*

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Abstract

External borrowing by governments is widely seen as a tool for financing development, yet its growth effects remain controversial. We construct plausibly exogenous foreign credit supply shocks from the bilateral structure of public sector lending, isolating creditor-driven shifts in borrowing capacity from borrower demand. Using data on 134 developing economies over 1970–2023, we show that positive shocks persistently raise public investment and external debt but, on average, do not improve output or productivity; they instead come with weaker external balances, partial crowding-out of private investment, and, in the following years, rising defaulted debt. The evidence points to lower returns to public investment and overborrowing, rather than Dutch disease, as the explanation for the missing output gain. Moreover, the benefits of borrowing depend on institutional quality: countries with stronger institutions achieve more favorable productivity and output responses, accumulate more public capital, and rely less on domestic financing.

Keywords: External public sector borrowing; Public sector debt; Credit supply shocks; Public investment; Sovereign default; Economic development; Institutional quality; Capital allocation

JEL classification: F34; F36; F43; H63; O16; O43

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1. Introduction

Access to external finance has long occupied a central place in theories of economic development. From early development models emphasizing capital scarcity (McKinnon, 1964; Chenery and Strout, 1966) to modern open-economy frameworks (Obstfeld and Rogoff, 1996; Uribe and Schmitt-Grohé, 2017), the ability of the public sector to tap foreign savings is widely viewed as a mechanism for financing productive investment, accelerating capital accumulation, and raising living standards. The underlying logic is straightforward: countries with limited domestic savings should be able to borrow abroad, invest in high-return projects, and converge more rapidly toward the income levels of advanced economies. Yet the historical record presents a striking paradox. While some countries have successfully used external borrowing to support sustained growth and structural transformation, many others have accumulated large external debt burdens with little discernible improvement in productivity or long-run economic performance. Why does external public sector borrowing promote development in some countries but not in others?

This question lies at the heart of several longstanding debates in international macroeconomics and development economics. Standard neoclassical models predict that capital should flow from rich countries, where returns are low, to poorer countries, where returns are high (Lucas, 1990). In practice, however, international capital does not consistently flow to the countries with the greatest growth potential, nor do countries receiving larger capital inflows systematically experience stronger economic performance. Indeed, some of the fastest-growing developing economies have historically attracted relatively modest amounts of foreign capital, while countries receiving substantial inflows have often experienced disappointing growth outcomes (Gourinchas and Jeanne, 2013). A more skeptical strand of the literature argues that greater access to external public sector finance need not foster development and may instead encourage overborrowing. When governments are relatively impatient, access to foreign credit can lead to excessive debt accumulation, crowd out private investment, and ultimately reduce growth (Aguiar and Amador, 2011; Aguiar et al., 2020; Aguiar, 2025). The

resulting discrepancy between theory and evidence has given rise to a broad literature on the allocation puzzle that established that the growth effects of foreign borrowing vary widely across countries and episodes. Identifying the mechanisms behind that variation, however, has been difficult.

A central reason is identification. Borrowing by the public sector is inherently endogenous to economic conditions. Governments tend to borrow more during episodes of weak growth, fiscal stress, adverse terms-of-trade shocks, natural disasters, or political transitions. Productivity booms may also create more demand for credit. At the same time, creditors adjust lending in response to changing perceptions of borrower risk and shifts in global financial conditions. Observed borrowing therefore reflects a combination of credit demand and credit supply, making it difficult to distinguish the effects of borrowing itself from the circumstances that give rise to it. This challenge has complicated efforts to determine whether external borrowing promotes investment, productivity, and economic growth, or merely responds to underlying economic developments.

This paper addresses this challenge by isolating plausibly exogenous variation in credit supply within existing public sector lending relationships. We exploit a key but largely overlooked feature of the international lending system: borrowing relationships are highly concentrated and remarkably persistent. Using a comprehensive dataset covering bilateral borrower-creditor relationships for 134 emerging market and developing economies (EMDEs) between 1970 and 2023, we adapt an identification strategy from the banking literature (Amiti and Weinstein, 2018; Amiti et al., 2019) to separate borrower demand from creditor-specific shifts in credit supply. Specifically, we decompose bilateral lending flows into global, borrower-specific, creditor-specific, and idiosyncratic components, and combine creditor-specific shocks with countries' pre-existing creditor exposures to construct borrower-level external public sector credit supply shocks. These shocks capture changes in borrowing capacity stemming from developments on the creditor side rather than from borrowers' financing needs, allowing us to identify the macroeconomic consequences of exogenous shifts in access to external finance.

The shocks we identify have properties that reassure us that we disentangle demand

from supply shocks that are exogenous from the perspective of the borrowing country. Whereas the demand shocks are predicted by lagged GDP and productivity growth, the supply shocks are not. Moreover, both shocks generate a contemporaneous increase in net external borrowing and a higher external debt to GDP ratio. At the same time, placebo tests confirm that the shocks do not predict greater borrowing when applied to past data or when the shocks are randomly reassigned across countries.

Using the identified supply shocks, our analysis yields three key findings. Our first finding is that easier access to foreign credit generates significant investment and borrowing booms. Positive foreign credit supply shocks lead governments to increase public investment and accumulate significantly larger external debt stocks. The resulting expansion is accompanied by larger fiscal deficits, real exchange rate appreciation, stronger import growth, and weaker current-account balances. Yet despite the rise in public investment, we find little evidence of sustained improvements in output or productivity for the average country. Public investment increases, but economic performance does not improve commensurately. These findings suggest that relaxing financing constraints is not, by itself, sufficient to generate durable growth gains.

Our second finding is that the costs of the borrowing boom arrive with a delay. Defaulted external public debt rises in the years following a positive credit supply shock, although the estimates by creditor type are imprecise. Together with the weak output response, this points to two channels. The first is lower returns to public investment: public investment and the capital–output ratio rise, but output does not. The second is overborrowing: governments accumulate debt faster than their capacity to service it, and the costs surface as defaults several years later. By contrast, we find little support for a Dutch disease channel. Although the real exchange rate appreciates, domestic prices do not rise relative to export prices, and exports recover rather than contract persistently.

Our third, and central, finding is that institutions fundamentally shape the effectiveness of external public sector finance. Countries with stronger institutional environments, measured using the International Country Risk Guide (ICRG) Political Risk Index, experience markedly different outcomes following similar increases in access to foreign credit. In these countries, positive credit supply shocks translate into larger

and more persistent increases in public investment and more favorable productivity and output responses, while stronger bureaucratic quality and government stability are also associated with attenuated crowding-out of private investment. By contrast, countries with weaker institutions experience declines in productivity and output despite comparable increases in borrowing and investment spending. The evidence therefore points to a crucial distinction between financing and development: external public sector credit relaxes resource constraints, but institutions determine whether additional resources are transformed into productive capital and sustained growth.

These findings suggest a broader reinterpretation of the role of external borrowing in development. That institutions shape aggregate economic performance is well established (Acemoglu et al., 2005); less settled is the channel through which they do so. Our results speak to one such channel, and relate closely to the debate over whether external resources are more effective in stronger policy and institutional environments. This proposition was advanced by Burnside and Dollar (2000) and contested by Easterly et al. (2004) and Rajan and Subramanian (2008). Relative to that literature, which compares countries receiving different volumes of aid, we hold the credit expansion approximately fixed and vary the institutional environment. Conditional on a comparable expansion in credit supply, the macroeconomic response differs systematically with institutional quality: where institutional quality is weak, additional external credit finances public investment without corresponding gains in output or productivity, and is followed by declines in both. Where it is strong, the same expansion leaves output and productivity broadly unchanged. This is consistent with the view that the returns to external public sector finance depend on the capacity of the state to allocate borrowed resources, though we do not observe project-level outcomes and cannot rule out that institutional quality proxies for correlated country characteristics.

Related literature and contributions. Our paper relates to three strands of literature. First, we contribute to the literature on public sector borrowing and international capital flows. A longstanding literature has emphasized the potential gains from directing capital toward economies in which capital is scarce (Lucas, 1990), while subsequent work has

documented that the empirical allocation of international capital differs markedly from this benchmark. Reinhart and Rogoff (2004) emphasize sovereign repayment risk as an important explanation for the limited flow of debt capital from rich to poor countries, while Alfaro et al. (2008) show that institutional quality helps explain why capital does not flow systematically toward poorer economies. Going one step further, Gourinchas and Jeanne (2013) document that capital does not systematically flow toward developing countries with higher productivity growth, and Prasad et al. (2007) find little evidence that greater reliance on foreign capital is associated with faster growth among nonindustrial economies. Related work also emphasizes that the composition of external finance matters for its economic consequences (Faria and Mauro, 2009; Aizenman et al., 2013).

Second, our findings relate to a large literature showing that greater openness to capital flows need not translate into productive investment or higher productivity. The literature identifies several channels. Openness may fail to raise investment at all: Prasad et al. (2007) document that non-industrial countries relying less on foreign capital grew faster, and Alfaro et al. (2004) and Aghion et al. (2009) find that the growth benefits of openness materialize only above thresholds of domestic financial development. Openness may also raise investment while allocating it poorly. Aguiar and Amador (2011) provide a theoretical foundation for this idea: political-economy and limited-commitment frictions can cause otherwise similar degrees of financial openness to generate very different growth dynamics. Particularly closely related is Gopinath et al. (2017), who show that the decline in real interest rates following European integration coincided with rising capital misallocation and lower aggregate TFP in southern Europe: with size-dependent financial frictions, additional capital flowed toward firms with higher net worth rather than higher productivity. A parallel literature emphasizes the sectoral margin, with inflows intermediated disproportionately into nontradables (Reis, 2013; Benigno and Fornaro, 2014; Müller and Verner, 2024). These effects are not universal. Bau and Matray (2023) and Larrain and Stumpner (2017) find that liberalization episodes reduced misallocation where they relaxed binding constraints on high-return firms, suggesting that the sign depends on whether foreign capital reaches constrained producers or is intermediated through collateral-based channels that favor incumbents.

Third, our findings provide a more granular empirical perspective on the concerns raised by Aguiar and Amador (2011); Aguiar et al. (2020); Aguiar (2025) about government access to foreign credit. Consistent with this literature, easier access to public sector borrowing can generate substantial debt accumulation without producing corresponding productivity or growth gains. We further show that this debt accumulation is followed by rising defaults several years later. This links the overborrowing view to the literature documenting that sovereign defaults and restructurings carry large and persistent output costs (Borensztein and Panizza, 2009; Cruces and Trebesch, 2013; Kuvshinov and Zimmermann, 2019), particularly when they occur after a default rather than preemptively (Asonuma and Trebesch, 2016; Asonuma et al., 2019). Importantly, however, we show that this result masks substantial heterogeneity, with the consequences of greater access to credit depending critically on the institutional environment of the borrowing country.

Our contributions lie at the intersection of these literatures. First, we provide new causal evidence on the macroeconomic consequences of access to external public sector finance. By adapting the approach of Amiti and Weinstein (2018) and Amiti et al. (2019) to bilateral lending relationships, we isolate creditor-driven shifts in credit supply from changes in borrowers' financing demand. Our approach is related to Kraay (2014), who also exploits the structure of official lending to developing-country governments, using the long lags between loan approval and disbursement to isolate a predetermined component of government spending. Because loan approvals themselves reflect governments' earlier financing requests, this approach does not separate borrower demand from creditor supply. Second, our results provide a new perspective on the international capital allocation puzzle. The weak relationship between foreign capital inflows and growth may partly reflect endogenous financing demand and selection into foreign borrowing (Acharya et al., 2024), rather than the causal effect of foreign borrowing itself. By isolating creditor-driven shifts in credit supply, we uncover a second explanation: greater access to foreign finance does not systematically raise output or productivity, particularly in countries with weaker institutions. Third, our findings provide a more granular empirical perspective on the concerns raised by Aguiar and

Amador (2011); Aguiar et al. (2020); Aguiar (2025) about government access to foreign credit. Consistent with this literature, easier access to public sector borrowing can generate substantial debt accumulation without producing corresponding productivity or growth gains. Importantly, however, we show that this result masks substantial heterogeneity, with the consequences of greater access to credit depending critically on the institutional environment of the borrowing country.

The remainder of the paper proceeds as follows. Section 2. describes the bilateral lending data and documents the concentration, persistence, and commonality of borrower-creditor relationships. Section 3. presents the identification strategy and construction of foreign credit supply shocks. Section 4. reports the main results and explores heterogeneity across countries. Section 5. examines the channels behind the weak output response, including a delayed rise of debt in default. Section 6. concludes.

2. Data

Our empirical analysis relies on an unbalanced annual panel of emerging-market and developing economies (EMDEs) spanning 1970 to 2023. Below we describe our key data sources, variable definitions, and construction procedures.

2.1. External Public Debt

Our analysis draws on the World Bank's International Debt Statistics (IDS), which report the external public and publicly guaranteed (PPG) debt of developing economies at the borrower-creditor level.[1,2] The dataset covers 134 borrowing countries over the period 1970 to 2023, jointly accounting for 37 percent of global GDP and 81 percent of the world's population in 2019. On the lending side, the data distinguish 302 individual creditors, comprising multilateral institutions, bilateral official lenders, and global private creditors (including bondholders).

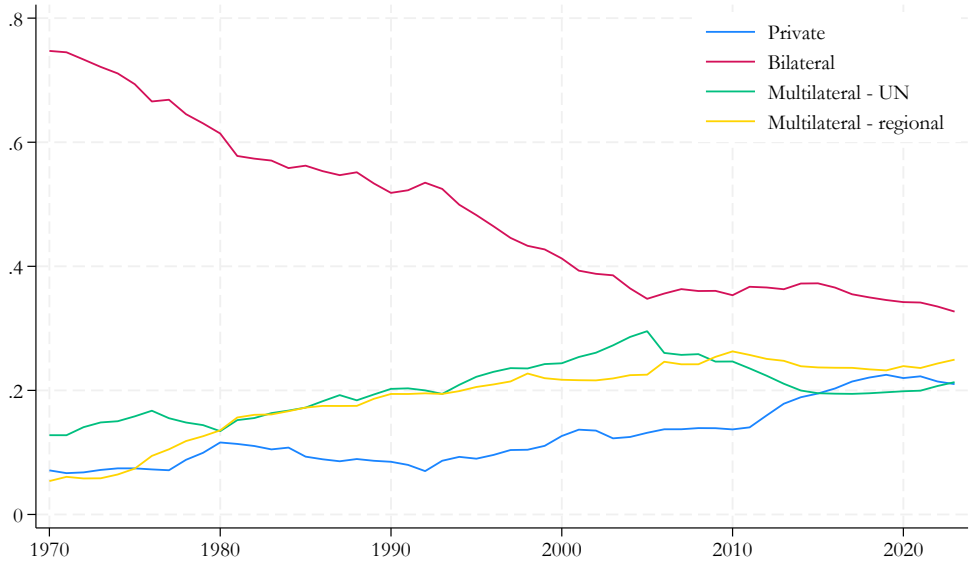
The composition of external creditors has shifted markedly over the sample period. Figure 1 plots the share of the world debt stock held by each creditor type. Bilateral creditors accounted for roughly three quarters of the outstanding stock in 1970 but for only about one third by 2023. This decline was absorbed by multilateral institutions (both those in the United Nations system and regional development banks) whose combined share rose steadily through the 1990s and 2000s, and by bondholders, whose share increased most notably after the Global Financial Crisis.[3]

[1] Public debt statistics may be subject to underreporting and subsequent revisions. Using historical vintages of sovereign debt statistics, Horn et al. (2024) document systematic ex post upward revisions across countries and reporting systems.

[2] The IDS classifies the use of IMF credit and SDR allocations separately from PPG external debt. We therefore exclude IMF credit from the bilateral creditor-level analysis. While IMF credit is economically an external public liability, IMF financing is primarily designed to address balance-of-payments needs and is often extended through the monetary authorities. It is therefore less suited to our identification strategy, which relies on persistent borrower-creditor lending relationships and creditor-specific supply shocks.

[3] In the IDS, bilateral creditors are identified by country of residence. Each creditor-country entry therefore aggregates lending by all entities resident in that country, which can include both official lenders, such as development agencies and export credit agencies, and private lenders, such as commercial banks. For our identification strategy, this aggregation implies that a creditor-specific shock captures shifts in lending by all institutions resident in a given creditor country. Such residence-level shifts remain on the supply side from the perspective of the borrower, but they cannot be attributed to a single lending institution.

Figure 1: Share of world debt stock by creditor type, 1970–2023



Notes: The figure plots the share of the aggregate debt stock of all borrowers in the sample owed to global private creditors (bondholders), bilateral creditors, multilateral creditors in the United Nations system, and regional multilateral creditors.
Source: World Bank International Debt Statistics.

2.2. Three features of foreign lending to governments

Three features of the bilateral lending data are central to our identification strategy: lending is (i) concentrated across creditors, (ii) sticky over time, and (iii) correlated across borrowers of the same creditor.

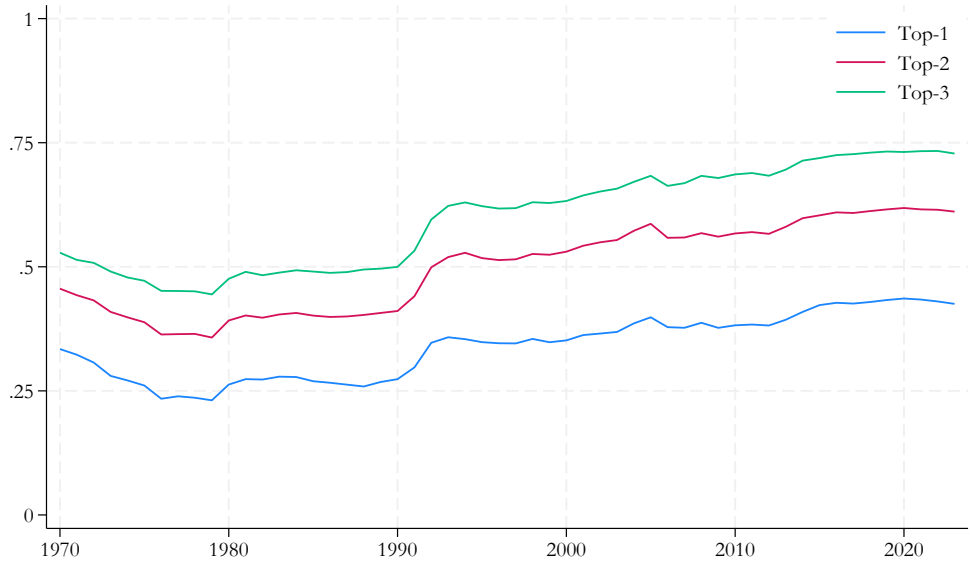
Concentrated lending. Borrowers rely on a small number of dominant creditors. Figure 2 plots the unweighted mean share of each borrower's debt stock owed to its largest one, two, and three creditors. Across the sample period, the single largest creditor accounts for roughly 25 to 40 percent of a typical borrower's external debt stock, and the three largest creditors jointly account for 50 to 75 percent. Concentration declined somewhat during the 1970s but has trended upward since the early 1980s.

To summarize concentration in a single statistic, we compute the inverse Herfindahl index of creditor shares, which can be interpreted as the effective number of creditors:

$$invHH_{i,t} = \frac{1}{\sum_j s_{ij,t}^2}, \qquad s_{ij,t} = \frac{B_{ij,t}}{B_{i,t}}, \tag{1}$$

where $s_{ij,t}$ denotes the share of borrower i's total debt stock $B_{i,t}$ owed to creditor j. Figure 3 plots the kernel density of $invHH_{i,t}$ for three subperiods. The distribution is centered at a small effective number of creditors—around four to five—and its mode has shifted *leftward* over time, indicating that borrowing has become more, not less, concentrated in recent decades despite the entry of new creditors.

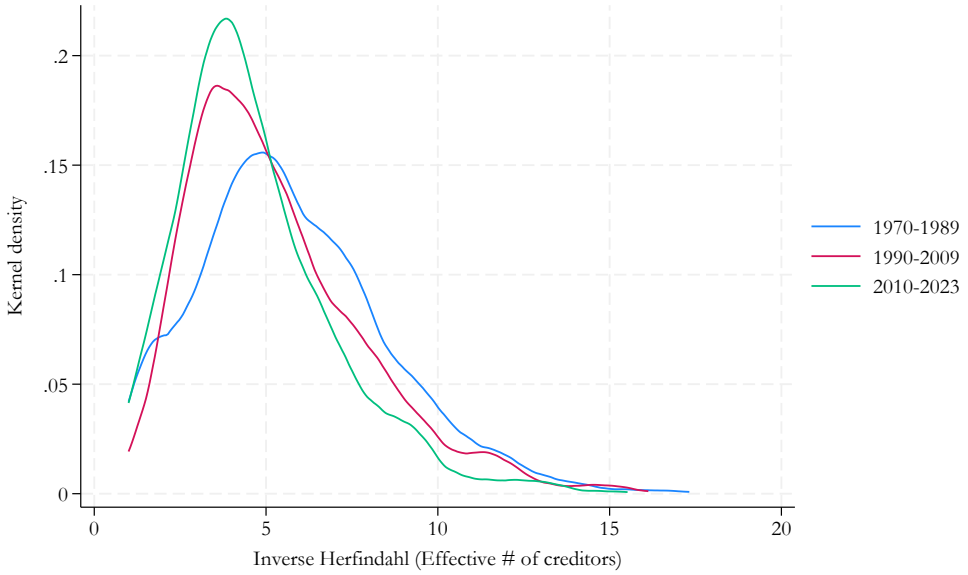
Figure 2: Share of debt stock owed to largest one, two, and three creditors (unweighted mean)



Notes: The figure plots the unweighted mean across borrowers of the share of each borrower's outstanding external public and publicly guaranteed debt stock owed to its largest, two largest, and three largest creditors. Creditors are ranked by exposure separately within each borrower–year, so the identity of the top-ranked creditors may change over time.
Source: World Bank International Debt Statistics.

Sticky lending. Borrower-creditor relationships are highly persistent. Figure 4 plots the distribution of the length of active borrower-creditor relationships as of 2023. The distribution is bimodal: alongside a mass of relatively young relationships, a substantial share of borrower-creditor pairs have been active for four decades or longer. In many cases these span nearly the entire sample period. Relationship persistence differs across creditor types. Figure 5 reports the unconditional probability that a borrower-creditor relationship ends for 2023. For all creditor types, relationships terminate with a probability of under 1 to over 3 percent per year.

Figure 3: Distribution of the effective number of creditors (inverse Herfindahl index), by subperiod

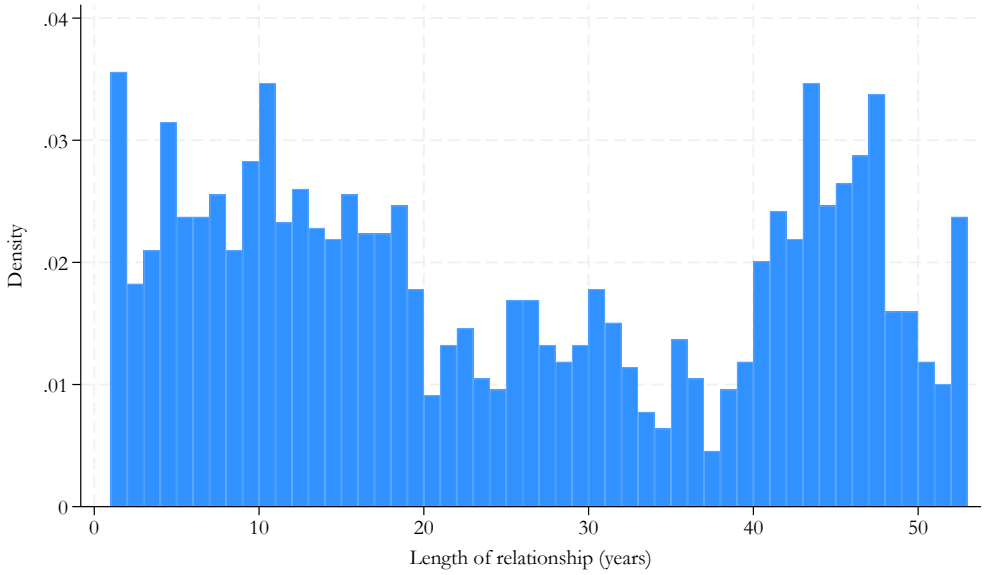


Notes: The figure plots kernel densities of the inverse Herfindahl index of creditor shares defined in Equation (1), which can be interpreted as the effective number of creditors of a borrower. Each density pools all borrower–year observations falling within the indicated subperiod. Densities are estimated using an Epanechnikov kernel with bandwidth of 0.5.
Source: World Bank International Debt Statistics.

The stickiness of relationships implies that fluctuations in borrowing operate primarily through existing relationships rather than through the formation or dissolution of new ones. Figure 6 decomposes aggregate net borrowing into intensive and extensive margins: in a typical year, the mean of the share of net borrowing along the intensive margin is about 85 percent, a share that is remarkably stable over 1980 to 2023. The median share of net borrowing along the intensive margin has been 100 percent since the late 1980s.

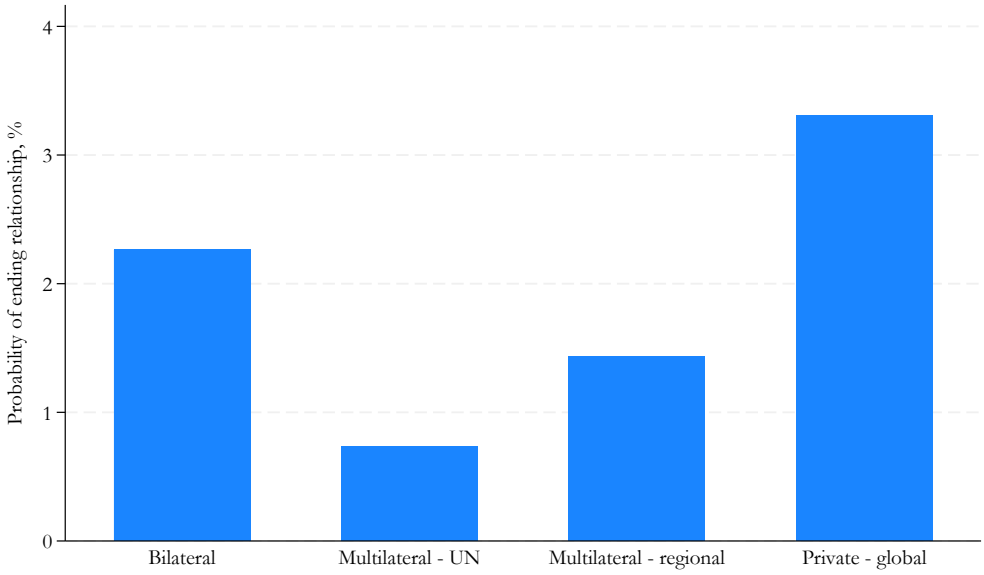
Correlated lending. Finally, lending is correlated across borrowers of the same creditor: creditors tend to expand or contract lending to their entire portfolio of borrowers simultaneously. To quantify the importance of these common supply-side movements, we regress the growth of bilateral net borrowing on alternative sets of fixed effects and compare their explanatory power. Figure 7 reports the R^2 and adjusted R^2 from specifications with year fixed effects (capturing global shocks), borrower-year fixed effects (capturing borrower demand), creditor-year fixed effects (capturing creditor supply), and

Figure 4: Distribution of the length of borrower-creditor relationships, 2023



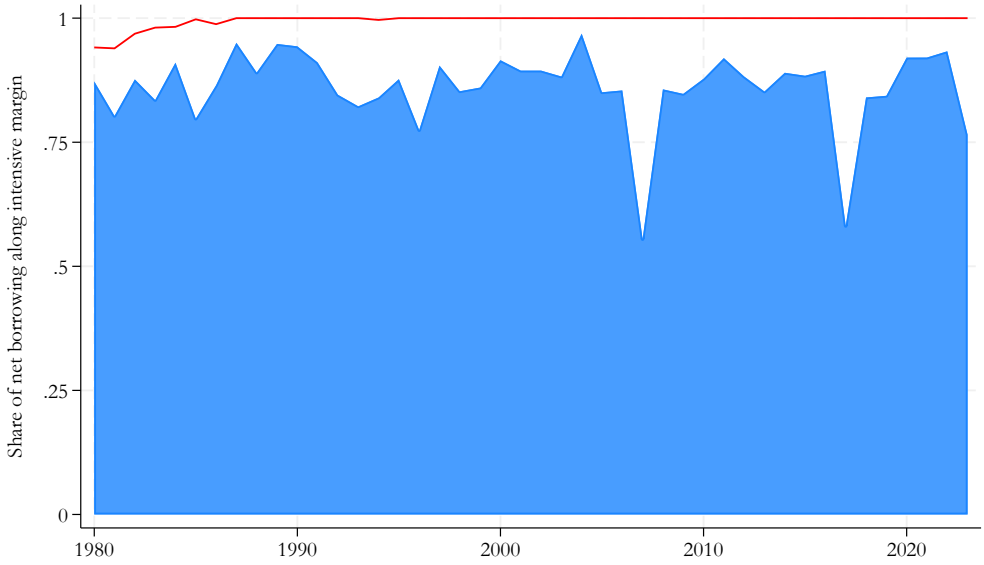
Notes: The figure plots the histogram of the length, in years, of borrower–creditor lending relationships active in 2023. A relationship is treated as active in a given year if the borrower reports a positive outstanding stock owed to that creditor, and its length is the number of years since the relationship was first observed. Relationships that began before 1970 are left-censored at the start of the sample. Bin width is 1 year.
Source: World Bank International Debt Statistics.

Figure 5: Unconditional probability of ending a borrower-creditor relationship, by creditor type (unweighted mean), 2023



Notes: The figure reports the unweighted mean, across borrower–creditor pairs within each creditor type, of the unconditional probability that a relationship active in 2022 is no longer active in 2023. A relationship is treated as terminated when the outstanding stock falls to zero.
Source: World Bank International Debt Statistics.

Figure 6: Share of net borrowing along the intensive margin, 1980–2023



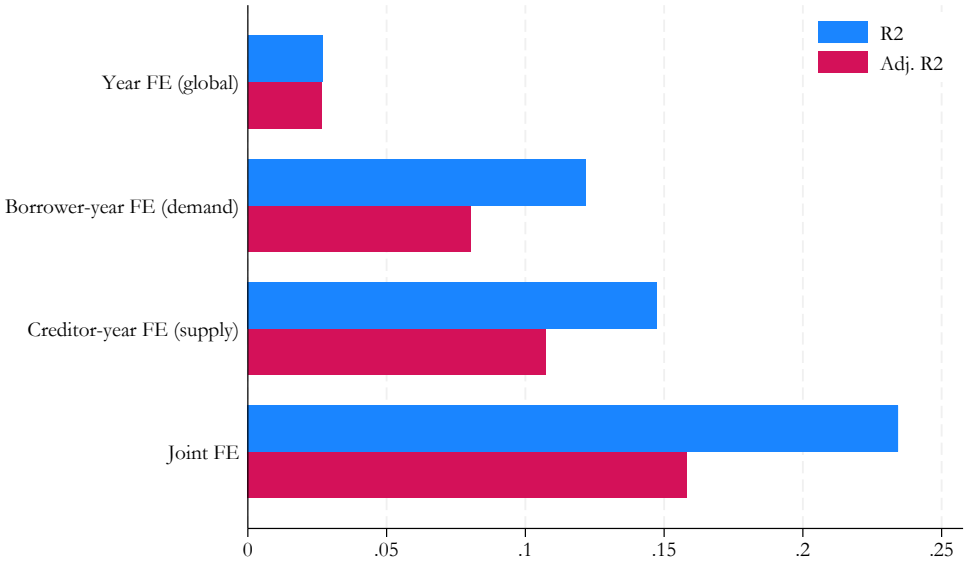
Notes: The figure decomposes aggregate net borrowing into intensive and extensive margins following Equation 6. The intensive margin comprises net borrowing from creditors with a positive outstanding stock in the previous year; the extensive margin comprises borrowing from creditors with no prior exposure. The shaded area plots the unweighted mean across borrowers of the intensive-margin share of net borrowing; the solid line plots the median.
Source: World Bank International Debt Statistics.

their combination. Creditor-year fixed effects explain a larger share of the variation in bilateral lending (adjusted R^2 of about 0.11) than borrower-year fixed effects (about 0.08), and far more than common global shocks alone (below 0.03). Common creditor-level supply shocks thus account for a substantial part of systematic variation in bilateral lending. This is a feature we exploit in Subsection 3.2. to construct borrower-specific credit supply shocks.

2.3. Other Data

Our main data source for macroeconomic data is the Global Macro Database (GMD) by Müller et al. (2025). We complement this database using the Penn World Tables (PWT) 11.0 (Feenstra et al., 2015) for national accounts data and the Public Finance in Modern History by Mauro et al. (2015) for fiscal data. We use the IMF's Investment and Capital Stock Dataset for data on public and private investment. For data on institutional quality, we use the political risk rating as well as its subcategories from the International

Figure 7: Explanatory power of alternative fixed effects for the growth of bilateral net borrowing.



Notes: The figure reports the R^2 and adjusted R^2 from separate OLS regressions of the growth rate of bilateral net borrowing on the indicated sets of fixed effects: year effects, borrower–year effects, creditor–year effects, and all three jointly. Regressions are estimated over 1970–2023 on borrower-creditor pairs with a positive outstanding stock in $t-1$.
Source: World Bank International Debt Statistics.

Country Risk Guide (ICRG), which provides broad cross-country coverage dating back to the mid-1980s.[4] Some robustness checks include the use of bilateral trade data, which are from the CEPII BACI dataset. Data on defaulted public debt, in total and by official and private creditors, are from the Bank of Canada–Bank of England Sovereign Default Database.

2.4. Final Sample

After merging across data sources, the resulting estimation sample, reflecting the availability of all variables required for the baseline analysis, covers 73 EMDEs from 1980 to 2023.[5] Table A.1 reports means, standard deviations, and observation counts for

[4]The World Bank's Country Policy and Institutional Assessment (CPIA) scores offer an alternative measure of the quality of countries' policy and institutional frameworks. However, the scores are publicly available only for IDA-eligible countries and only from 2005 onwards, which makes them unsuitable for the sample and time period considered in this paper.

[5]Note that because the local projections are estimated up to a five-year horizon, the effective base-year sample for the full impulse-response window ends in 2019.

the main variables shown in the impulse-response figures. Table A.2 lists the countries included in the baseline sample.

3. Empirical Strategy

In this section, we start by laying out the identification problem, i.e., observed borrowing reflects both borrowers' demand for external financing and creditors' willingness to lend. We then describe how we use the bilateral structure of external public debt to decompose net borrowing into global, borrower-specific, creditor-specific, and idiosyncratic components, constructing borrower-level foreign credit supply shocks from the creditor-specific component.

3.1. Identification Problem

The key issue in identifying the effect of external borrowing on macroeconomic performance is selection: countries that borrow more tend to be systematically different from countries that borrow less. This can generate spurious correlations between borrowing and macroeconomic performance because changes in the demand for borrowing are correlated with other factors that impact performance.

Consider the supply and demand for external credit. We summarize (log) demand $b^d_{i,t}$ using a general log-linear demand curve of country i that is downward sloping in the real interest rate $r_{i,t}$:

$$b^d_{i,t} = \alpha^d_i + \alpha^d_t - \beta^d_B r_{i,t} + \epsilon^d_{B,i,t} \quad , \tag{2}$$

where α^d_i is a country-specific time-invariant demand shifter, α^d_t is a global time-varying demand shifter, and $\epsilon^d_{B,i,t}$ is a country-specific time-varying demand shifter. Supply of credit is given by an upward-sloping supply curve:

$$b^s_{i,t} = \alpha^s_i + \alpha^s_t + \beta^s_B r_{i,t} + \epsilon^s_{B,i,t} \quad , \tag{3}$$

where, analogously, α^s_i, α^s_t and $\epsilon^s_{B,i,t}$ are different supply shifters. The growth of the debt

stock can be written as

$$g^B_{i,t} \approx \gamma_t + \gamma^d_{i,t} + \gamma^s_{i,t} \tag{4}$$

where γ_t is a global shock that captures common supply and demand shocks, and $\gamma^d_{i,t}$ and $\gamma^s_{i,t}$ are country-specific demand and supply shocks.[6]

If we are interested in identifying the causal effect of external borrowing on economic growth and other macroeconomic outcomes, we can start by specifying the annual growth rate of real GDP of country i between years $t+h$ and $t-1$ as a function of its external borrowing $g^B_{i,t}$ as well as the country's trend growth rate, global shocks, and idiosyncratic shocks:

$$y_{i,t+h} - y_{i,t-1} = \beta_h g^B_{i,t} + \alpha^h_i + \alpha^h_t + \nu^h_{i,t} \tag{5}$$

where β_h is the coefficient of interest. α^h_i (capturing country-specific trends) and α^h_t (capturing global shocks) are country and time fixed effects, $\nu^h_{i,t}$ is an idiosyncratic shock.

Estimating this equation, either in the cross-section or in panel form, raises several issues. Estimates using cross-sectional variation, like in Aguiar (2025), may pick up smoothing demand from slow-growing countries that tap into external markets to finance fiscal stimulus or to compensate for weak domestic revenues. Fast-growing countries may borrow more because rising incomes increase creditworthiness. Lenders may also prefer to extend credit to fast-growing countries. Unobservable drivers of growth (e.g., shifts in policy regimes and preferences of policymakers) may also correlate with a country's willingness to borrow and lenders' appetite. These concerns can be attenuated by estimating in panel form using fixed effects for α^h_i and α^h_t but a simple panel specification does not address country-specific time-varying idiosyncratic growth drivers in the error term $\epsilon^h_{i,t}$ that may be correlated with the demand for credit that is reflected in $g^B_{i,t}$.

[6]Specifically, $\gamma_t \equiv \frac{\beta^s_B \Delta\alpha^d_t + \beta^d_B \Delta\alpha^s_t}{\beta^s_B + \beta^d_B}$, $\gamma^d_{i,t} \equiv \frac{\beta^s_B \Delta\epsilon_B i,t^d}{\beta^s_B + \beta^d_B}$, $\gamma^s_{i,t} \equiv \frac{\beta^d_B \Delta\epsilon_B i,t^s}{\beta^s_B + \beta^d_B}$. Combining Equation 2 and Equation 3 into Equation 4 uses the approximation $\Delta \ln x_t \approx \Delta x_t / x_{t-1}$ for small values.

3.2. Constructing Demand and Supply Shocks

Instead, we exploit bilateral data to construct the demand and supply shocks separately. The key insight is that countries borrow disproportionately from a small set of long-standing creditors. When those creditors expand or contract lending globally, countries with greater exposure experience differential changes in borrowing capacity even if their own financing needs are unchanged. These creditor-specific shifts therefore resemble supply-side shocks to external finance.[7]

We consider a set of external creditors indexed $j = 1, ..., J$. The growth rate of the debt stock of country i can be decomposed as

$$g^B_{i,t} = \sum_{w>0} w_{ij,t-1} g^B_{ij,t} + \sum_{w=0} \Delta B_{ij,t}/B_{i,t} \quad . \tag{6}$$

where $g^B_{ij,t}$ is the growth rate of the debt stock $B_{ij,t}$ of external public sector debt of country i owed to creditor j. The first term is the intensive margin with $w_{ij,t-1} \equiv B_{ij,t-1}/B_{i,t-1}$ equal to the share of creditor j in the outstanding debt stock of the previous year. The second term is the extensive margin. We focus on decomposing the first term into components capturing global shocks, country-specific demand shocks, and country-specific supply shocks.

In turn, the growth rate of bilateral debt stocks can be written as a function of global shocks α_t, borrower-specific shocks $\alpha_{i,t}$, creditor-specific shocks $\alpha_{j,t}$, and an idiosyncratic term $\epsilon_{ij,t}$:

$$g^B_{ij,t} = \alpha_t + \alpha_{i,t} + \alpha_{j,t} + \epsilon_{ij,t} \tag{7}$$

[7] A potential concern is that expansions in external credit to governments may be accompanied by changes in grants. Official creditors such as multilateral development banks and bilateral agencies often provide loans and grants jointly, so a shock that expands a creditor's lending capacity may also raise its grant disbursements to the same recipients. Because grants increase government resources without adding to debt, our estimates would then capture the effect of a broader package of external financing rather than of borrowing alone, overstating the effect per dollar of debt. The direction of the bias is not clear a priori, however, since grants and loans can also be substitutes: the International Development Association, for instance, provides grants instead of credits to countries at high risk of debt distress. An increase in grants is recorded in government revenues and the income account in the balance of payments. Our results show that credit supply shocks are not followed by higher revenues or an increase in the income account relative to GDP, which suggests that, if present, the role of grants is limited.

Amiti and Weinstein (2018) show that using lagged debt stocks $B_{ij,t-1}$ as weights in Weighted Least Squares (WLS) estimation will produce estimates of borrower and creditor shocks whose weighted average will exactly match the borrower, creditor, and global growth rates of relationships that existed in $t-1$. We can therefore write Equation 6 using the estimated shocks from Equation 7 as

$$g^B_{i,t} = \hat{\alpha}_t + \hat{\alpha}_{i,t} + \sum w_{ij,t-1}\hat{\alpha_{j,t}} + \nu_{i,t} \quad , \tag{8}$$

where $\nu_{i,t}$ includes the extensive margin term.

Using $\sum w_{ij,t-1}\hat{\alpha_{j,t}}$ as a borrower-specific supply shock is desirable if several properties hold. For one, exogeneity requires that both the baseline creditor shares $w_{ij,t-1}$ and the creditor-specific shocks $\alpha_{j,t}$ must be as good as randomly assigned with respect to the country's unobserved idiosyncratic shocks after controlling for observed covariates and time fixed effects. Amiti and Weinstein (2018) show that if an interaction term were included, WLS estimation of Equation 7 produces identical estimates of the borrower and creditor shocks as long as the components of the interaction term that vary only at the borrower or creditor level are defined to be part of the shocks.

A second requirement is that relevance of the supply shocks. The intensive margin, and, more specifically, shocks common to borrowers from the same creditor, must account for most of the variation in lending. This property is clearly satisfied in our data, since lending tends to be concentrated, sticky, and correlated, as we showed in Section 2.

3.3. Measurement

Normalization. Our method requires a choice of numeraire since the borrower- and creditor-specific fixed effects are only identified relative to a constant. We normalize the system by expressing each shock relative to the median borrower or creditor shock. Specifically, we define $\hat{\alpha}_{i,t}$ relative to the growth rate of the median borrower each year, and $\hat{\alpha}_{j,t}$ relative to the growth rate of the median creditor. This implies that the global shock $\hat{\alpha}_t$ includes the sum of the growth rates of the median borrower and creditor.

Net borrowing. As a matter of accounting, the outstanding stock $B_{ij,t}$ evolves as

$$B_{ij,t} = B_{ij,t-1} + D_{ij,t} - A_{ij,t} + z_{ij,t} \tag{9}$$

where $D_{ij,t}$ is the disbursement by j to i and $A_{ij,t}$ is amortization of outstanding debt. $z_{ij,t}$ is a stock-flow adjustment term which captures any changes in the debt stock unrelated to disbursements and amortization, such as interest arrears, penalties, and forms of debt relief like face value reductions. Net borrowing is given by the difference between disbursements and amortization:

$$NB_{ij,t} = D_{ij,t} - A_{ij,t}. \tag{10}$$

We use net borrowing, rather than the change in the debt stock, as our preferred measure of borrowing. This ensures we are not picking up components of the stock-flow adjustment term $z_{ij,t}$. Summing over creditors, total net external borrowing is $NB_{i,t} \equiv \sum_{j=1}^{J} NB_{ij,t}$.

Shocks by creditor group. We construct shocks by creditor groups to study how access to different types of creditors affects macroeconomic performance. Let $\mathcal{G}^k$ be $K = \{1, ..., K\}$ sets of creditors. The supply shocks by creditor group are given by $\sum_{j \in \mathcal{G}^k} w_{ij,t-1} \hat{\alpha_{j,t}}$.

Robustness. Because the creditor-specific shocks $\hat{\alpha}_{j,t}$ are estimated from the same bilateral data used to construct borrower exposures, a borrower that accounts for a large share of a creditor's portfolio may mechanically contribute its own demand shock to the supply shock it is assigned. This concern is familiar from shift-share designs in the trade and labor literatures, where shifts are commonly computed excluding the unit of observation (Autor et al., 2013; Goldsmith-Pinkham et al., 2020), and Borusyak et al. (2022) show that such own-observation bias is most severe when exposure is concentrated. As a robustness check, we therefore re-estimate Equation 7 separately for each borrower i, excluding all of i's bilateral relationships, and construct $Supply_{i,t}^{LOO} = \sum_j w_{ij,t-1} \hat{\alpha}_{j,t}^{(-i)}$. The leave-one-out shocks are highly correlated with the baseline shocks, and the resulting

impulse responses in Section 4. are very similar to the baseline estimates.

A second concern is that foreign credit supply shocks may be correlated with trade shocks. Bilateral creditors may, for example, lend more to countries from which they import more, so that our credit supply shocks partly reflect shifts in foreign demand for the borrower's exports rather than shifts in creditors' willingness to lend. To address this concern, we apply the same decomposition to bilateral trade flows and decompose the growth of bilateral exports into global, exporter-specific, and importer-specific components using WLS with lagged bilateral export values as weights. The exporter-specific component captures export supply shocks, reflecting changes in the borrowing country's overall competitiveness. Aggregating the importer-specific components using each country's lagged export shares yields borrower-level export demand shocks, which capture changes in import demand from existing trading partners. Table 1 shows that the credit supply shocks are not correlated with the export demand shocks, which suggests that our credit supply shocks do not simply reflect trade linkages between borrowers and their creditors.

Finally, the shocks and impulse responses are robust to normalizing relative to the mean rather than the median.

Table 1: Credit supply and demand shocks and export shocks

	No FE		Country FE		Country + Year FE	
	(1)	(2)	(3)	(4)	(5)	(6)
Dep. var.: credit shock	Demand	Supply	Demand	Supply	Demand	Supply
Credit supply shock	-0.36^{***}		-0.34^{***}		-0.35^{***}	
	(0.04)		(0.04)		(0.04)	
Credit demand shock		-0.17^{***}		-0.15^{***}		-0.14^{***}
		(0.03)		(0.03)		(0.03)
Export supply shock	0.02	-0.01	0.02	-0.01	0.02	-0.01
	(0.02)	(0.01)	(0.02)	(0.01)	(0.02)	(0.01)
Export demand shock	-0.06	-0.02	-0.08^{**}	0.00	-0.07^{*}	0.00
	(0.04)	(0.03)	(0.04)	(0.03)	(0.04)	(0.03)
Global shock	Yes	Yes	Yes	Yes	Absorbed by year FE	
Observations	4,997	4,997	4,997	4,997	4,997	4,997
R^2	0.173	0.611	0.244	0.657	0.252	0.695

Notes: The table reports regressions of the estimated credit demand shock (odd columns) and credit supply shock (even columns) on the export supply and export demand shocks, controlling for the other credit shock. Export shocks are constructed by applying the decomposition in Equation 7 to bilateral export flows. All shocks are standardized. The sample covers all borrower-years with available credit and trade shocks and is therefore larger than the local projection sample. Robust standard errors in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Sources: World Bank International Debt Statistics; CEPII BACI.

4. Findings

Before turning to the macroeconomic effects of foreign credit supply shocks, we examine the estimated shock series. We first assess the fit of the decomposition and show how the WLS estimates differ from OLS estimates. A central concern is that the estimated creditor shocks may continue to reflect borrower fundamentals. To assess whether the identified variation plausibly captures shifts in credit supply rather than borrowing demand, we then examine whether the estimated shocks are predicted by lagged measures of economic performance and productivity. Demand shocks are strongly related to prior growth, whereas supply shocks are not.

4.1. Estimated Shocks

Fit. We have already discussed the importance of estimating the shocks using WLS as opposed to OLS. We now turn to assessing how much these differences matter in practice. To establish a baseline for understanding the fit of the WLS estimates, we first estimate Equation 7 using WLS fixed effects to obtain estimates of the borrower and creditor shocks and then sum them across creditors to obtain the borrower's growth rate according to Equation 8. We can then see how well the fixed-effects procedure works by comparing a borrower's actual net borrowing, $g^B_{i,t}$, with the predicted values of the intensive margin $\hat{\alpha}_t + \hat{\alpha}_{i,t} + \sum w_{ij,t-1}\hat{\alpha_{j,t}}$. If new lending is not important, it would be the case that WLS would produce estimates very similar to those of the actual growth rates.

We assess this in Figure 8, where we plot the estimates of borrowing growth produced by WLS estimation against actual growth. We see that most of the WLS estimates are close to the 45-degree line, suggesting that in most cases, borrowing from new creditors is not that important. For borrowers with very high borrowing rates (more than 50 percent), the fit deteriorates, as these borrowers tap into new sources of credit.

Regressing actual growth rates on the WLS fitted values produces a slope of about 1 with an R^2 of 0.81, indicating that about four fifths of the variance in borrowing comes from existing lending relationships (Table 2), with the remainder coming from new relationships. Including the shocks one by one, the R^2 of the WLS estimates increases

Table 2: Fit of predicted borrowing using WLS and OLS

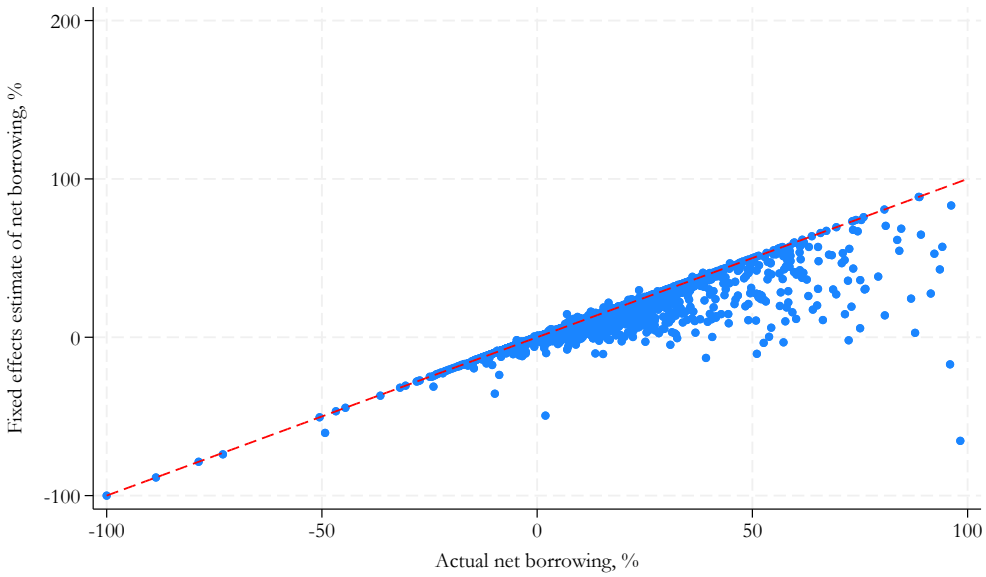
	(1) WLS	(2) WLS	(3) WLS	(4) WLS	(5) OLS	(6) OLS	(7) OLS	(8) OLS
Predicted	1.05***							
	(0.02)							
Global		0.35***	0.68***	1.08***				
		(0.01)	(0.01)	(0.02)				
Demand			0.88***	1.02***				
			(0.02)	(0.02)				
Supply				1.01***				
				(0.03)				
Predicted					0.43***			
					(0.01)			
Global						0.25***	0.34***	0.48***
						(0.01)	(0.01)	(0.02)
Demand							0.35***	0.38***
							(0.02)	(0.02)
Supply								0.40***
								(0.03)
Observations	5,440	5,440	5,440	5,440	5,440	5,440	5,440	5,440
R-squared	0.811	0.182	0.711	0.815	0.390	0.177	0.371	0.407

Robust standard errors in parentheses.

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

from 0.18 for the global shock to 0.71 for the global shock jointly with the demand shock, to 0.81 when including all three shocks jointly. This suggests that most variation in lending originates in the borrower country, although there is still meaningful variation coming from exposure to existing creditors.[8] We also check the fit for the OLS estimates, with the predicted values plotted against actual growth in Figure 9. As opposed to the WLS estimates, many observations are above the 45 degree line, overestimating actual borrowing. The R^2 of the OLS fitted values is only 0.39, suggesting that the OLS method can account for only half of the variation in borrowing relative to the WLS method. The slope for the OLS method is also substantially attenuated, with a coefficient of 0.43 vs. 1.05 for the WLS method.

Figure 8: Predicted borrowing, WLS

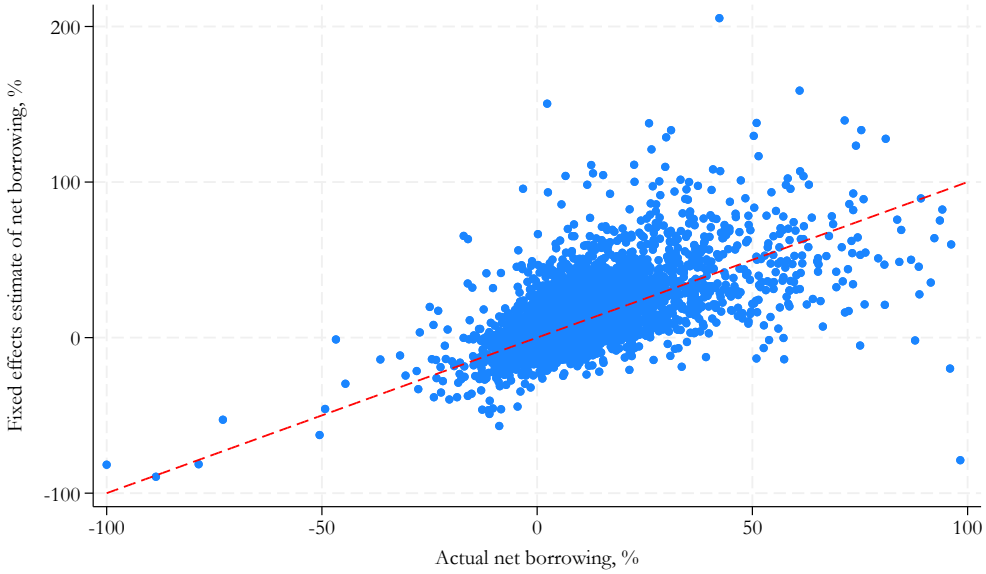


Notes: The figure plots predicted net borrowing as percentage of outstanding debt stock using WLS versus actual. Predicted values are based on WLS estimates of Equation 7 defined as percentage changes, which are then aggregated according to the right-hand side of equation Equation 8. The figure is restricted to observations with actual borrowing below 100 percent. Red dashed line is 45 degree line.
Sources: See Section 2.

Relationship to output and productivity proxies. Next, we assess to what extent our demand and supply shocks are predicted by lagged productivity growth. We estimate

[8]Creditor shocks dominate at the bilateral pair level (Subsection 2.2.), while borrower shocks dominate once aggregated to the borrower level. This is because creditor shocks partly average out across a borrower's portfolio.

Figure 9: Predicted borrowing, OLS



Notes: The figure plots predicted net borrowing as percentage of outstanding debt stock using OLS versus actual. Predicted values are based on OLS estimates of Equation 7 defined as percentage changes, which are then aggregated according to the right-hand side of equation Equation 8. The figure is restricted to observations with actual borrowing below 100 percent. Red dashed line is 45 degree line.
Sources: See Section 2.

$$y_{i,t} = \eta_i + \eta_t + \beta\pi_{i,t-1} + \gamma X_{i,t} + \epsilon_{i,t} \tag{11}$$

where $y_{i,t}$ is either the estimated demand shock $\hat{\alpha}_{i,t}$ or the estimated supply shock $\sum w_{ij,t-1}\hat{\alpha_{j,t}}$. $\pi_{i,t-1}$ is a measure of lagged GDP or productivity growth, expressed in log points. η_i and η_t are country- and year-fixed effects. $X_{i,t}$ is a vector of control variables, which includes the other shock (the demand shock in case $y_{i,t}$ is the supply shock, and vice versa) and three years of lags of both shocks.

The estimates are reported in Table 3. A 10 percentage point increase in lagged real GDP growth (or 0.1 log points) is associated with a 0.07 standard deviations higher demand shock. For the lagged growth rate of real GDP per capita, this is 0.08 standard deviations, and these associations are significant at the 5 and 1 percent level. This relationship is weaker and not significant when expressing real GDP relative to employment. The data suggest that this is because demand from borrowers tends to coincide with periods of higher employment growth. There is no corresponding

Table 3: Shocks and lagged output and productivity growth

	GDP (total)		GDP (per capita)		Labor productivity	
	(1)	(2)	(3)	(4)	(5)	(6)
	Demand	Supply	Demand	Supply	Demand	Supply
GDP (total)	0.65**	0.04				
	(0.26)	(0.16)				
GDP (p.c.)			0.77***	-0.05		
			(0.27)	(0.15)		
Labor prod.					0.38	0.09
					(0.26)	(0.16)
Observations	3,367	3,367	3,367	3,367	3,367	3,367
R-squared	0.535	0.850	0.536	0.850	0.535	0.850

Robust standard errors in parentheses.

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

significant or economically meaningful relationship for the supply shocks. These results suggest that faster-growing countries tend to exhibit significantly higher demand for foreign credit, but their supply shocks are not different from other countries.

First stage. Our shocks are only useful if they trigger a meaningful increase in external borrowing and external public debt. To check whether such a 'first stage' exists in the data, we estimate how borrowing and debt levels comove with the different shocks at different horizons:

$$y_{i,t+h} = \eta_i + \beta_h^S Supply_{i,t} + \beta_h^D Demand_{i,t} + \gamma_h Global_t + \varepsilon_{i,t+h}, \tag{12}$$

where $y_{i,t+h}$ is net borrowing relative to the lagged debt stock or the change in the external debt stock at horizon h relative to the year of the shock.

We report the responses of net borrowing in Table 4 (the annual flow) and changes

Table 4: Shocks and net borrowing at different horizons

	(1)	(2)	(3)	(4)	(5)	(6)
	h = 0	h = 1	h = 2	h = 3	h = 4	h = 5
Demand	14.59***	6.38***	3.42***	1.09*	0.11	-0.55*
	(1.66)	(0.54)	(0.41)	(0.55)	(0.46)	(0.28)
Supply	7.82***	5.07***	2.72***	-0.05	0.12	-0.49
	(1.51)	(0.94)	(0.76)	(0.95)	(0.87)	(0.88)
Observations	3,784	3,702	3,620	3,538	3,456	3,374

Global shock not shown. Driscoll-Kraay standard errors in parentheses.

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

in the external debt stock in Table 5 (the cumulative sum). Both demand and supply shocks predict significant and large increases in net borrowing in the first three years after the shocks. A one standard deviation demand shock is associated with a 15, 6 and 3 percent higher borrowing rate, whereas for supply shocks this is 8, 5 and 3 percent. Importantly, the increase in net borrowing is short-lived: for the supply shock, the borrowing response dissipates within approximately three years. Correspondingly, following a one standard deviation demand shock countries' external debt to GDP ratios increase by about 4.5 percentage points after three years, then stay permanently higher. Following a one standard deviation supply shock, the external debt stock increases by about 2.5 percentage points on impact, then keeps rising and is 11 percentage points higher 5 years after the shock.

Taken together these findings suggest that our shocks are good predictors of increases in external borrowing and external debt stocks, validating our approach.

Placebo tests. We perform two sets of placebo tests to show that the shocks predict borrowing only for treated countries and time periods. First, we lag the responses of net borrowing and changes in the external debt stock by 5 and 10 years and regress these on the demand and supply shocks and country and year fixed effects. Table 6 shows that

Table 5: Shocks and change in external debt stock at different horizons

	(1) h = 0	(2) h = 1	(3) h = 2	(4) h = 3	(5) h = 4	(6) h = 5
Demand	2.34***	3.48***	4.09***	4.50***	4.66***	4.56***
	(0.26)	(0.40)	(0.50)	(0.68)	(0.91)	(0.92)
Supply	2.59***	4.48***	6.10***	7.99***	9.66***	11.29***
	(0.59)	(1.08)	(1.64)	(2.31)	(2.78)	(3.15)
Observations	3,777	3,695	3,613	3,531	3,449	3,367

Global shocks not shown. Driscoll-Kraay standard errors in parentheses.

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

demand and supply shocks generate contemporaneous significant increases in borrowing and debt stocks but the lagged values do not exhibit this pattern.[9] As a second placebo test, we randomly reassign the shocks to other countries within each year. Table 7 shows that net borrowing and the external debt stock do not respond to the shock for this test.

[9] Table 6 reports a significant and *negative* coefficient for the change in the external debt stock with respect to the demand shock for horizon $h = -5$. The coefficient is small relative to the contemporaneous effect (-0.89 vs. 2.70), goes the wrong direction for a demand-driven confound, and appears only for the demand shocks, not the supply shocks that are the main object of interest of this paper.

Table 6: Placebo test across time

	Net borrowing			Change in external debt stock		
	(1)	(2)	(3)	(4)	(5)	(6)
	h = 0	h = -5	h = -10	h = 0	h = -5	h = -10
Demand	13.07***	-0.66	-1.01	2.70***	-0.89***	-0.40
	(0.19)	(0.42)	(0.64)	(0.31)	(0.23)	(0.40)
Supply	8.42***	1.13	-1.85	2.49***	-0.79	0.43
	(0.54)	(1.22)	(2.15)	(0.88)	(0.80)	(0.76)
Observations	2,987	2,987	2,987	3,066	3,066	3,066

Driscoll-Kraay standard errors in parentheses.

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 7: Placebo test across countries

	Net borrowing			Change in external debt stock		
	(1)	(2)	(3)	(4)	(5)	(6)
	h = 0	h = 1	h = 2	h = 0	h = 1	h = 2
Demand	-0.97	-0.04	0.64	0.05	0.27	-0.23
	(0.74)	(0.44)	(0.72)	(0.25)	(0.32)	(0.58)
Supply	-1.19	0.85	1.38	-0.26	-0.09	0.00
	(1.08)	(1.06)	(2.30)	(0.32)	(0.48)	(0.55)
Observations	3,429	3,440	3,451	3,616	3,616	3,616

Driscoll-Kraay standard errors in parentheses.

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

4.2. Macroeconomic outcomes

To examine the dynamic effects of exogenous changes in external public sector credit supply, we estimate local projections following Jordà (2005). For each outcome variable, we estimate cumulative responses over horizons $h = 0, \ldots, 5$ according to

$$y^{cum}_{i,t+h} = \eta_i + \beta_h Supply_{i,t} + \gamma_h Global_t + \Gamma'_h X_{i,t-1:t-4} + \Psi'_h y_{i,t-1:t-3} + \varepsilon_{i,t+h}, \qquad h = 0, \ldots, 5, \quad (13)$$

where $y^{cum}_{i,t+h}$ denotes the cumulative response of outcome variable y relative to the year preceding the shock, $Supply_{i,t}$ is the standardized contemporaneous credit supply shock, $Global_t$ captures the contemporaneous global common shock, and $X_{i,t-1:t-4}$ includes four lags of real GDP growth, external net borrowing, the public debt ratio, credit demand shocks, and the credit supply shock itself. We further control for three lags of the dependent variable and include country fixed effects. Standard errors are computed using Driscoll–Kraay estimators to account for both serial and cross-sectional dependence. Throughout, the reported impulse responses correspond to a one-standard-deviation increase in the estimated foreign credit supply shock.

For ease of exposition, we group the results into fiscal outcomes, real-sector outcomes, and external-sector outcomes. For fiscal outcomes, we decompose the change in the overall fiscal deficit, $d_{i,t} = D_{i,t}/Y_{i,t}$, into contributions from public investment ($i^G_{i,t}$), government consumption ($c^G_{i,t}$), transfers, subsidies and interest ($\tilde{e}_{i,t}$), and revenue ($\tau_{i,t}$), all expressed as shares of GDP:

$$d^{cum}_{i,t+h} = i^{G,cum}_{i,t+h} + c^{G,cum}_{i,t+h} + \tilde{e}^{cum}_{i,t+h} - \tau^{cum}_{i,t+h}, \quad (14)$$

where $\tilde{E}_{i,t} = (E_{i,t} - I^G_{i,t} - C^G_{i,t})/Y_{i,t}$ captures all government expenditures other than public investment and government consumption, with $E_{i,t}$ denoting total government expenditures. The identity holds exactly, so the four contributions sum to the observed change in the deficit; an increase in the revenue ratio enters with a negative sign, reducing the deficit.

For real outcomes, we decompose GDP using both the production function and

expenditure approaches. Following Klenow and Rodríguez-Clare (1997) and Hall and Jones (1999), we write the changes in real GDP using the standard Cobb-Douglas production function as

$$q_{i,t+h}^{cum} = a_{i,t+h}^{cum} + k_{i,t+h}^{cum} + l_{i,t+h}^{cum}. \tag{15}$$

The first term is the contribution of TFP, which includes the capital accumulation that TFP growth itself induces. The second term is the contribution of capital deepening, measured by changes in the capital–output ratio. The third term is the contribution of employment.[10]

For external sector outcomes, we write changes in the current account as a share of GDP $ca_{i,t}$ as

$$ca_{i,t+h}^{cum} = x_{i,t+h}^{cum} - m_{i,t+h}^{cum} + ia_{i,t+h}^{cum} \tag{17}$$

where $x_{i,t}$, $m_{i,t}$ and $ia_{i,t}$ are the exports, imports and the income account as a share of GDP.

4.2.1. Baseline responses

Figures 10–12 summarize the estimated impulse responses. Figure 10 shows that positive foreign credit supply shocks trigger a sizable fiscal expansion. Public investment rises by about 0.3 to 0.4 percentage points of GDP after three years. The investment boom is financed primarily through larger fiscal deficits rather than higher revenues, resulting in a persistent increase in the public debt ratio of about six percentage points of GDP within four to five years.[11] Notably, the fiscal expansion is not confined to the

[10] Substituting $K_{i,t} = (K_{i,t}/Q_{i,t})\, Y_{i,t}$ into the production function $Q_{i,t} = A_{i,t} K_{i,t}^{\alpha} L_{i,t}^{-\alpha}$ and solving for $Q_{i,t}$ yields

$$Q_{i,t} = A_{i,t}^{\frac{1}{1-\alpha}} \left(\frac{K_{i,t}}{Q_{i,t}} \right)^{\frac{\alpha}{1-\alpha}} L_{i,t}. \tag{16}$$

In the main text we use $q_{i,t} \equiv \ln Q_{i,t}$, $a_{i,t} \equiv \ln A_{i,t}^{\frac{1}{1-\alpha}}$, $k_{i,t} \equiv \ln \frac{K_{i,t}}{Q_{i,t}}^{\frac{\alpha}{1-\alpha}}$ and $l_{i,t} \equiv \ln L_{i,t}$. This specification ensures that the contribution of TFP includes the capital accumulation that TFP growth itself induces.

[11] Higher public debt should not be interpreted as a direct measure of the debt-service burden, which also depends on financing terms such as interest rates, maturities, and concessionality.

expenditure side. Government revenues also decline somewhat following the credit supply shock, amplifying the deterioration in the fiscal balance. The fiscal response therefore reflects both higher expenditure and lower revenue rather than simply an expansion in government spending.

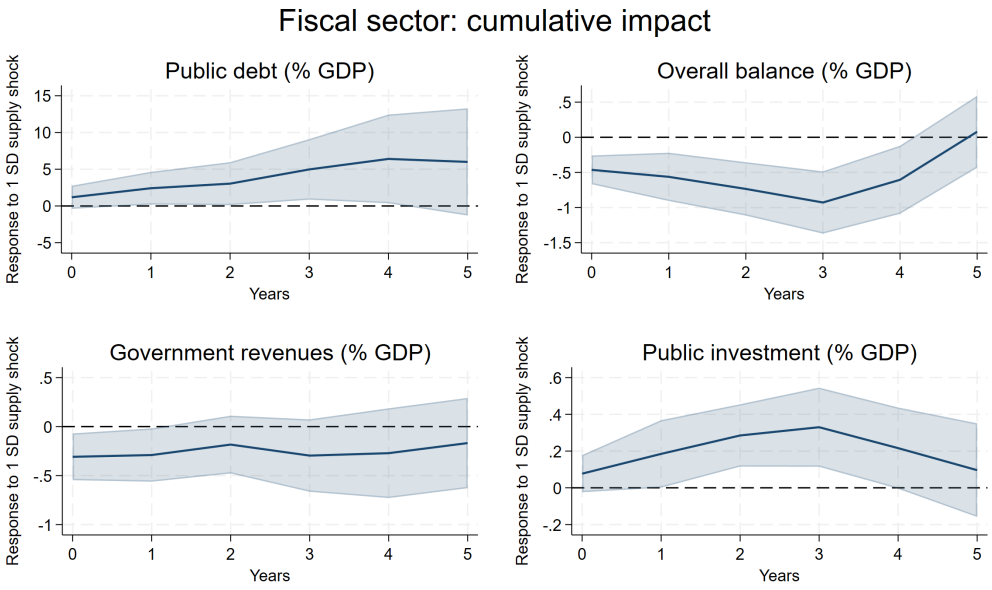
Despite this fiscal expansion, the average macroeconomic payoff is limited. As shown in Figure 11, we find no evidence of sustained increases in either real GDP or total factor productivity following the credit supply shock. The point estimates for both real GDP and total factor productivity turn negative at longer horizons. While the decline in real GDP is not statistically significant, the TFP response becomes significantly negative toward the end of the horizon. Private investment also declines over the medium run, with the negative response statistically significant at some horizons, consistent with some crowding-out of private capital formation. Consumption exhibits only a modest temporary decline before returning close to its pre-shock level. A decomposition reported in Appendix Figure A.1 shows that this muted aggregate response masks divergent movements in its components: household consumption declines, while government consumption increases following the credit supply shock. Taken together, these findings indicate that easier access to external credit does not seem to automatically translate into stronger medium-term growth or productivity.

The fiscal expansion is accompanied by a significant adjustment of the external sector (Figure 12). Imports increase because a share of the additional investment demand falls on imported (capital) goods, contributing to a temporary deterioration of the current account. At the same time, higher domestic demand, inflationary pressures, and nominal exchange rate appreciation result in a cumulative real appreciation of roughly eight percent over five years. This appreciation reduces external competitiveness and weighs on export performance.

Overall, the baseline results paint a nuanced picture of the effects of external financing. Easier access to foreign credit relaxes financing constraints and enables governments to expand public investment. However, these gains come at the cost of higher public indebtedness, real exchange rate appreciation, and a weaker external position, while generating little improvement in aggregate output or productivity on average. Before

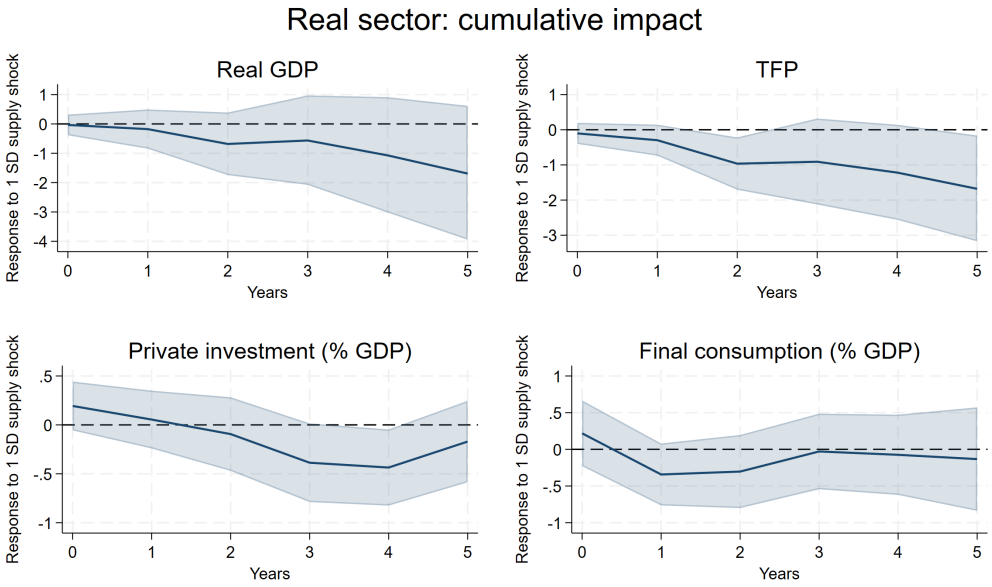
turning to differences across countries, we first examine whether these average responses are symmetric across positive and negative foreign credit supply shocks.

Figure 10: Fiscal responses to foreign credit supply shocks



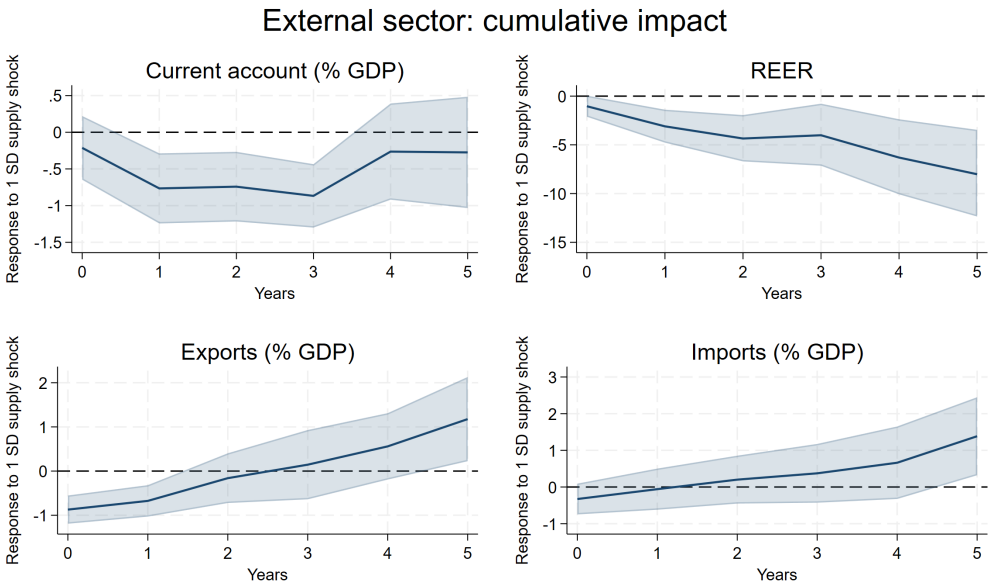
Notes: The figure reports cumulative local projection impulse responses to a one-standard-deviation positive foreign credit supply shock over horizons $h = 0, \ldots, 5$. The panels show the responses of the public debt ratio, the overall fiscal balance, government revenues, and public investment. Shaded areas denote 90 percent confidence intervals based on Driscoll–Kraay standard errors.
Sources: See Section 2.

Figure 11: Real-sector responses to foreign credit supply shocks



Notes: The figure reports cumulative local projection impulse responses to a one-standard-deviation positive foreign credit supply shock over horizons $h = 0, \ldots, 5$. The panels show the responses of real GDP, total factor productivity, private investment, and private consumption. Variables measured in levels are reported as cumulative percentage-point changes relative to GDP, while variables estimated in logarithms are reported as cumulative percent deviations from the pre-shock level. Shaded areas denote 90 percent confidence intervals based on Driscoll–Kraay standard errors.
Sources: See Section 2.

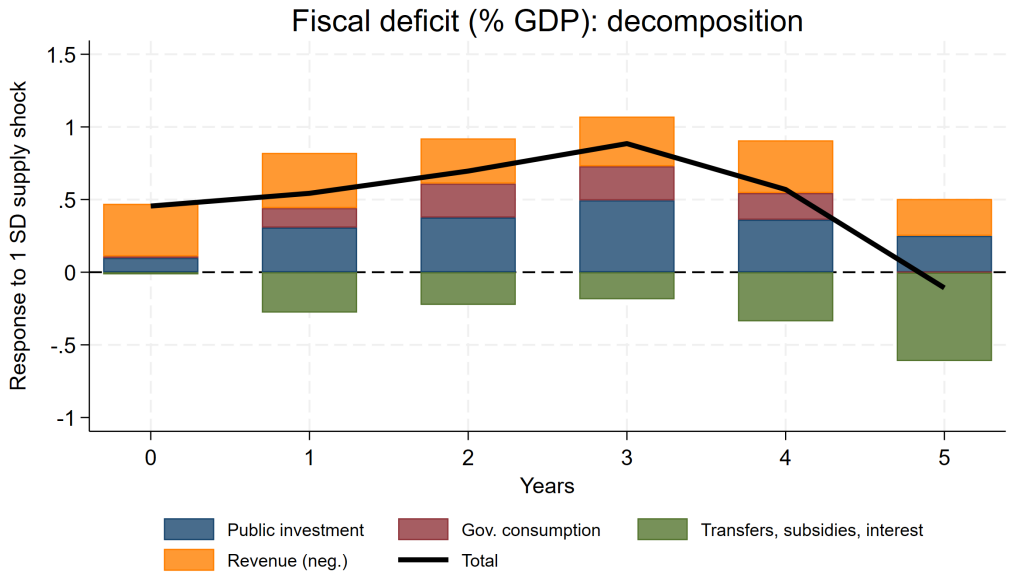
Figure 12: External-sector responses to foreign credit supply shocks



Notes: The figure reports cumulative local projection impulse responses to a one-standard-deviation positive foreign credit supply shock over horizons $h = 0, \ldots, 5$. The panels show the responses of the current account balance, the real effective exchange rate (REER), exports, and imports. Shaded areas denote 90 percent confidence intervals based on Driscoll–Kraay standard errors.
Sources: See Section 2.

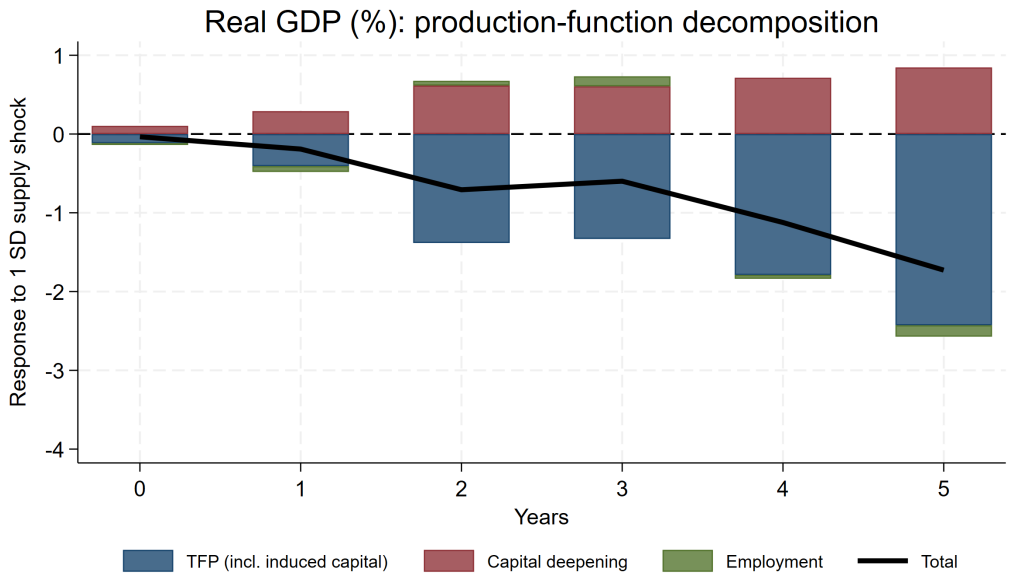
Decomposing the responses. To understand what drives these average responses, we decompose the responses of the fiscal deficit, real GDP, and the current account into their components (equations (14), (15), and (17)). Figure 13 shows that the widening of the deficit, by almost one percentage point of GDP at its peak after three years, is driven mainly by higher public investment and persistently lower revenue, with a smaller contribution from government consumption. Other expenditure falls and offsets part of the widening; together with the fading contribution of public investment, this brings the deficit back close to its pre-shock level by year five. Figure 14 shows that the decline in real GDP is driven by the TFP term, which becomes more negative over the horizon and exceeds the total decline. Capital deepening makes a positive contribution that offsets part of it, while employment contributes little. The decline in output is therefore accounted for by the TFP term rather than by the contributions of capital or labor. Finally, Figure 15 shows that the deterioration of the current account over the first three years initially reflects lower exports, consistent with the real appreciation, and subsequently higher imports and a negative contribution from net income, transfers, and statistical discrepancies. At longer horizons, higher exports start offsetting rising imports.

Figure 13: Decomposition of the fiscal deficit response



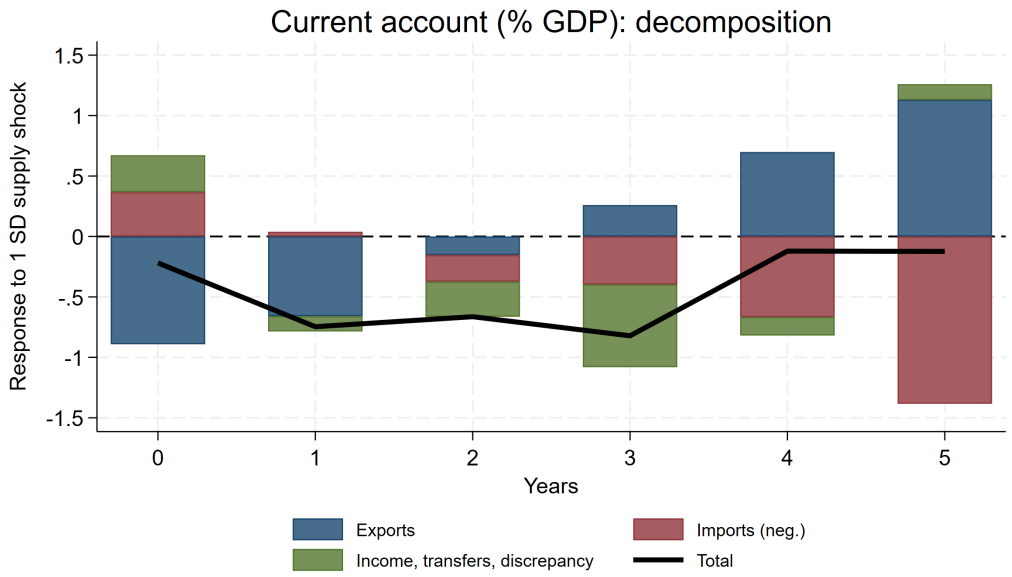
Notes: The figure decomposes the cumulative local projection response of the overall fiscal deficit (the negative of the overall balance, in percent of GDP) to a one-standard-deviation positive foreign credit supply shock over horizons $h = 0, \ldots, 5$ into the contributions of public investment, government consumption, other expenditure, and revenue. Other expenditure is total government expenditure less public investment and government consumption and includes transfers, subsidies, and interest. Revenue enters with a negative sign, so a decline in revenue raises the deficit. Contributions are in percentage points of GDP and add up to the response of the deficit (black line). Only point estimates are shown.
Sources: See Section 2.

Figure 14: Decomposition of the real GDP response



Notes: The figure decomposes the cumulative local projection response of real GDP to a one-standard-deviation positive foreign credit supply shock over horizons $h = 0, \ldots, 5$ into the contributions of total factor productivity (TFP), capital deepening, and employment, using a Cobb–Douglas production function with a capital share of $\alpha = 1/3$. The TFP term is $\ln A^{1/(1-\alpha)}$ and includes the capital accumulation induced by TFP itself; capital deepening is $\frac{\alpha}{1-\alpha} \ln(K/Q)$, where K is the capital stock and Q is real GDP; employment is $\ln L$. Contributions are measured in log points $\times 100$ (approximately percent) and add up to the response of real GDP (black line). Only point estimates are shown.
Sources: See Section 2.

Figure 15: Decomposition of the current account response



Notes: The figure decomposes the cumulative local projection response of the current account balance (in percent of GDP) to a one-standard-deviation positive foreign credit supply shock over horizons $h = 0, \ldots, 5$ into the contributions of exports, imports (entering with a negative sign), and a residual that captures net income, transfers, and statistical discrepancies, computed as the current account less net exports. Contributions are in percentage points of GDP and add up to the response of the current account (black line). Only point estimates are shown.
Sources: See Section 2.

4.2.2. Asymmetric responses

The baseline estimates impose a symmetric response to positive and negative realizations of the identified foreign credit supply shock. However, expansions in external credit need not mirror contractions if borrowing constraints, adjustment costs, or financial frictions generate nonlinear responses. To examine this possibility, we decompose the shock into positive and negative components and include both in the local projection specification.[12]

Specifically, we define

$$Supply^{+}_{i,t} = \max(Supply_{i,t}, 0), \qquad Supply^{-}_{i,t} = -\min(Supply_{i,t}, 0),$$

and estimate the baseline specification replacing $Supply_{i,t}$ with $Supply^{+}_{i,t}$ and $Supply^{-}_{i,t}$. Since $Supply^{-}_{i,t}$ is coded as the absolute size of a negative shock, symmetry implies that the coefficients on $Supply^{+}_{i,t}$ and $Supply^{-}_{i,t}$ are equal in magnitude and opposite in sign.

Overall, the results point to only limited evidence of economically meaningful asymmetries. The most striking finding is that the responses of the external sector are remarkably symmetric: positive foreign credit supply shocks appreciate the real exchange rate and weaken the current account by roughly the same magnitude that negative shocks depreciate the exchange rate and strengthen the external balance. This symmetry provides additional reassurance that the baseline estimates capture a stable transmission mechanism rather than being driven by one tail of the shock distribution.

Some asymmetry is nevertheless evident for fiscal outcomes. Positive supply shocks induce sizable increases in public investment and public debt, whereas negative shocks are associated with more muted fiscal adjustments. This pattern is economically plausible, as tighter external financing conditions need not translate into an immediate reduction in outstanding public debt and governments may smooth expenditure adjustments when borrowing constraints tighten. Overall, however, these differences do not alter the qualitative conclusions from the baseline analysis. We therefore next investigate whether the average responses conceal systematic differences across countries.

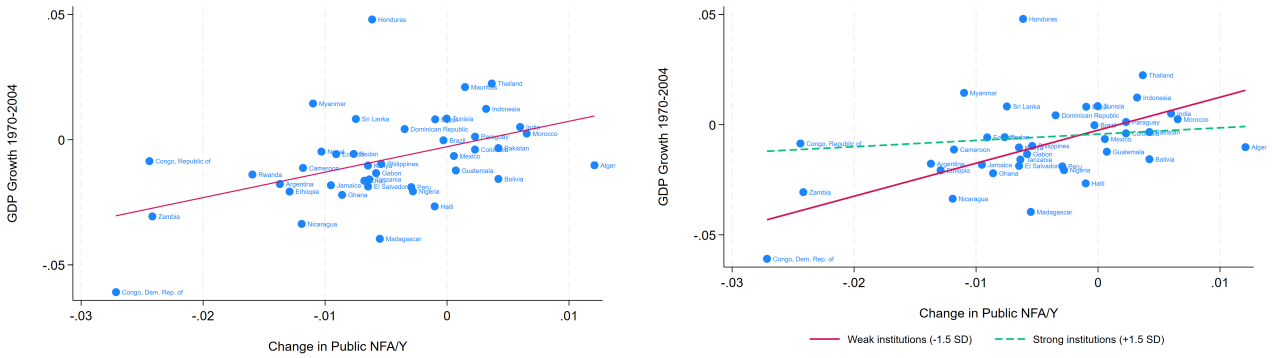
[12] The corresponding impulse responses are reported in Appendix Figures A.2–A.4.

4.2.3. Heterogeneous effects

The baseline estimates mask potentially important differences in countries' ability to absorb additional external financing. In particular, differences in income levels and institutional quality may affect both the allocation of borrowed resources and the economy's capacity to transform additional public investment into higher productivity and output. We therefore examine heterogeneous responses along two complementary dimensions: income level and institutional quality.

As a first descriptive illustration, we revisit the motivating evidence in Aguiar (2025) through the lens of institutional quality. Panel (a) of Figure 16 reproduces Figure 3 from Aguiar, which documents a positive cross-country relationship between changes in public net foreign assets and long-run economic growth. Panel (b) takes the same relationship and interacts the change in public NFA with institutional quality, measured using the International Country Risk Guide (ICRG) Political Risk Index. For this descriptive exercise, we use each country's median value over 1985–1995. The fitted relationships are evaluated at 1.5 standard deviations below and above the sample mean of institutional quality.

Figure 16: Public net foreign assets, growth, and institutional quality



(a) Aguiar (2025) (b) By institutional quality

Notes: Panel (a) reproduces Figure 3 from Aguiar (2025). Panel (b) shows the same cross-country relationship for countries with available ICRG data, allowing the relationship between the change in public net foreign assets and long-run economic growth to vary with institutional quality. Institutional quality is measured by each country's median ICRG Political Risk Index over 1985–1995. The fitted relationships are evaluated at 1.5 standard deviations below and above the sample mean of institutional quality.

Sources: Aguiar (2025); International Country Risk Guide (ICRG).

The pattern is suggestive: the positive NFA–growth relationship is considerably steeper at weak institutional quality (slope 1.50, $p = 0.008$), while it is much flatter and statistically insignificant at strong institutional quality (slope 0.29, $p = 0.60$). However, given the small cross-section—Aguiar's original sample contains only 42 countries—the interaction itself is not statistically significant ($p = 0.21$), so we cannot formally establish that the two slopes differ. Nevertheless, this descriptive evidence suggests that institutional quality may help account for heterogeneous responses to external public-sector borrowing.

We therefore examine heterogeneity more systematically using our identified foreign credit supply shocks. We first compare low-income countries (LICs) with other EMDEs and then examine the role of institutional quality using both continuous and discrete measures based on the ICRG. To this end, we estimate two complementary local projection specifications.

$$\begin{aligned} y_{i,t+h}^{cum} = \alpha_i + \beta_h Supply_{i,t} + \delta_h \left(Supply_{i,t} \times Group_i\right) + \gamma_h Global_t \\ + \Gamma_h' X_{i,t-1:t-4} + \Psi_h' y_{i,t-1:t-3} + \varepsilon_{i,t+h}, \qquad h = 0, \ldots, 5, \end{aligned} \tag{18}$$

where $Group_i$ alternatively denotes (i) a dummy identifying low-income countries (LICs) and (ii) an indicator for countries with above-median values of selected institutional quality measures.

Second, to exploit the full time variation in institutional quality, we interact the foreign credit supply shock with a continuous measure of institutional quality,

$$\begin{aligned} y_{i,t+h}^{cum} = \alpha_i + \beta_h Supply_{i,t} + \theta_h \left(Supply_{i,t} \times Inst_{i,t}^{5y}\right) + \gamma_h Global_t \\ + \Gamma_h' X_{i,t-1:t-4} + \Psi_h' y_{i,t-1:t-3} + \varepsilon_{i,t+h}, \qquad h = 0, \ldots, 5, \end{aligned} \tag{19}$$

where $Inst_{i,t}^{5y}$ denotes the standardized rolling five-year lagged average of the ICRG Political Risk Index. This specification allows the response to foreign credit supply shocks to vary continuously with institutional quality rather than imposing a discrete classification.

Income level. We first examine whether the effects of foreign credit supply shocks differ systematically between low-income countries (LICs) and other EMDEs. Figures 17–19 summarize the corresponding impulse responses for fiscal, real-sector, and external-sector outcomes.

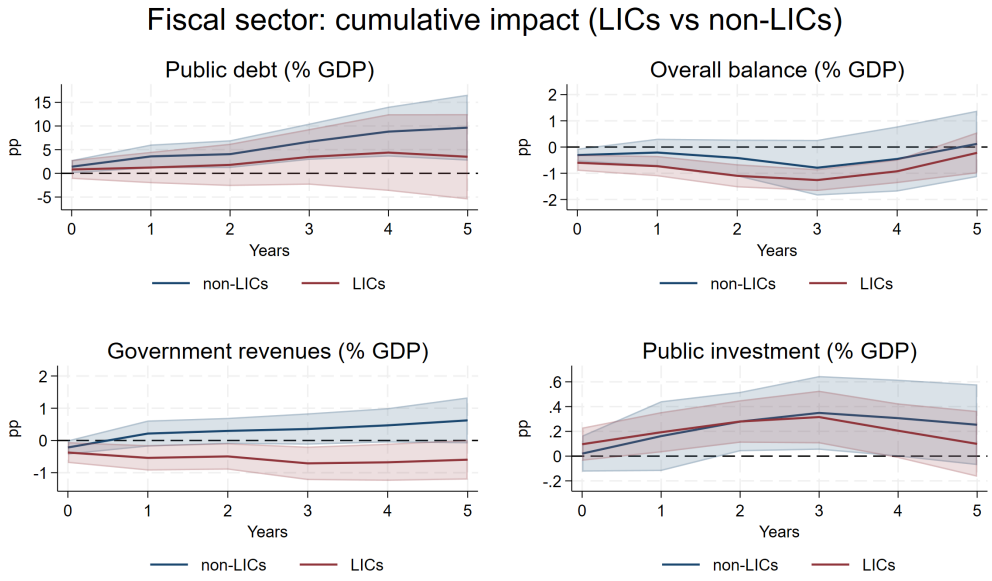
Overall, the responses are broadly similar across the two groups. Positive foreign credit supply shocks raise public investment and public debt in both LICs and non-LICs. However, while government revenues remain broadly unchanged in non-LICs, they decline modestly in LICs, suggesting that easier access to external financing may temporarily reduce the need for domestic revenue mobilization. LICs also exhibit somewhat smaller increases in public investment and correspondingly lower debt accumulation, although these differences remain moderate.

Turning to the real sector, both groups display limited evidence of sustained improvements in output or productivity following the borrowing shock. Nevertheless, the responses of real GDP and total factor productivity are consistently weaker in LICs, while private investment declines in both groups. In contrast, LICs experience a marked increase in private consumption, whereas consumption declines in non-LICs, pointing to a greater share of the additional external financing being absorbed through current spending rather than productive investment.

The external responses reinforce this interpretation. While non-LICs do not exhibit a deterioration in the current account, LICs experience substantially larger current account deficits, stronger import growth, and a drop in exports. Together, these findings suggest that external borrowing in LICs translates relatively more into domestic absorption, particularly consumption and imports, and less into productivity-enhancing capital accumulation.

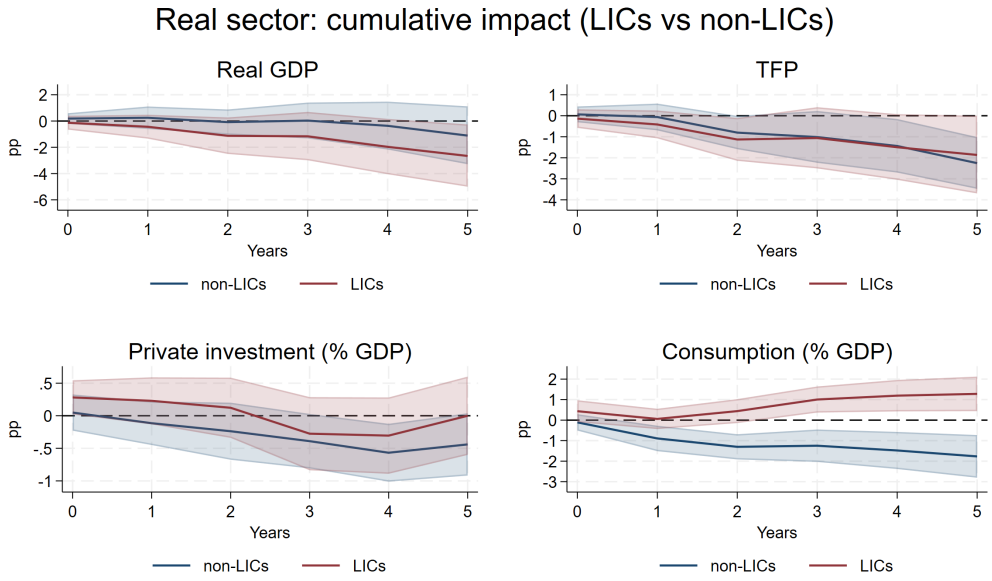
Income level alone, however, still explains only part of the observed heterogeneity. Although LICs display somewhat weaker macroeconomic outcomes, considerable variation remains within both income groups. We therefore next turn to institutional quality, which provides a more direct measure of countries' absorptive capacity and, as we show below, helps to better explain the cross-country differences in the transmission of foreign credit supply shocks.

Figure 17: Fiscal responses by income group



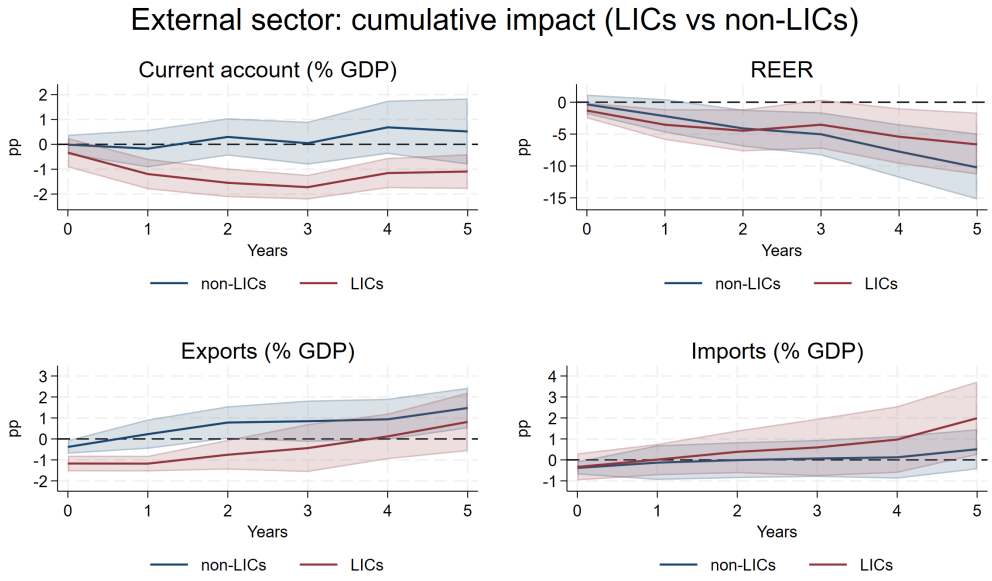
Notes: The figure reports cumulative local projection impulse responses to a one-standard-deviation positive foreign credit supply shock over horizons $h = 0, \ldots, 5$, estimated separately for low-income countries (LICs) and other EMDEs through an interaction between the credit supply shock and a LIC indicator. The panels show the responses of the public debt ratio, the overall fiscal balance, government revenues, and public investment. Shaded areas denote 90 percent confidence intervals based on Driscoll–Kraay standard errors.
Sources: See Section 2.

Figure 18: Real-sector responses by income group



Notes: The figure reports cumulative local projection impulse responses to a one-standard-deviation positive foreign credit supply shock over horizons $h = 0, \ldots, 5$, estimated separately for low-income countries (LICs) and other EMDEs through an interaction between the credit supply shock and a LIC indicator. The panels show the responses of real GDP, total factor productivity, private investment, and private consumption. Variables measured in levels are reported as cumulative percentage-point changes relative to GDP, while variables estimated in logarithms are reported as cumulative percent deviations from the pre-shock level. Shaded areas denote 90 percent confidence intervals based on Driscoll–Kraay standard errors.
Sources: See Section 2.

Figure 19: External-sector responses by income group



Notes: The figure reports cumulative local projection impulse responses to a one-standard-deviation positive foreign credit supply shock over horizons $h = 0, \ldots, 5$, estimated separately for low-income countries (LICs) and other EMDEs through an interaction between the credit supply shock and a LIC indicator. The panels show the responses of the current account balance, the real effective exchange rate (REER), exports, and imports. Shaded areas denote 90 percent confidence intervals based on Driscoll–Kraay standard errors.
Sources: See Section 2.

Institutional quality. The average effects reported above conceal substantial cross-country heterogeneity. We argue that institutional quality governs how effectively countries transform external finance into productive capital. If institutions determine project selection, implementation, and accountability, then identical increases in borrowing capacity should generate very different outcomes across institutional environments. We therefore next examine whether the transmission of foreign credit supply shocks varies with institutional quality. To this end, we interact the standardized foreign credit supply shock with the standardized rolling five-year lagged average of the ICRG Political Risk Index. Throughout the discussion below, the reported impulse responses are evaluated at 1.5 standard deviations above and below the sample mean of institutional quality, corresponding to countries with relatively strong and relatively weak institutional environments, respectively. Figures 20–22 summarize the resulting impulse responses.

The results reveal striking differences in how countries absorb additional external financing. As shown in Figure 20, countries with stronger institutions translate easier access to foreign credit into substantially larger and more persistent increases in public investment. Direct tests of the difference between the two responses confirm that the public investment response is significantly larger under stronger institutions at several horizons (Figure A.5). At the same time, these countries accumulate considerably less public debt and experience only a modest deterioration in the overall fiscal balance despite the stronger investment response. Government revenues also remain broadly stable, whereas they decline in countries with weaker institutions. Taken together, these findings suggest that stronger institutional environments allow governments to allocate external financing considerably more efficiently.

These differences are mirrored by the real-sector responses (Figure 21). Unlike the average responses documented above, countries with stronger institutions exhibit more favorable responses of both real GDP and total factor productivity following positive foreign credit supply shocks. Output and productivity initially increase and remain broadly stable over much of the horizon, whereas both decline more markedly in countries with weaker institutional environments. The strong-minus-weak differences

are positive throughout the response horizon, particularly for output, although they are imprecisely estimated and generally not statistically significant (Figure A.6). Private investment does not respond very differently across institutional environments and, if anything, declines modestly over the medium run, although the estimates are imprecise. By contrast, private consumption rises more strongly in weaker institutional environments, suggesting that a larger share of the additional external financing is absorbed through current spending rather than productivity-enhancing investment.

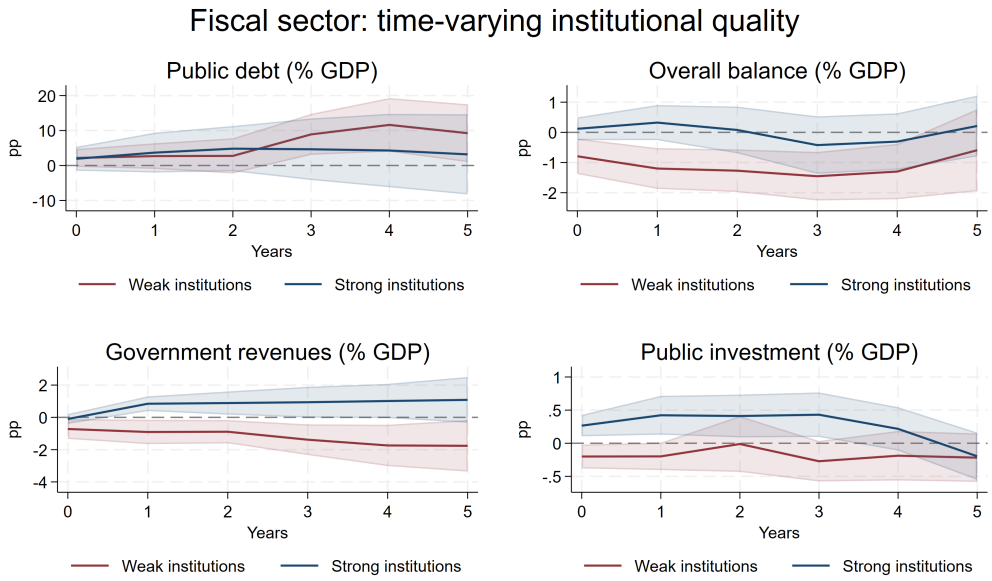
The external adjustment nevertheless remains an important part of the transmission mechanism (Figure 22). Countries with stronger institutions continue to experience a sizable real exchange rate appreciation following positive foreign credit supply shocks and imports rise in response to stronger investment demand. However, in contrast to what occurs in weaker institutional environments, this appreciation is accompanied by stronger public investment and more favorable output and productivity responses, consistent with a greater share of external financing being directed toward productive capital accumulation.

One mechanism underlying these differences appears to be the composition of government financing. Figure 23 shows that governments with stronger institutions substitute external borrowing for domestic financing to a much greater extent than governments with weaker institutions.[13] The substitution away from domestic financing provides evidence that the gains from stronger institutions do not arise simply because these countries borrow more. Rather, stronger institutions appear to improve the allocation and composition of financing, allowing governments to finance productive investment while limiting distortions associated with domestic borrowing and private-sector crowding-out. They are able to finance larger increases in public investment without a commensurate deterioration in the overall fiscal balance. At the same time, the associated gross capital inflows might generate real exchange rate

[13]Domestic financing is constructed as the residual financing need after accounting for external net borrowing, i.e. the overall fiscal deficit minus external net borrowing. This approximation is exact when there are no additional changes in terms of net acquisition of financial assets (below-the-line items). We do not have sufficient data for our sample that covers these additional items. Concerns about below-the-line items bear primarily on the timing of the estimated effects, not on their persistence. Because any buildup or drawdown of these items (such as government deposits) is expected to unwind over time, they should not affect the estimates beyond the short run.

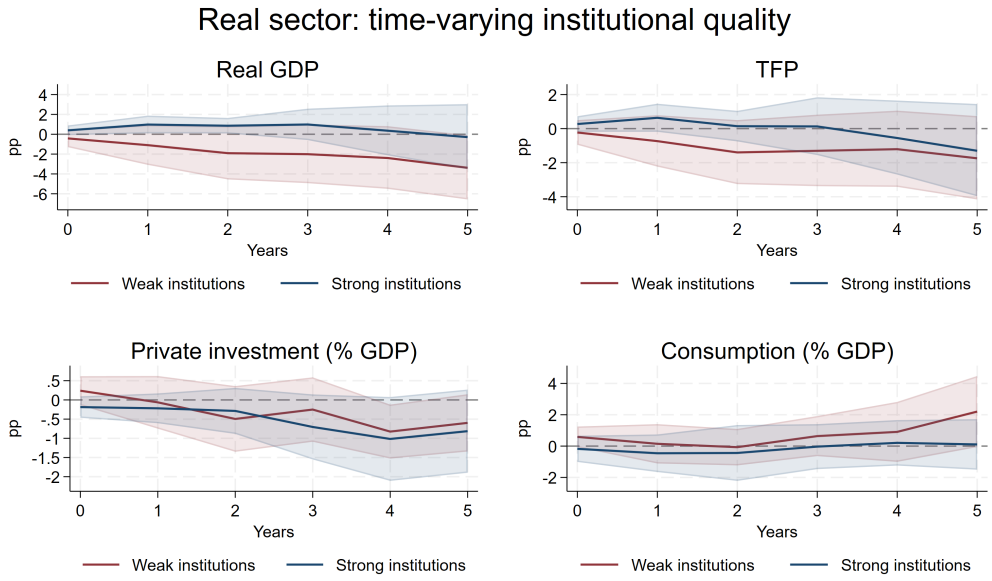
appreciation and a temporary weakening of the external position. Taken together, these findings suggest that the macroeconomic benefits of external borrowing depend critically not only on access to external finance itself, but also on the institutional capacity to allocate it productively.

Figure 20: Fiscal responses by institutional quality



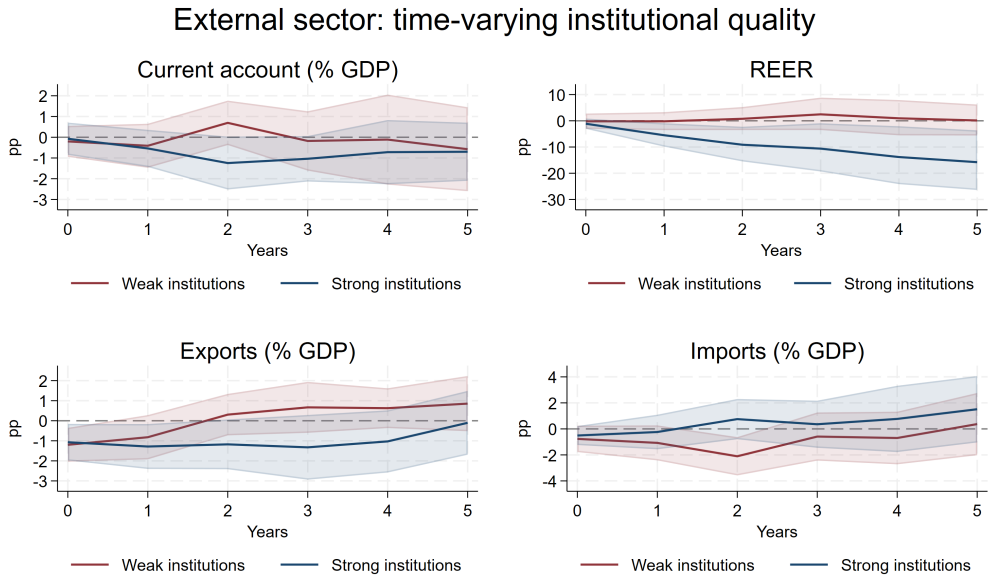
Notes: The figure reports cumulative local projection impulse responses to a one-standard-deviation positive foreign credit supply shock over horizons $h = 0, \ldots, 5$. Institutional quality is measured by the standardized rolling five-year lagged average of the ICRG Political Risk Index. Responses are evaluated at 1.5 standard deviations above and below the sample mean of institutional quality. The panels show the responses of the public debt ratio, the overall fiscal balance, government revenues, and public investment. Shaded areas denote 90 percent confidence intervals based on Driscoll–Kraay standard errors.
Sources: See Section 2.

Figure 21: Real-sector responses by institutional quality



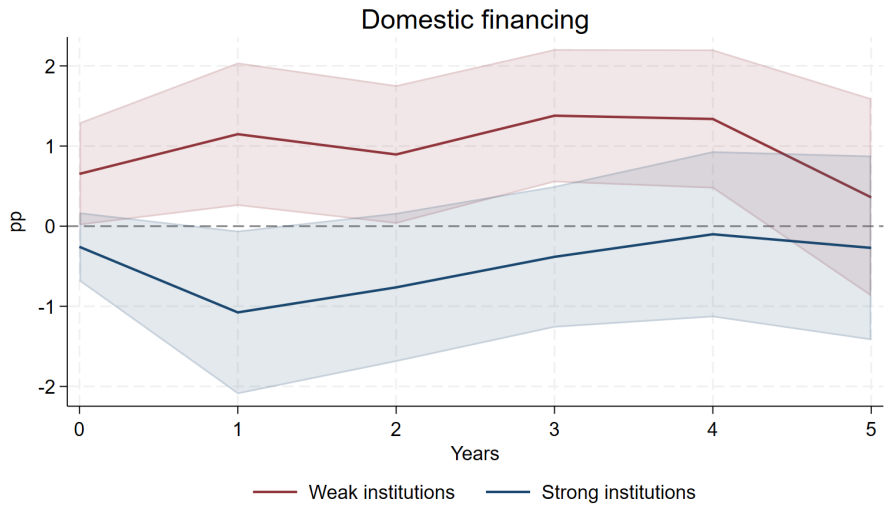
Notes: The figure reports cumulative local projection impulse responses to a one-standard-deviation positive foreign credit supply shock over horizons $h = 0, \ldots, 5$. Institutional quality is measured by the standardized rolling five-year lagged average of the ICRG Political Risk Index. Responses are evaluated at 1.5 standard deviations above and below the sample mean of institutional quality. The panels show the responses of real GDP, total factor productivity, private investment, and private consumption. Shaded areas denote 90 percent confidence intervals based on Driscoll–Kraay standard errors.
Sources: See Section 2.

Figure 22: External-sector responses by institutional quality



Notes: The figure reports cumulative local projection impulse responses to a one-standard-deviation positive foreign credit supply shock over horizons $h = 0, \ldots, 5$. Institutional quality is measured by the standardized rolling five-year lagged average of the ICRG Political Risk Index. Responses are evaluated at 1.5 standard deviations above and below the sample mean of institutional quality. The panels show the responses of the current account balance, the real effective exchange rate (REER), exports, and imports. Shaded areas denote 90 percent confidence intervals based on Driscoll–Kraay standard errors.
Sources: See Section 2.

Figure 23: Domestic financing response by institutional quality



Notes: The figure reports cumulative local projection impulse responses of domestic financing to a one-standard-deviation positive foreign credit supply shock over horizons $h = 0, \ldots, 5$. Domestic financing is constructed as the residual financing need after accounting for external net borrowing, i.e., the overall fiscal deficit minus external net borrowing. Positive values therefore indicate greater reliance on domestic financing. Institutional quality is measured by the standardized rolling five-year lagged average of the ICRG Political Risk Index. Responses are evaluated at 1.5 standard deviations above and below the sample mean of institutional quality. Shaded areas denote 90 percent confidence intervals based on Driscoll–Kraay standard errors.
Sources: See Section 2.

Government stability and bureaucracy quality. The results above establish that institutional quality is an important determinant of how countries absorb external public sector borrowing. To better understand which aspects of institutional quality drive this heterogeneity, we next decompose the ICRG Political Risk Index into two of its key components: government stability and bureaucracy quality.[14] Because these subindices exhibit relatively little time- and cross-country variation, we compute each country's pre-determined median value over 1985–1995 and split countries according to whether this value lies above or below the sample median. We then re-estimate the heterogeneous local projections (see Equation 18). The corresponding impulse responses are reported in Appendix Figures A.8–A.13.

The decomposition broadly confirms the baseline findings. In both cases, countries with stronger institutions are the only group that exhibits a persistent increase in public investment following a positive foreign credit supply shock, while countries with weaker institutions display little evidence of a sustained investment response. At the same time, private investment declines much more sharply in countries characterized by weak government stability or poor bureaucratic quality, whereas the crowding-out effect is considerably more muted in countries with stronger institutional environments. Differences across the remaining macroeconomic variables are generally less pronounced. Overall, these findings suggest that the ability to transform external public sector borrowing into productive investment depends not only on broad institutional quality but, more specifically, on institutional features that support policy continuity and an effective public administration.

[14] As an additional robustness exercise, we also examine heterogeneity across the ICRG subindices for corruption, democratic accountability, investment profile, law and order, and military involvement in politics. These dimensions generally reveal less systematic differences in the macroeconomic responses to foreign credit supply shocks. The corresponding results are reported in Appendix Figures A.14–A.18.

Creditor type. We then estimate the local projections including the three creditor-specific shocks jointly,

$$y^{cum}_{i,t+h} = \alpha_i + \beta^B_h Supply^B_{i,t} + \beta^M_h Supply^M_{i,t} + \beta^P_h Supply^P_{i,t} + \gamma_h Global_t + \Gamma'_h X_{i,t-1:t-4} + \Psi'_h y_{i,t-1:t-3} + \varepsilon_{i,t+h}, \tag{20}$$

where B, M, and P denote bilateral, multilateral, and global private creditors, respectively. The specification also controls for the contemporaneous common component of borrowing, $Global_t$, and four lags of each creditor-specific supply shock. The coefficients β^B_h, β^M_h, and β^P_h therefore capture the response to a supply innovation from a given creditor group conditional on supply shocks from the other groups and common movements in borrowing.

Figures 24–26 reveal substantial heterogeneity across creditor types. Bilateral credit supply shocks generate the clearest fiscal expansion: public investment increases, the fiscal balance deteriorates, and public debt rises persistently. Yet this expansion is not accompanied by sustained gains in output or productivity. Private investment declines, while consumption initially increases. Consistent with an expansion in domestic absorption, the current account deteriorates and the REER appreciates. Taken together, these responses suggest that additional bilateral financing expands the fiscal envelope but does not translate into commensurate improvements in productive capacity.

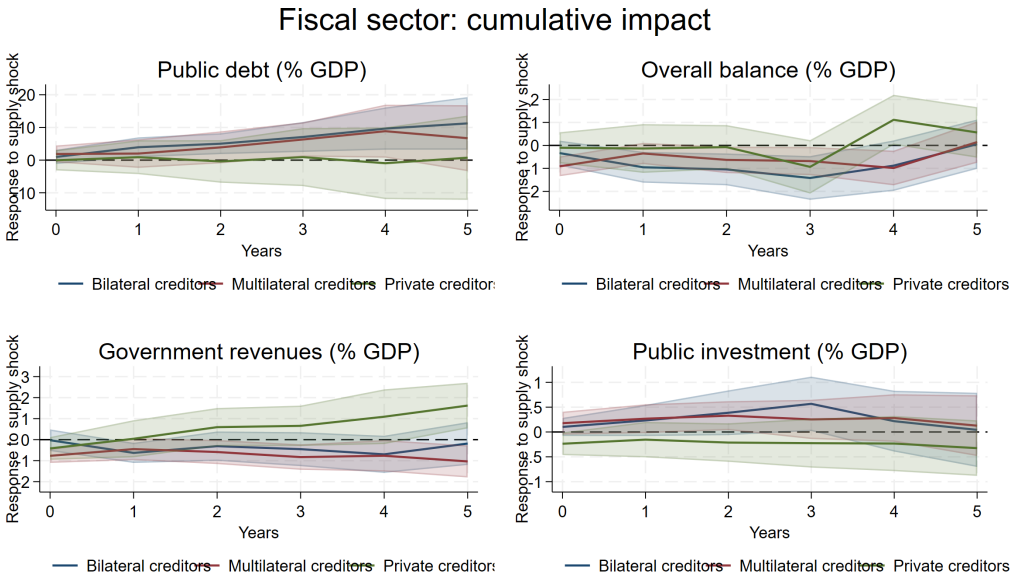
The response to private credit supply is notably different. Private supply shocks generate little systematic fiscal expansion or increase in public investment, but are associated with more favorable real-side outcomes: output and TFP increase over much of the horizon and private investment is initially stronger. At the same time, the current account does not display the persistent deterioration observed following bilateral shocks. Multilateral credit supply shocks exhibit a third pattern. They are associated with little increase in public investment despite a persistent increase in public debt, while the responses of output and productivity are comparatively weak. One possible interpretation of this pattern is that multilateral financing is more frequently associated with policy adjustment and conditionality, which may entail short-run output costs. While our analysis does not allow us to identify this channel directly, the results are consistent with

such an interpretation.[15] These differences suggest that the macroeconomic transmission of external public sector financing depends not only on the availability of foreign credit, but also on its source.

Finally, we examine whether these creditor-specific effects themselves depend on countries' institutional environments. Appendix Figures A.19–A.27 show that the institutional-quality result documented above is not merely an aggregate-credit phenomenon, but also appears within creditor categories. This is particularly pronounced for private credit: the favorable output and productivity responses are concentrated in countries with stronger institutions. Thus, while the differences across creditor types remain, the results qualify a simple interpretation that private credit is intrinsically more growth-friendly and instead point to an important role for the institutional environment in determining how external financing is absorbed.

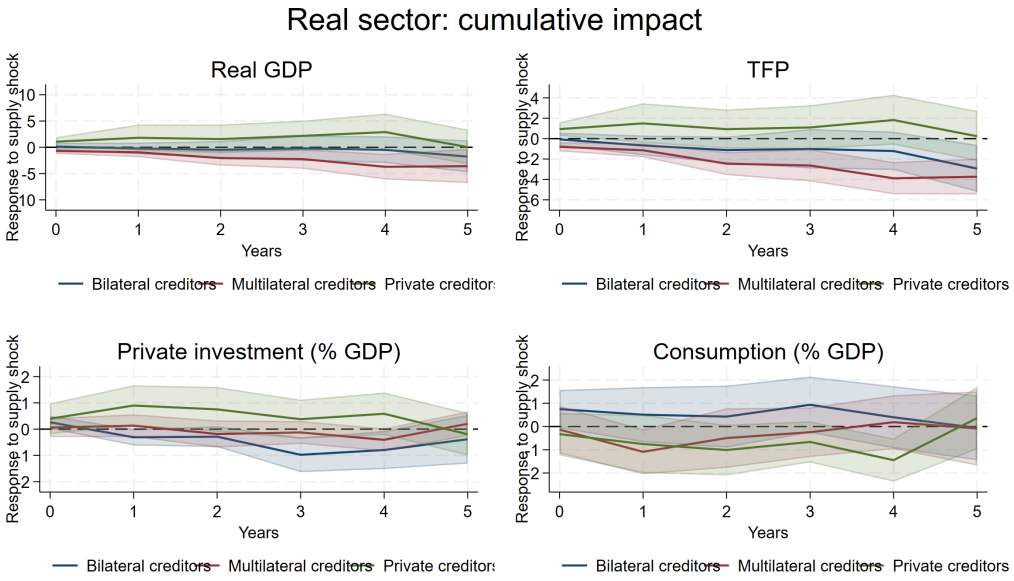
[15]To ensure that the estimated effects of multilateral lending are not driven by its association with IMF-supported adjustment programs, we re-estimate the creditor-type specifications excluding all country-years in which an IMF-supported program is in place. As an alternative, we also control directly for IMF-program years. The estimated responses remain very similar in both exercises and are omitted for brevity.

Figure 24: Fiscal-sector responses by creditor type



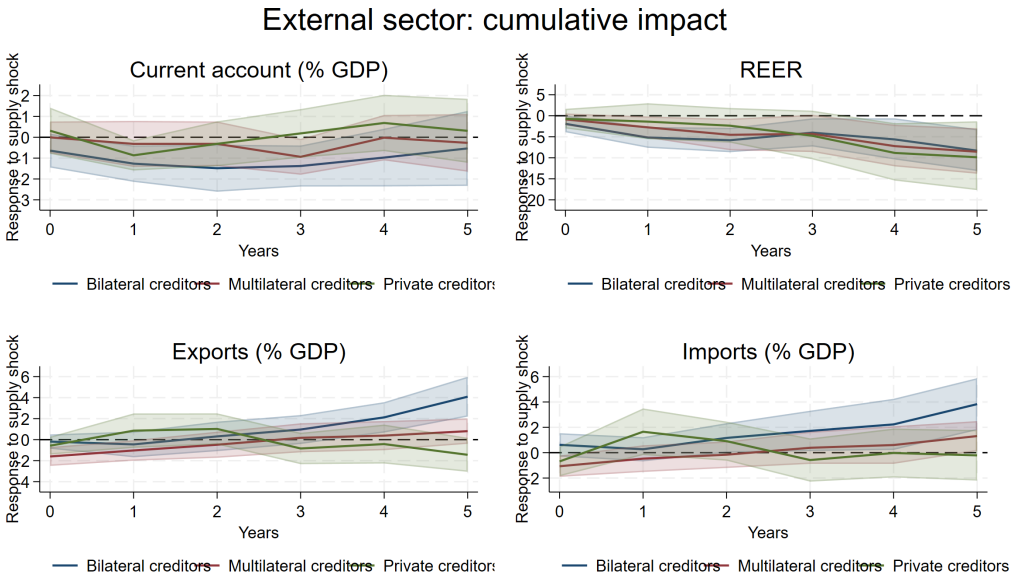
Notes: The figure reports cumulative local projection impulse responses to positive creditor-specific foreign credit supply shocks over horizons $h = 0, \ldots, 5$. Bilateral, multilateral, and private credit supply shocks are included jointly in the specification, so each response captures the effect of a creditor-specific supply innovation conditional on supply shocks from the other creditor groups. Creditor-specific shocks are normalized by the standard deviation of the aggregate foreign credit supply shock, allowing responses to equally sized supply innovations to be compared across creditor types. The panels show the responses of public debt, the overall fiscal balance, government revenues, and public investment. Shaded areas denote 90 percent confidence intervals based on Driscoll–Kraay standard errors.
Sources: See Section 2.

Figure 25: Real-sector responses by creditor type



Notes: The figure reports cumulative local projection impulse responses to positive creditor-specific foreign credit supply shocks over horizons $h = 0, \ldots, 5$. Bilateral, multilateral, and private credit supply shocks are included jointly in the specification, so each response captures the effect of a creditor-specific supply innovation conditional on supply shocks from the other creditor groups. Creditor-specific shocks are normalized by the standard deviation of the aggregate foreign credit supply shock, allowing responses to equally sized supply innovations to be compared across creditor types. The panels show the responses of real GDP, total factor productivity (TFP), private investment, and consumption. Shaded areas denote 90 percent confidence intervals based on Driscoll–Kraay standard errors.
Sources: See Section 2.

Figure 26: External-sector responses by creditor type



Notes: The figure reports cumulative local projection impulse responses to positive creditor-specific foreign credit supply shocks over horizons $h = 0, \ldots, 5$. Bilateral, multilateral, and private credit supply shocks are included jointly in the specification, so each response captures the effect of a creditor-specific supply innovation conditional on supply shocks from the other creditor groups. Creditor-specific shocks are normalized by the standard deviation of the aggregate foreign credit supply shock, allowing responses to equally sized supply innovations to be compared across creditor types. The panels show the responses of the current account balance, the real effective exchange rate (REER), exports, and imports. Shaded areas denote 90 percent confidence intervals based on Driscoll–Kraay standard errors.
Sources: See Section 2.

4.3. Robustness

This section presents robustness checks for our main findings. We focus on the baseline specification reported in Figure 10–Figure 12.

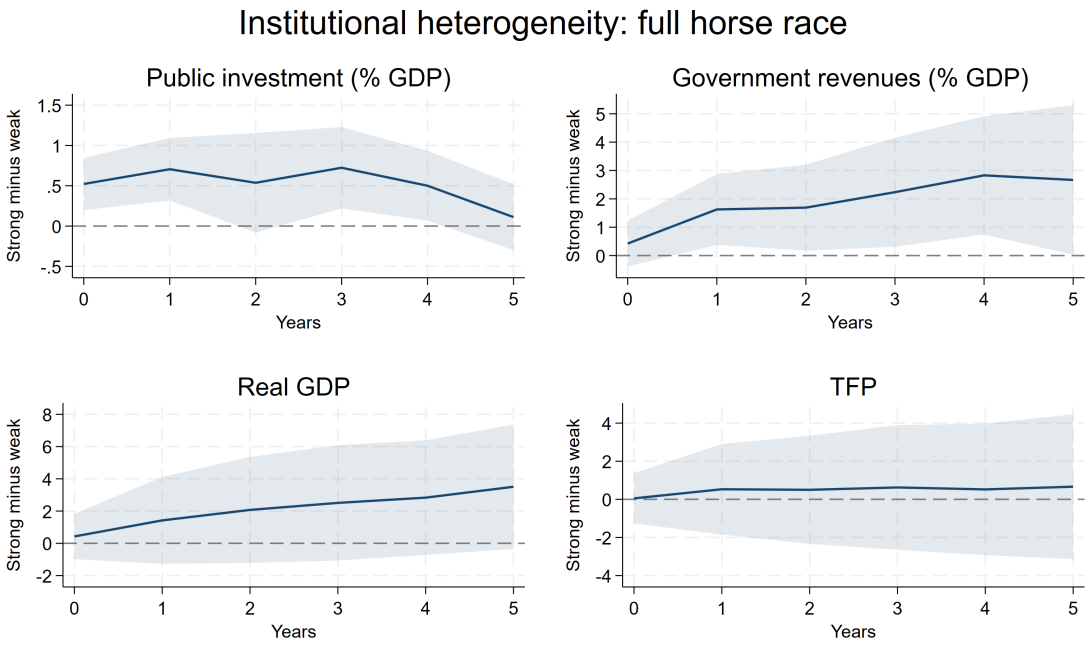
Large creditors. One potential concern with our identification is that the estimated supply shocks could be disproportionately driven by individual large creditors whose lending decisions may respond to factors that also affect borrowing countries' macroeconomic outcomes. This concern is particularly relevant for large bilateral and multilateral creditors. For instance, it raises the possibility that our results primarily capture the expansion of Chinese overseas lending rather than broader variation in foreign credit supply. To assess this concern, we construct credit supply shocks that sequentially exclude China and the World Bank and re-estimate our baseline local projections. In both cases, the resulting impulse responses remain almost identical to the baseline estimates. This indicates that our main findings are not driven by either of these large creditors and, in particular, do not reflect a China-specific lending cycle. Given the close similarity of the resulting impulse responses to the baseline estimates, we do not report the additional figures for brevity.

Global shocks. A related concern is that creditor-specific lending decisions may respond to global developments that also directly affect borrowing countries' macroeconomic outcomes. Our baseline specification already controls for the common component of public sector borrowing recovered from the bilateral decomposition. We assess the robustness of our results to potentially omitted global factors by additionally controlling, in turn, for global geopolitical risk and global oil prices. As a more general test, we also re-estimate the specification including year fixed effects, which absorb any common time-varying shocks, including the common component of borrowing. Across all three specifications, the resulting impulse responses remain very similar to the baseline estimates. This provides reassurance that our findings are not driven by omitted common global developments. Given the close similarity of the results, we again omit the corresponding figures for brevity.

Alternative dimensions of development. Institutional quality is correlated with other dimensions of economic and financial development that may themselves shape the transmission of external credit. We therefore assess whether the institutional heterogeneity documented above simply captures differences in countries' income levels, financial development, or financial openness. Specifically, we augment the institutional heterogeneity specification by interacting the foreign credit supply shock simultaneously with the five-year lagged averages of income per capita, financial development, and financial openness, each standardized in the same manner as our institutional-quality measure.

Figure 27 reports the resulting strong-minus-weak institutional differences for selected fiscal and real-sector outcomes. The stronger public investment response under higher institutional quality is remarkably robust: even after allowing the effects of foreign credit supply to vary jointly with all three alternative dimensions of development, the difference remains economically sizable and statistically significant over several horizons. Government revenues also respond more favorably under stronger institutions. The more favorable GDP response remains economically sizable and increases over the medium run, although the difference is imprecisely estimated. By contrast, the differential TFP response is substantially attenuated. Overall, these results indicate that the stronger translation of additional external financing into public investment and more favorable fiscal outcomes under stronger institutions is not simply capturing differences in income levels, financial development, or financial openness.

Figure 27: Institutional heterogeneity conditional on alternative dimensions of development



Notes: The figure reports differences in cumulative local projection impulse responses to a one-standard-deviation positive foreign credit supply shock between countries with stronger and weaker institutional quality over horizons $h = 0, \ldots, 5$. Strong and weak institutional quality correspond to $+1.5$ and -1.5 standard deviations of the standardized five-year lagged average of the ICRG Political Risk Index, respectively. The specification additionally allows the response to the foreign credit supply shock to vary with income per capita, financial development, and financial openness, each measured using standardized five-year lagged averages. The panels report the strong-minus-weak differences for public investment, government revenues, real GDP, and total factor productivity. Public investment and government revenues are expressed in percentage points of GDP; real GDP and total factor productivity are reported as approximate percent differences. Shaded areas denote 90 percent confidence intervals based on Driscoll–Kraay standard errors.
Sources: See Section 2..

5. Channels

The baseline results point to a tension: positive foreign credit supply shocks raise public investment and debt, yet output and productivity do not improve and, if anything, decline at longer horizons. The literature suggests three channels that could account for this pattern: low public investment efficiency, overborrowing, and Dutch disease. Each has distinct observable implications. In this section, we assess each channel against the impulse responses reported above and two additional sets of responses, for prices and for defaulted debt.

5.1. Low investment efficiency

If public investment projects are poorly selected or implemented, additional spending raises the recorded capital stock without a commensurate increase in productive capacity (Pritchett, 2000; Gupta et al., 2011; Dabla-Norris et al., 2012). Rapid scaling-up of public investment can strain absorptive capacity, lowering the return on each additional unit of spending (Presbitero, 2016). This channel predicts three patterns: capital accumulation without a corresponding rise in output, and hence a falling output–capital ratio and lower measured TFP; little crowding-in of private investment; and a deterioration in the external balance that is not matched by an expansion of export capacity.

The evidence is consistent with these predictions. Public investment rises by about 0.3 to 0.4 percentage points of GDP after three years (Figure 10), and capital deepening makes a positive and growing contribution to output throughout the horizon (Figure 14). Yet real GDP does not increase, and the TFP term in the production-function decomposition becomes increasingly negative, more than offsetting the contribution of capital. The capital–output ratio therefore rises because capital increases while output does not. Since TFP is measured as a residual, part of this decline likely reflects capital that is recorded in the accounts but contributes little to production, in line with the distinction between investment spending and productive capital emphasized by Pritchett (2000). Private investment does not respond positively to the public investment boom and declines over the medium run (Figure 11), so there is no evidence of crowding-in.

The heterogeneity results reinforce this interpretation. Where institutional quality is higher, the same credit supply shock produces a larger and more persistent increase in public investment together with more favorable output and productivity responses (Figures 20 and 21). Among the ICRG components, bureaucracy quality and government stability, the dimensions most closely related to project appraisal, implementation, and policy continuity, matter most (Figures A.8–A.13). The institutional dimension along which outcomes differ is precisely the one that governs how efficiently investment spending is converted into productive capital.

5.2. Overborrowing

A second possibility is that easier access to credit induces governments to borrow more than they can repay. Governments that are impatient or face political-economy frictions borrow excessively when credit becomes available (Aguiar and Amador, 2011; Aguiar et al., 2020; Acharya et al., 2024), and private borrowing decisions that ignore their effect on aggregate financial conditions generate overborrowing at the level of the economy (Bianchi, 2011; Korinek, 2018). Credit booms financed by capital inflows are, in turn, strong predictors of subsequent crises (Gourinchas and Obstfeld, 2012). This channel predicts that the costs of a borrowing boom might materialize with a delay: debt accumulates faster than servicing capacity, borrowing flows reverse, and default risk rises in later years.

Several features of our results fit this channel. Net borrowing increases for about three years after the shock and then fades (Table 4), while the external debt ratio keeps rising, to about 11 percentage points of GDP after five years (Table 5). The continued rise after borrowing flows have faded reflects weak output growth, which raises the ratio through the denominator, and possibly stock-flow adjustments. Overall, the public debt ratio increases by about six percentage points of GDP within four to five years (Figure 10), while the fiscal balance returns to its pre-shock level only through lower other spending.

The most direct evidence comes from defaulted debt. Figure 28 reports the cumulative responses of defaulted public debt, in percent of GDP, owed to all creditors, to official creditors, and to private creditors. Defaulted debt does not respond on impact but rises

with a lag, reaching about 1.8 percentage points of GDP after four years and about 3.6 percentage points after eight years. Most of the increase reflects official creditors, whose defaulted debt rises by about 3 percentage points of GDP after eight years, although the estimates are imprecise at intermediate horizons. Defaulted debt owed to private creditors rises more smoothly and is statistically significant from the fourth year onward, but is quantitatively smaller, at about 0.6 percentage points of GDP after eight years.

This pattern is broadly consistent with a large literature on the incidence and costs of sovereign default. Defaults tend to follow periods of rapid debt accumulation and are concentrated in countries with weak repayment histories and institutions (Reinhart et al., 2003; Reinhart and Rogoff, 2009). The estimates by creditor type are relatively imprecise and do not allow us to say whether arrears are concentrated on private or on official creditors, a distinction that matters given the de facto seniority structure of sovereign debt (Schlegl et al., 2019). The timing is also consistent with the medium-term output losses. Defaults are associated with large and persistent declines in output (Borensztein and Panizza, 2009; Kuvshinov and Zimmermann, 2019), and restructurings with larger haircuts are followed by higher borrowing costs and longer exclusion from markets (Cruces and Trebesch, 2013). Asonuma and Trebesch (2016) show that restructurings that take place after a default, rather than preemptively, involve larger output losses and longer negotiations, and Asonuma et al. (2019) document that post-default restructurings are followed by sharp contractions in private credit and investment. These costs are consistent with the decline in private investment and output at longer horizons in our baseline responses.

Not every implication of the overborrowing channel is borne out. Output does not first rise and then fall, as a pure overborrowing boom would predict, and employment contributes little to the output response (Figure 14). The evidence therefore suggests that overborrowing compounds, rather than replaces, the low efficiency of the investment it finances: because borrowed resources generate little additional output, servicing capacity does not keep pace with the debt, and default might become more likely over time.

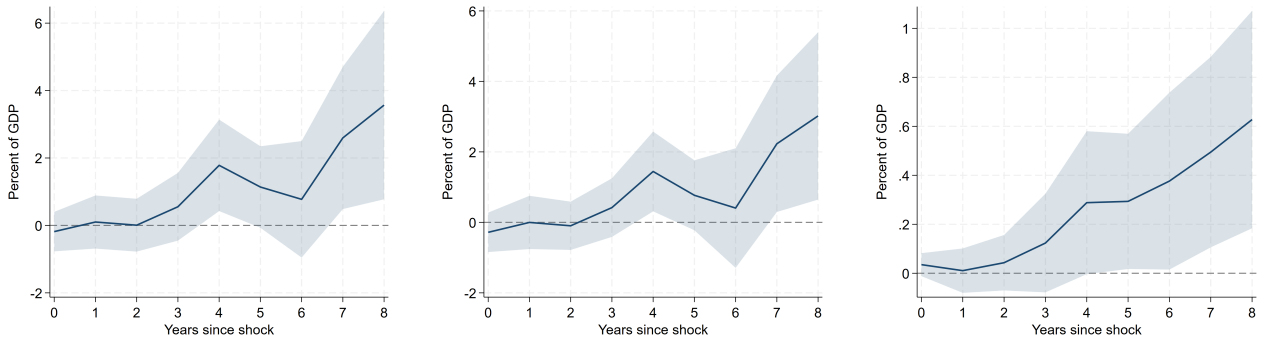
5.3. Dutch disease

A third possibility is that capital inflows crowd out the tradable sector. Higher domestic demand raises the relative price of nontradables, appreciates the real exchange rate, and draws resources away from tradables (Corden and Neary, 1982). If the tradable sector is the main source of productivity growth, this reallocation lowers aggregate productivity (Adam and Bevan, 2006; Rajan and Subramanian, 2011; Benigno and Fornaro, 2014). This channel predicts a real exchange rate appreciation, a rise in the prices of domestic absorption (consumption and investment) and of GDP relative to export prices, and stagnant or falling exports.

The real exchange rate does appreciate, by about eight percent over five years (Figure 12). The other predictions of the channel, however, find little support. Figure 29 reports the responses of the price levels of GDP, investment, and consumption relative to the price level of exports. None of the three rises relative to export prices; all three fall, by roughly five to six percent after five years, although the responses are imprecisely estimated at intermediate horizons. The relative price of domestic absorption therefore moves in the opposite direction to what a Dutch disease mechanism requires. Export prices instead rise relative to domestic prices, the opposite of the shift in internal relative prices that the mechanism implies.

Export performance points in the same direction. Exports decline initially, consistent with the appreciation, but recover after two years and are above their pre-shock level by year five (Figure 12). The later deterioration of the current account is driven by imports and by net income and transfers, not by a loss of exports (Figure 15). Finally, the heterogeneity results run against the Dutch disease channel. Countries with stronger institutions experience a larger real appreciation than countries with weaker institutions, yet their output and productivity responses are more favorable (Figures 21 and 22). If Dutch disease drove the output response, the countries with the largest appreciation should perform worst.

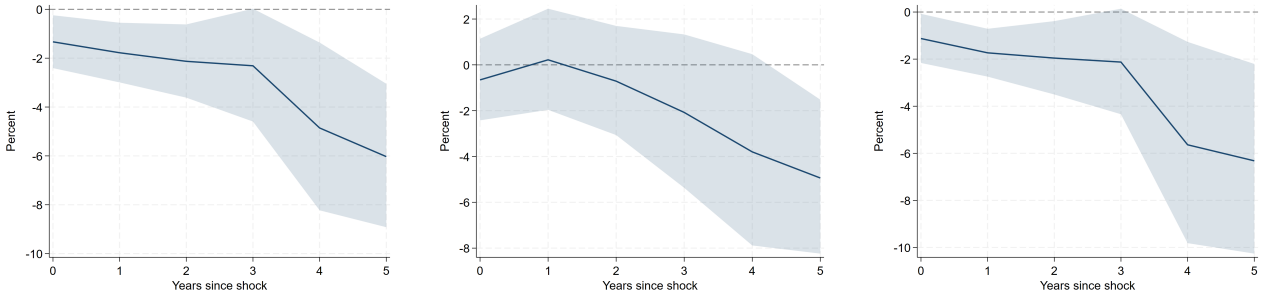
Figure 28: Defaulted debt responses to foreign credit supply shocks



(a) All creditors (b) Official creditors (c) Private creditors

Notes: The figure reports cumulative local projection impulse responses of defaulted public debt, in percent of GDP, to a one-standard-deviation positive foreign credit supply shock over horizons $h = 0, \ldots, 8$. The panels show defaulted debt owed to all creditors, to official (bilateral and multilateral) creditors, and to private creditors. Defaulted debt is winsorized at the 99th percentile. Shaded areas denote 90 percent confidence intervals based on Driscoll–Kraay standard errors. Note the different vertical scales across panels. *Sources:* Bank of Canada–Bank of England Sovereign Default Database; see Section 2.

Figure 29: Price responses to foreign credit supply shocks



(a) GDP price (b) Investment price (c) Consumption price

Notes: The figure reports cumulative local projection impulse responses to a one-standard-deviation positive foreign credit supply shock over horizons $h = 0, \ldots, 5$. The panels show the price level of GDP, investment, and consumption, each relative to the price level of exports, reported as cumulative percent deviations from the pre-shock level. Price levels are from the Penn World Table 10.01 and are expressed in a common currency relative to the United States; the ratios are not affected by the nominal exchange rate. Shaded areas denote 90 percent confidence intervals based on Driscoll–Kraay standard errors. *Sources:* Penn World Table 10.01; see Section 2.

6. Conclusion

External public sector borrowing occupies a central place in development finance. Yet despite decades of experience with foreign lending, evidence on its macroeconomic consequences has remained surprisingly inconclusive. A key obstacle has been identification: countries do not borrow randomly, and borrowing decisions are tightly linked to domestic economic conditions. This paper addresses that challenge by exploiting the bilateral structure of public sector lending relationships to isolate plausibly exogenous variation in countries' access to external public sector credit. Using a novel borrower-level measure of public sector credit supply shocks, we identify the causal effects of external public sector borrowing on a broad set of macroeconomic outcomes.

Our results reveal that access to external public sector finance and successful development are not synonymous. Positive foreign credit supply shocks relax public sector financing constraints and lead to significant increases in public investment. However, for the average country, these investment booms are accompanied by higher public debt, real exchange rate appreciation, weaker external balances, and some crowding-out of private investment, while generating little lasting improvement in productivity or output. Moreover, the costs of the borrowing are back-loaded: defaulted debt rises in the years following the shock, although the estimates by creditor type are imprecise. The evidence points to two channels behind the weak output response. Borrowed resources finance public investment that adds to the recorded capital stock but not to output, and the resulting debt grows faster than the capacity to service it. By contrast, we find little evidence of Dutch disease: the real exchange rate appreciates, but domestic relative prices do not shift toward nontradables and exports recover. These findings challenge the presumption that expanding access to external public sector credit is, by itself, sufficient to accelerate economic development.

The paper's central finding is that institutions are an important determinant of whether external public sector finance translates into stronger economic performance or primarily into additional indebtedness. Countries with stronger institutional environments consistently obtain larger economic benefits from positive credit supply

shocks. They exhibit more favorable productivity and output responses and rely less heavily on domestic financing. By contrast, countries with weaker institutions exhibit far more limited real benefits despite receiving similar external financing. Because both the efficiency of public investment and the capacity to service debt depend on how the state selects, implements, and finances projects, the channels we identify point to the same underlying constraint. The effectiveness of external public sector borrowing depends not only on the quantity of external resources available but also on the quality of the institutions responsible for allocating them.

These findings carry important implications for development policy. Debates surrounding development finance often focus on how to expand access to external capital. Our results suggest that an equally important question is how public sector borrowing is managed once resources are received. Strengthening public investment management, improving bureaucratic capacity, enhancing government effectiveness, and ensuring policy continuity may be prerequisites for translating external public sector finance into sustained growth.

More broadly, our findings shed light on why international capital does not always flow to its most productive uses and why similar public sector borrowing episodes can produce dramatically different outcomes across countries. The promise of external public sector finance depends not only on the willingness of creditors to lend to the public sector, but also on the ability of governments to transform borrowed resources into productive capital and higher future incomes.

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A Additional tables

Table A.1: Summary statistics

Variable	Unit	Mean	SD	N
Public debt	percent of GDP	61.93	66.18	2476
Overall balance	percent of GDP	-1.35	7.23	2427
Government revenue	percent of GDP	19.72	8.78	2432
Public investment	percent of GDP	4.76	3.83	2443
Real GDP growth	percent	3.83	4.03	2478
Total factor productivity	index	0.98	0.17	1665
Private investment	percent of GDP	11.90	6.08	2443
Consumption	percent of GDP	83.27	17.14	2478
Current account	percent of GDP	-4.57	9.44	2478
Exports	percent of GDP	28.95	16.10	2463
Imports	percent of GDP	36.71	19.71	2463
Real effective exchange rate	index	108.96	68.09	2459

Notes: The table reports summary statistics for the baseline estimation sample. Variables correspond to the main outcomes shown in the impulse-response figures. Note that because the local projections are estimated up to a five-year horizon and use lagged variables, the effective base-year sample for the full impulse-response window spans the time period from 1985 to 2019.

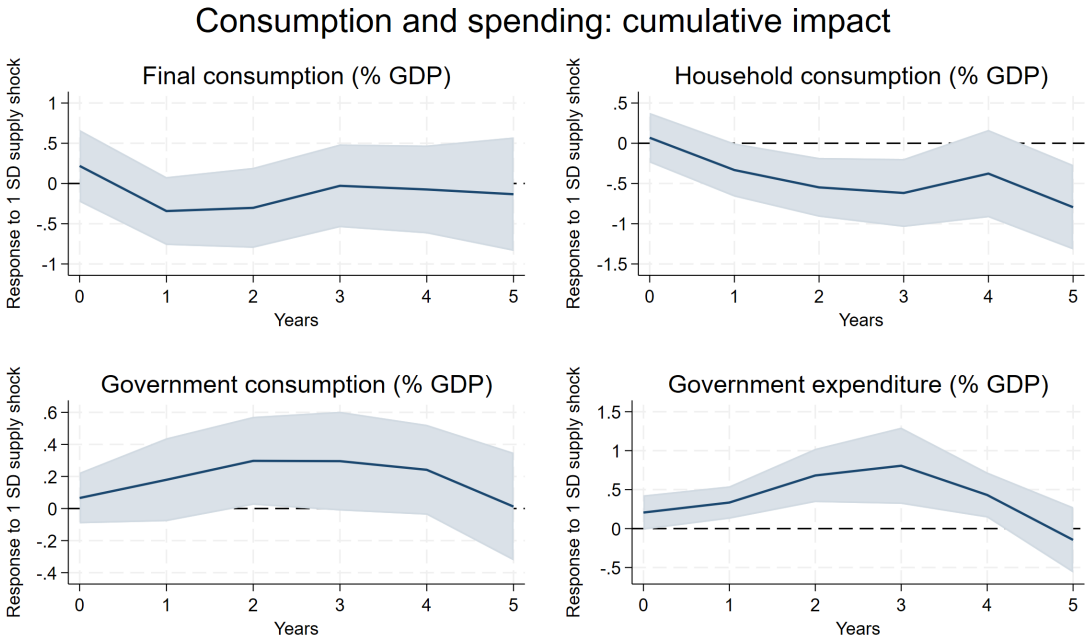
Table A.2: Countries in the baseline sample

ISO	Country	IFSid	ISO	Country	IFSid
ARG	Argentina	213	KEN	Kenya	664
BEN	Benin	638	KHM	Cambodia	522
BFA	Burkina Faso	748	LKA	Sri Lanka	524
BGD	Bangladesh	513	LSO	Lesotho	666
BLZ	Belize	339	MAR	Morocco	686
BOL	Bolivia	218	MDG	Madagascar	674
BRA	Brazil	223	MDV	Maldives	556
BTN	Bhutan	514	MEX	Mexico	273
BWA	Botswana	616	MLI	Mali	678
CAF	Central African Republic	626	MMR	Myanmar	518
CHN	China	924	MRT	Mauritania	682
CIV	Côte d'Ivoire	662	MUS	Mauritius	684
CMR	Cameroon	622	NER	Niger	692
COD	Congo, Dem. Rep.	636	NGA	Nigeria	694
COG	Congo, Rep.	634	NIC	Nicaragua	278
COL	Colombia	233	NPL	Nepal	558
CRI	Costa Rica	238	PAK	Pakistan	564
DMA	Dominica	321	PER	Peru	293
DOM	Dominican Republic	243	PHL	Philippines	566
DZA	Algeria	612	PRY	Paraguay	288
ECU	Ecuador	248	RWA	Rwanda	714
EGY	Egypt	469	SEN	Senegal	722
FJI	Fiji	819	SLE	Sierra Leone	724
GAB	Gabon	646	SLV	El Salvador	253
GHA	Ghana	652	STP	Sao Tome and Principe	716
GIN	Guinea	656	SWZ	Eswatini	734
GMB	Gambia	648	TCD	Chad	628
GNB	Guinea-Bissau	654	TGO	Togo	742
GRD	Grenada	328	THA	Thailand	578
GTM	Guatemala	258	TUN	Tunisia	744
HND	Honduras	268	TUR	Türkiye	186
HTI	Haiti	263	TZA	Tanzania	738
IDN	Indonesia	536	UGA	Uganda	746
IND	India	534	VCT	St. Vincent and the Grenadines	364
IRN	Iran	429	ZAF	South Africa	199
JAM	Jamaica	343	ZMB	Zambia	754
JOR	Jordan	439			

Notes: The table lists the countries included in the baseline estimation sample. The estimation sample excludes Burundi, Ethiopia, Guyana, Liberia, Sudan, Venezuela, and Zimbabwe because prolonged episodes of hyperinflation and/or major armed conflict during the sample period could disproportionately influence the estimated impulse responses.

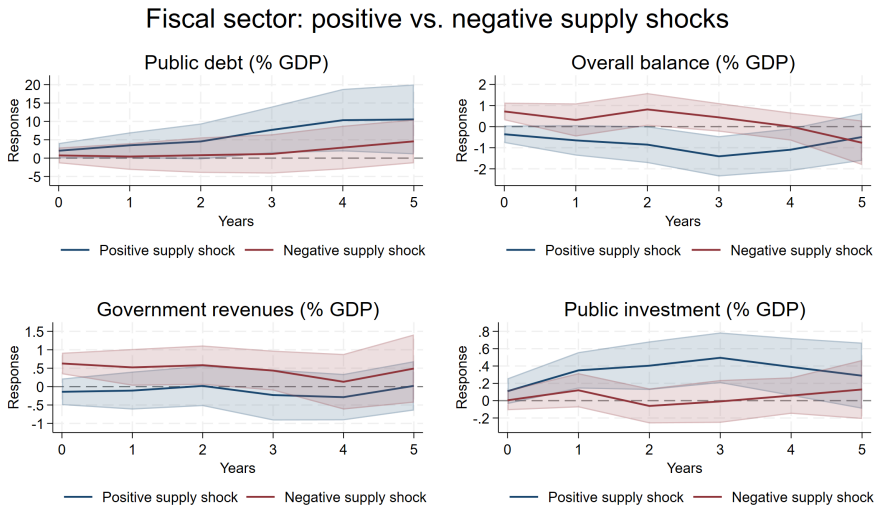
B Additional Figures

Figure A.1: Consumption and government spending responses to foreign credit supply shocks



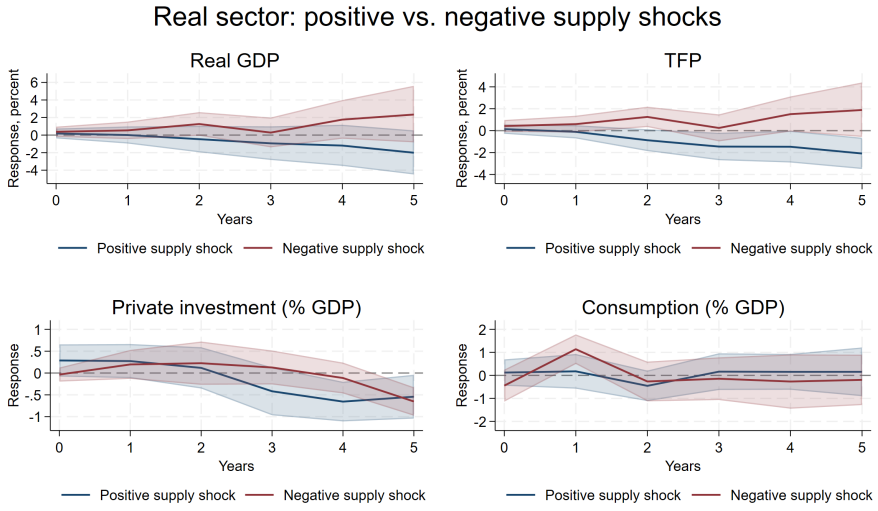
Notes: The figure reports cumulative local projection impulse responses to a one-standard-deviation positive foreign credit supply shock over horizons $h = 0, \ldots, 5$. The panels show the responses of total final consumption, household consumption, government consumption, and government expenditure, all expressed as a share of GDP. Shaded areas denote 90 percent confidence intervals based on Driscoll–Kraay standard errors. Each panel is estimated separately, controlling for lags of its own dependent variable. The decompositions in Section **??** use the same underlying series for government consumption and expenditure but impose a common estimation sample and a common set of controls across components so that the contributions add up exactly to the total response; individual contributions therefore need not coincide with the responses shown here.
Sources: See Section 2.

Figure A.2: Fiscal responses to positive and negative foreign credit supply shocks



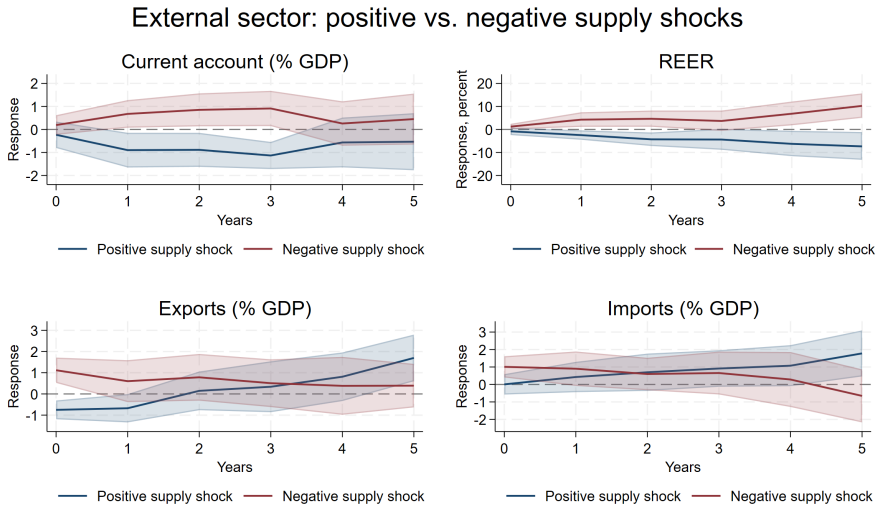
Notes: The figure reports cumulative local projection impulse responses to positive and negative foreign credit supply shocks over horizons $h = 0, \ldots, 5$. Positive and negative shocks enter the same local projection specification through separate positive and negative shock components. The panels show the responses of the public debt ratio, the overall fiscal balance, government revenues, and public investment. Shaded areas denote 90 percent confidence intervals based on Driscoll–Kraay standard errors.
Sources: See Section 2.

Figure A.3: Real-sector responses to positive and negative foreign credit supply shocks



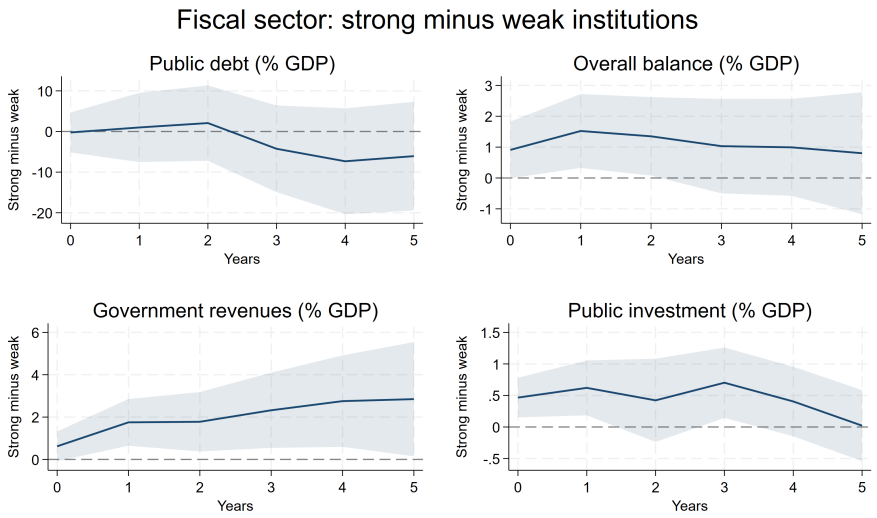
Notes: The figure reports cumulative local projection impulse responses to positive and negative foreign credit supply shocks over horizons $h = 0, \ldots, 5$. Positive and negative shocks enter the same local projection specification through separate positive and negative shock components. The panels show the responses of real GDP, total factor productivity, private investment, and private consumption. Variables measured in levels are reported as cumulative percentage-point changes relative to GDP, while variables estimated in logarithms are reported as cumulative percent deviations from the pre-shock level. Shaded areas denote 90 percent confidence intervals based on Driscoll–Kraay standard errors.
Sources: See Section 2.

Figure A.4: External-sector responses to positive and negative foreign credit supply shocks



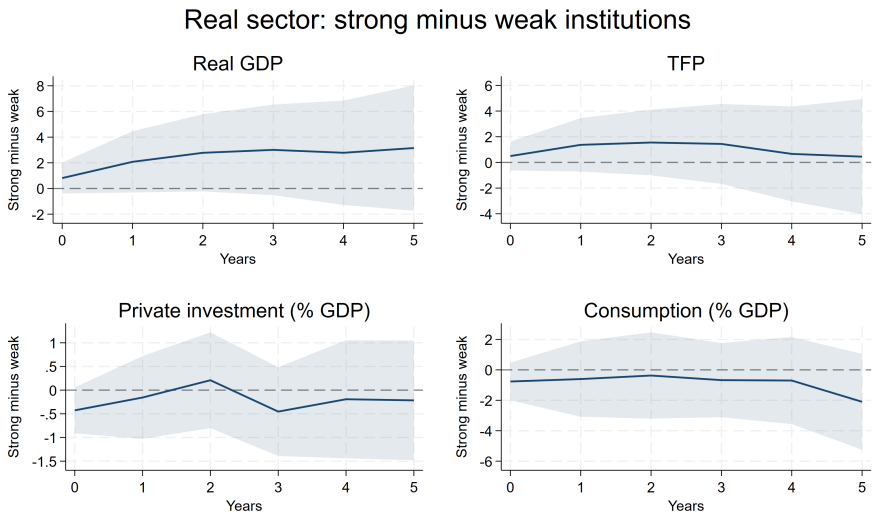
Notes: The figure reports cumulative local projection impulse responses to positive and negative foreign credit supply shocks over horizons $h = 0, \ldots, 5$. Positive and negative shocks enter the same local projection specification through separate positive and negative shock components. The panels show the responses of the current account balance, the real effective exchange rate (REER), exports, and imports. Shaded areas denote 90 percent confidence intervals based on Driscoll–Kraay standard errors.
Sources: See Section 2.

Figure A.5: Differences in fiscal responses by institutional quality



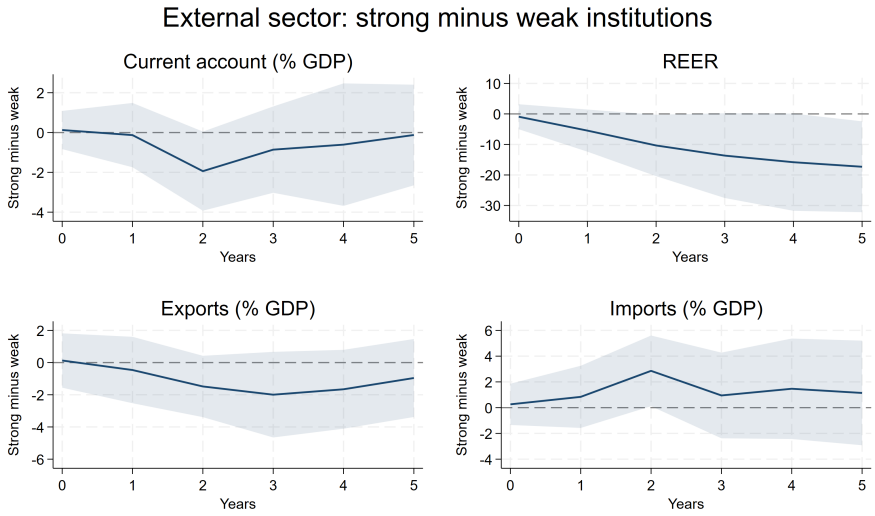
Notes: The figure reports differences in cumulative local projection impulse responses to a one-standard-deviation positive foreign credit supply shock between countries with stronger and weaker institutional quality over horizons $h = 0, \ldots, 5$. Institutional quality is measured using the standardized five-year lagged average of the ICRG Political Risk Index. Strong and weak institutional quality correspond to $+1.5$ and -1.5 standard deviations, respectively. Each panel reports the strong-minus-weak difference in the estimated response. Positive values therefore indicate a larger response at higher levels of institutional quality. The panels show the differences in the responses of the public debt ratio, the overall fiscal balance, government revenues, and public investment. Shaded areas denote 90 percent confidence intervals based on Driscoll–Kraay standard errors.
Sources: See Section 2.

Figure A.6: Differences in real-sector responses by institutional quality



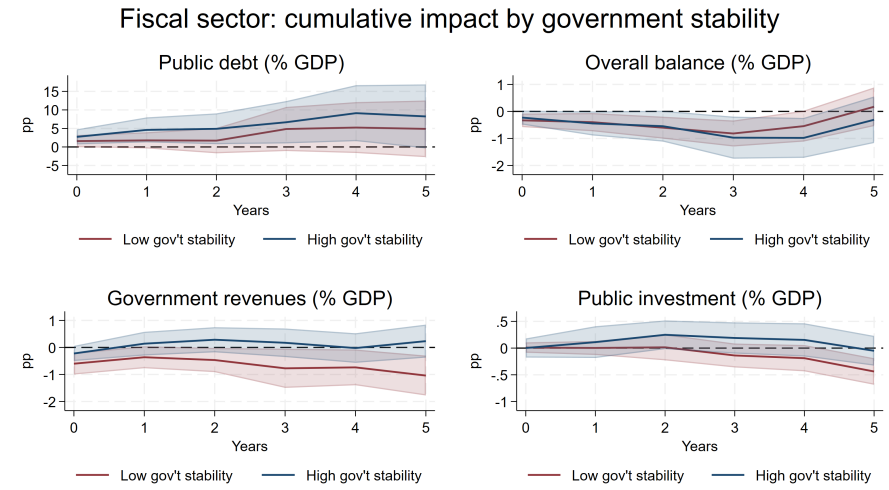
Notes: The figure reports differences in cumulative local projection impulse responses to a one-standard-deviation positive foreign credit supply shock between countries with stronger and weaker institutional quality over horizons $h = 0, \ldots, 5$. Institutional quality is measured using the standardized five-year lagged average of the ICRG Political Risk Index. Strong and weak institutional quality correspond to $+1.5$ and -1.5 standard deviations, respectively. Each panel reports the strong-minus-weak difference in the estimated response. Positive values therefore indicate a more favorable response at higher levels of institutional quality. The panels show the differences in the responses of real GDP, total factor productivity, private investment, and private consumption. Variables measured in levels are reported as cumulative percentage-point changes relative to GDP, while variables estimated in logarithms are reported as cumulative percent deviations from the pre-shock level. Shaded areas denote 90 percent confidence intervals based on Driscoll–Kraay standard errors.
Sources: See Section 2.

Figure A.7: Differences in external-sector responses by institutional quality



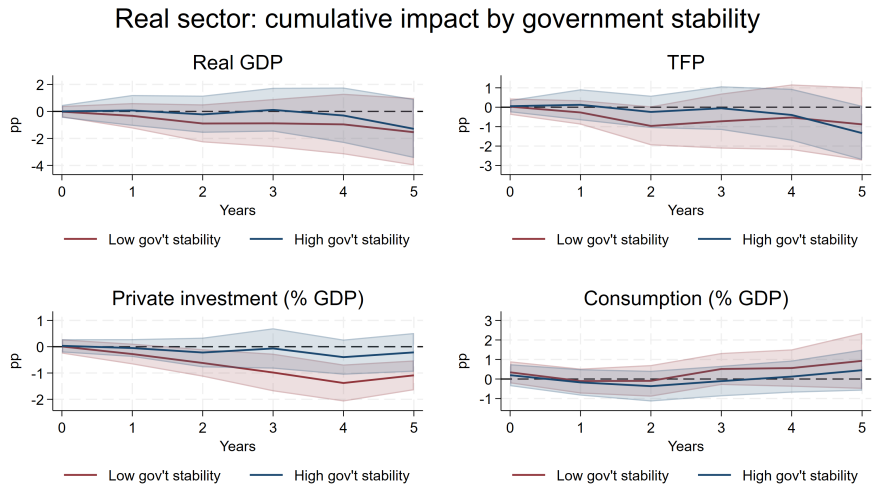
Notes: The figure reports differences in cumulative local projection impulse responses to a one-standard-deviation positive foreign credit supply shock between countries with stronger and weaker institutional quality over horizons $h = 0, \ldots, 5$. Institutional quality is measured using the standardized five-year lagged average of the ICRG Political Risk Index. Strong and weak institutional quality correspond to $+1.5$ and -1.5 standard deviations, respectively. Each panel reports the strong-minus-weak difference in the estimated response. Positive values therefore indicate a larger response at higher levels of institutional quality. The panels show the differences in the responses of the current account balance, the real effective exchange rate (REER), exports, and imports. Shaded areas denote 90 percent confidence intervals based on Driscoll–Kraay standard errors.
Sources: See Section 2.

Figure A.8: Fiscal responses by government stability



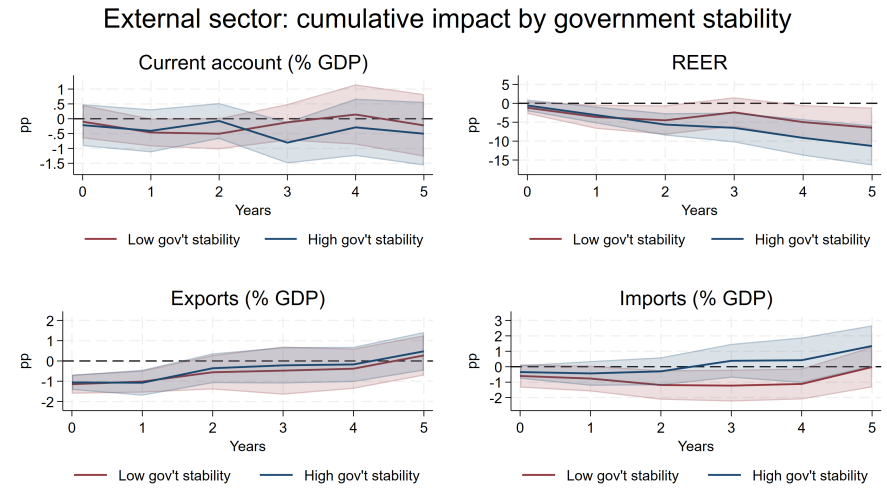
Notes: The figure reports cumulative local projection impulse responses to a one-standard-deviation positive foreign credit supply shock over horizons $h = 0, \ldots, 5$. Countries are split according to whether their pre-determined (1985–1995) country median of the ICRG Government Stability subindex is above or below the sample median. The panels show the responses of the public debt ratio, the overall fiscal balance, government revenues, and public investment. Shaded areas denote 90 percent confidence intervals based on Driscoll–Kraay standard errors.
Sources: See Section 2.

Figure A.9: Real-sector responses by government stability



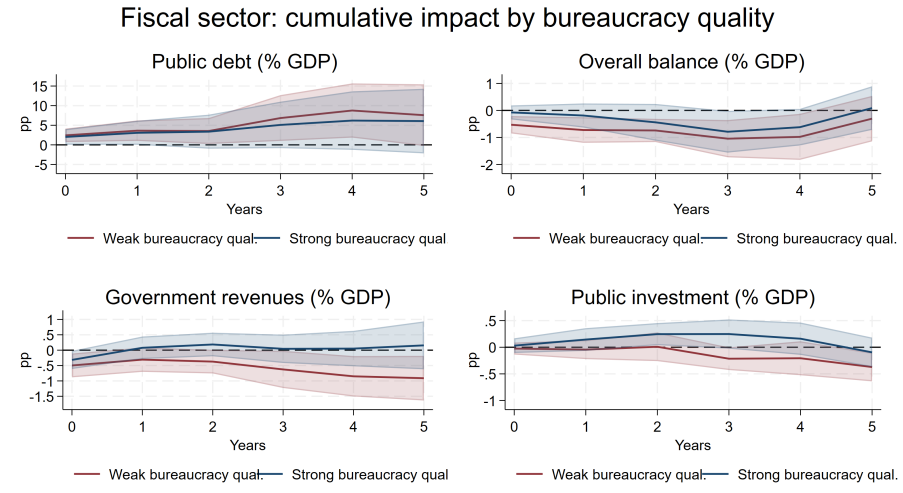
Notes: The figure reports cumulative local projection impulse responses to a one-standard-deviation positive foreign credit supply shock over horizons $h = 0, \ldots, 5$. Countries are split according to whether their pre-determined (1985–1995) country median of the ICRG Government Stability subindex is above or below the sample median. The panels show the responses of real GDP, total factor productivity, private investment, and private consumption. Variables measured in levels are reported as cumulative percentage-point changes relative to GDP, while variables estimated in logarithms are reported as cumulative percent deviations from the pre-shock level. Shaded areas denote 90 percent confidence intervals based on Driscoll–Kraay standard errors.
Sources: See Section 2.

Figure A.10: External-sector responses by government stability



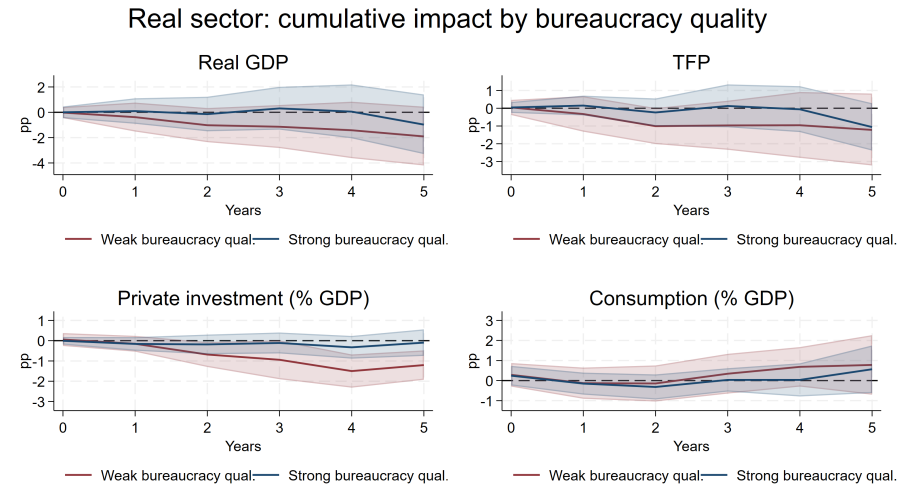
Notes: The figure reports cumulative local projection impulse responses to a one-standard-deviation positive foreign credit supply shock over horizons $h = 0, \ldots, 5$. Countries are split according to whether their pre-determined (1985–1995) country median of the ICRG Government Stability subindex is above or below the sample median. The panels show the responses of the current account balance, the real effective exchange rate (REER), exports, and imports. Shaded areas denote 90 percent confidence intervals based on Driscoll–Kraay standard errors.
Sources: See Section 2.

Figure A.11: Fiscal responses by bureaucracy quality



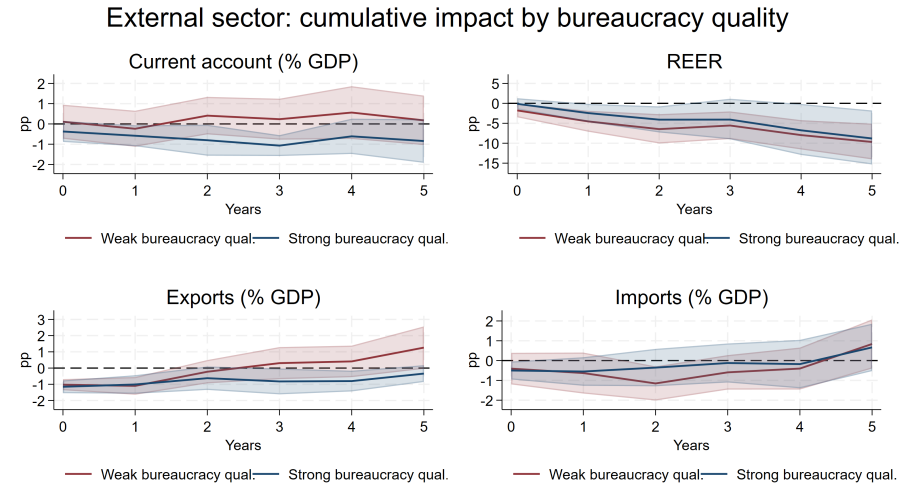
Notes: The figure reports cumulative local projection impulse responses to a one-standard-deviation positive foreign credit supply shock over horizons $h = 0, \ldots, 5$. Countries are split according to whether their pre-determined (1985–1995) country median of the ICRG Bureaucracy Quality subindex is above or below the sample median. The panels show the responses of the public debt ratio, the overall fiscal balance, government revenues, and public investment. Shaded areas denote 90 percent confidence intervals based on Driscoll–Kraay standard errors.
Sources: See Section 2.

Figure A.12: Real-sector responses by bureaucracy quality



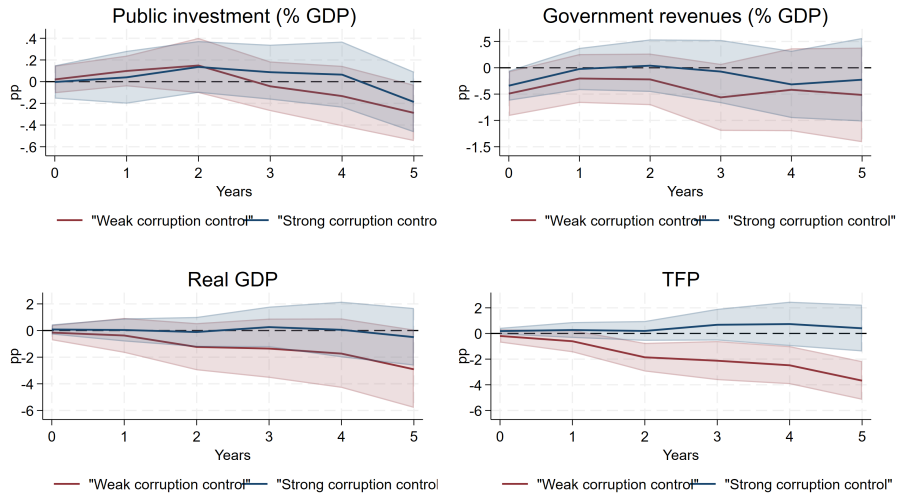
Notes: The figure reports cumulative local projection impulse responses to a one-standard-deviation positive foreign credit supply shock over horizons $h = 0, \ldots, 5$. Countries are split according to whether their pre-determined (1985–1995) country median of the ICRG Bureaucracy Quality subindex is above or below the sample median. The panels show the responses of real GDP, total factor productivity, private investment, and private consumption. Shaded areas denote 90 percent confidence intervals based on Driscoll–Kraay standard errors.
Sources: See Section 2.

Figure A.13: External-sector responses by bureaucracy quality



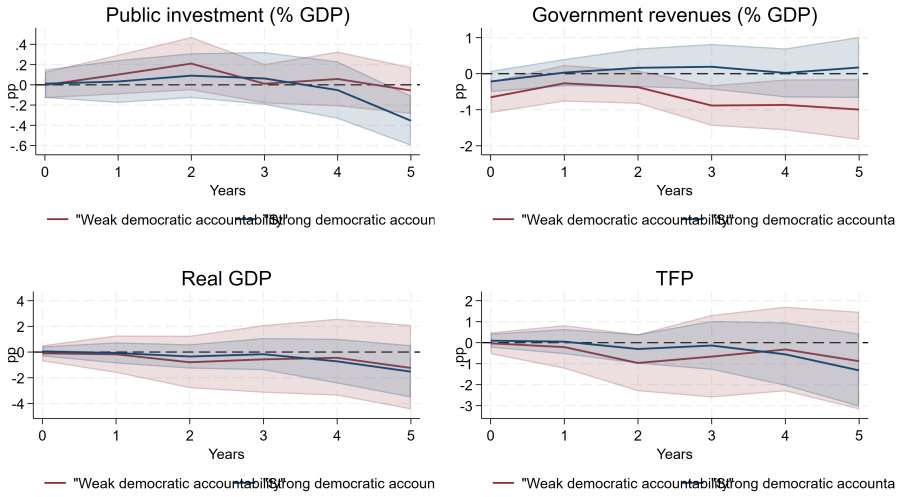
Notes: The figure reports cumulative local projection impulse responses to a one-standard-deviation positive foreign credit supply shock over horizons $h = 0, \ldots, 5$. Countries are split according to whether their pre-determined (1985–1995) country median of the ICRG Bureaucracy Quality subindex is above or below the sample median. The panels show the responses of the current account balance, the real effective exchange rate (REER), exports, and imports. Shaded areas denote 90 percent confidence intervals based on Driscoll–Kraay standard errors.
Sources: See Section 2.

Figure A.14: Macroeconomic responses by corruption control



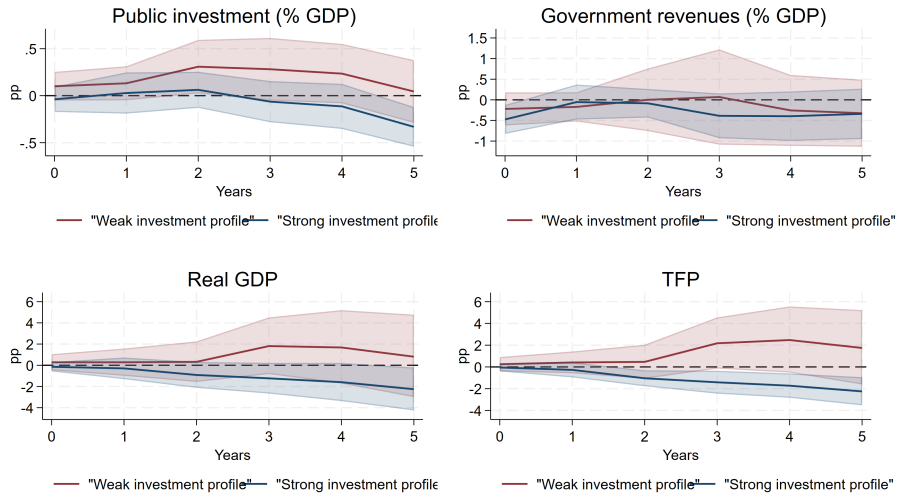
Notes: The figure reports cumulative local projection impulse responses to a one-standard-deviation positive foreign credit supply shock over horizons $h = 0, \ldots, 5$. Countries are split according to whether their pre-determined (1985–1995) country median of the ICRG Corruption subindex is above or below the sample median. Higher values of the subindex indicate stronger corruption control. The panels show the responses of public investment, government revenues, real GDP, and total factor productivity. Public investment and government revenues are expressed in percentage points of GDP; real GDP and total factor productivity are reported as cumulative percent deviations from the pre-shock level. Shaded areas denote 90 percent confidence intervals based on Driscoll–Kraay standard errors.
Sources: See Section 2.

Figure A.15: Macroeconomic responses by democratic accountability



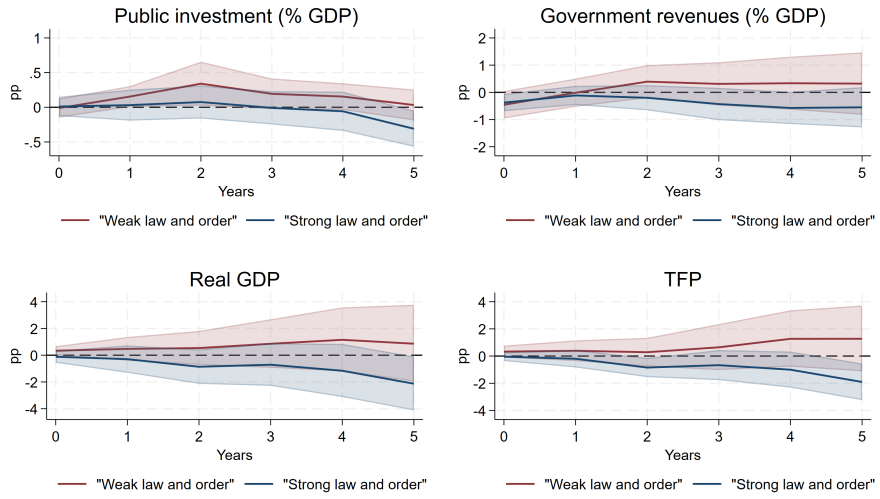
Notes: The figure reports cumulative local projection impulse responses to a one-standard-deviation positive foreign credit supply shock over horizons $h = 0, \ldots, 5$. Countries are split according to whether their pre-determined (1985–1995) country median of the ICRG Democratic Accountability subindex is above or below the sample median. Higher values of the subindex indicate stronger democratic accountability. The panels show the responses of public investment, government revenues, real GDP, and total factor productivity. Public investment and government revenues are expressed in percentage points of GDP; real GDP and total factor productivity are reported as cumulative percent deviations from the pre-shock level. Shaded areas denote 90 percent confidence intervals based on Driscoll–Kraay standard errors.
Sources: See Section 2.

Figure A.16: Macroeconomic responses by investment profile



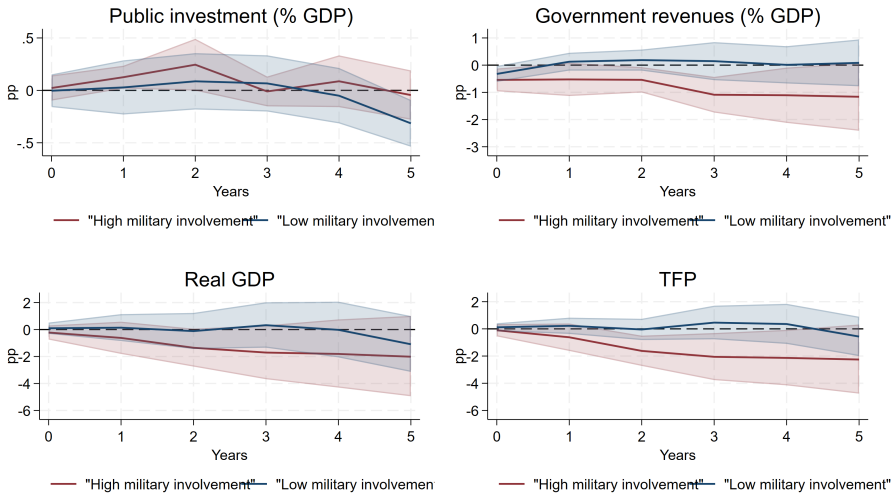
Notes: The figure reports cumulative local projection impulse responses to a one-standard-deviation positive foreign credit supply shock over horizons $h = 0, \ldots, 5$. Countries are split according to whether their pre-determined (1985–1995) country median of the ICRG Investment Profile subindex is above or below the sample median. Higher values of the subindex indicate a stronger investment profile. The panels show the responses of public investment, government revenues, real GDP, and total factor productivity. Public investment and government revenues are expressed in percentage points of GDP; real GDP and total factor productivity are reported as cumulative percent deviations from the pre-shock level. Shaded areas denote 90 percent confidence intervals based on Driscoll–Kraay standard errors.
Sources: See Section 2.

Figure A.17: Macroeconomic responses by law and order



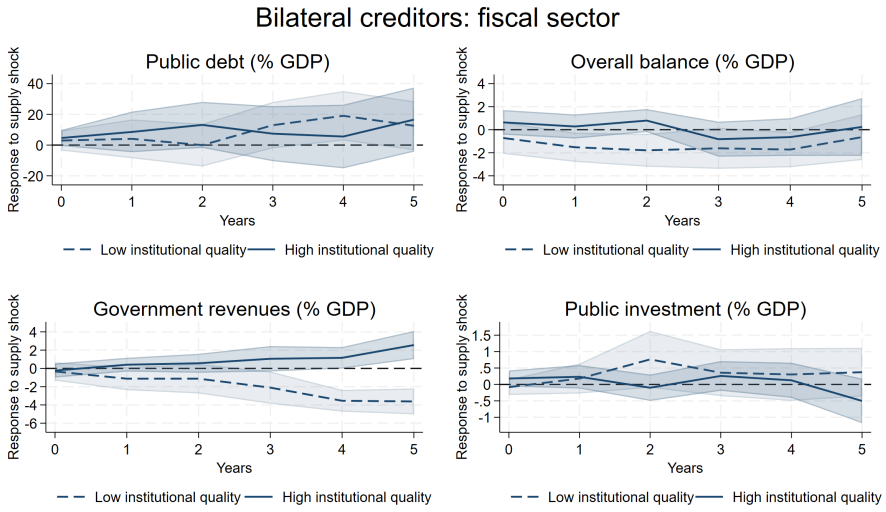
Notes: The figure reports cumulative local projection impulse responses to a one-standard-deviation positive foreign credit supply shock over horizons $h = 0, \ldots, 5$. Countries are split according to whether their pre-determined (1985–1995) country median of the ICRG Law and Order subindex is above or below the sample median. Higher values of the subindex indicate stronger law and order. The panels show the responses of public investment, government revenues, real GDP, and total factor productivity. Public investment and government revenues are expressed in percentage points of GDP; real GDP and total factor productivity are reported as cumulative percent deviations from the pre-shock level. Shaded areas denote 90 percent confidence intervals based on Driscoll–Kraay standard errors.
Sources: See Section 2.

Figure A.18: Macroeconomic responses by military involvement in politics



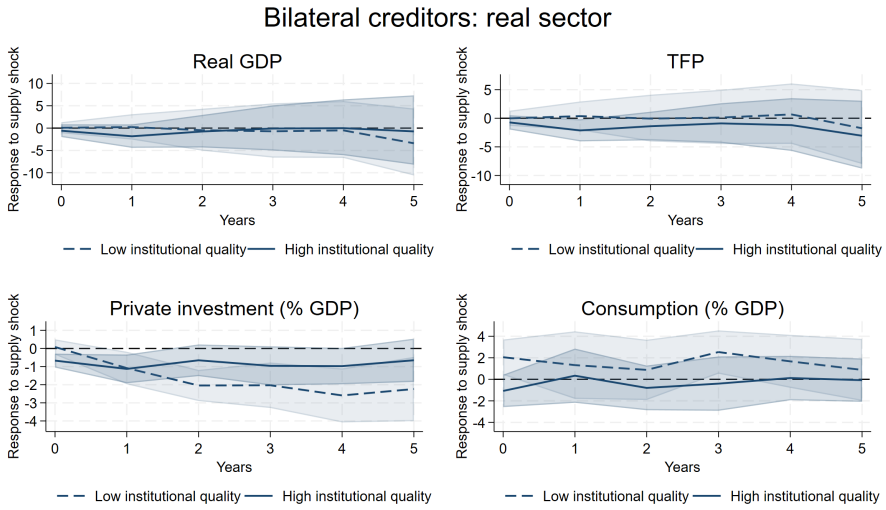
Notes: The figure reports cumulative local projection impulse responses to a one-standard-deviation positive foreign credit supply shock over horizons $h = 0, \ldots, 5$. Countries are split according to whether their pre-determined (1985–1995) country median of the ICRG Military in Politics subindex is above or below the sample median. Higher values of the subindex indicate lower military involvement in politics. The panels show the responses of public investment, government revenues, real GDP, and total factor productivity. Public investment and government revenues are expressed in percentage points of GDP; real GDP and total factor productivity are reported as cumulative percent deviations from the pre-shock level. Shaded areas denote 90 percent confidence intervals based on Driscoll–Kraay standard errors.
Sources: See Section 2.

Figure A.19: Fiscal-sector responses to bilateral credit supply shocks by institutional quality



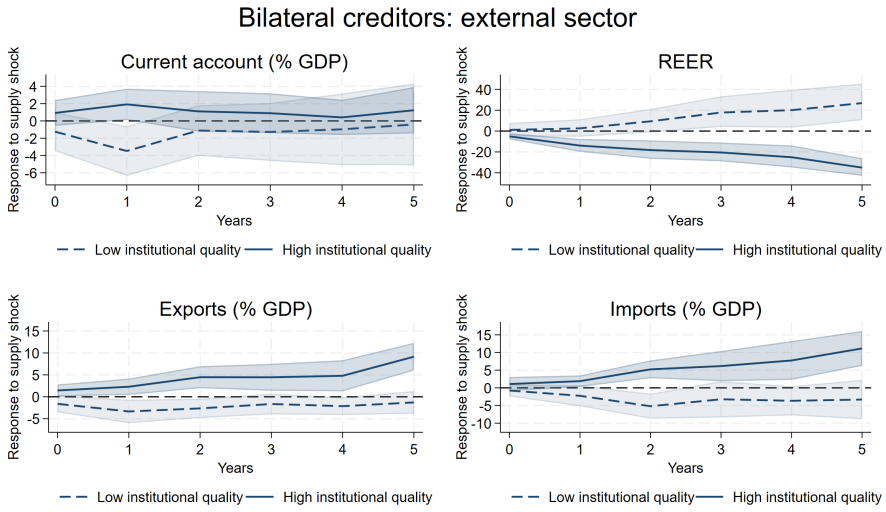
Notes: The figure reports cumulative local projection impulse responses to a positive bilateral credit supply shock over horizons $h = 0, \ldots, 5$, evaluated at low (-1.5 SD) and high ($+1.5$ SD) institutional quality. Institutional quality is measured by the standardized rolling five-year lagged average of the ICRG Political Risk Index. Bilateral, multilateral, and private credit supply shocks, as well as their interactions with institutional quality, are included jointly in the specification. Creditor-specific supply shocks are normalized by the standard deviation of the aggregate credit supply shock, allowing responses to equally sized supply innovations to be compared across creditor types. The panels show the responses of public debt, the overall fiscal balance, government revenues, and public investment. Shaded areas denote 90 percent confidence intervals based on Driscoll–Kraay standard errors.
Sources: See Section 2.

Figure A.20: Real-sector responses to bilateral credit supply shocks by institutional quality



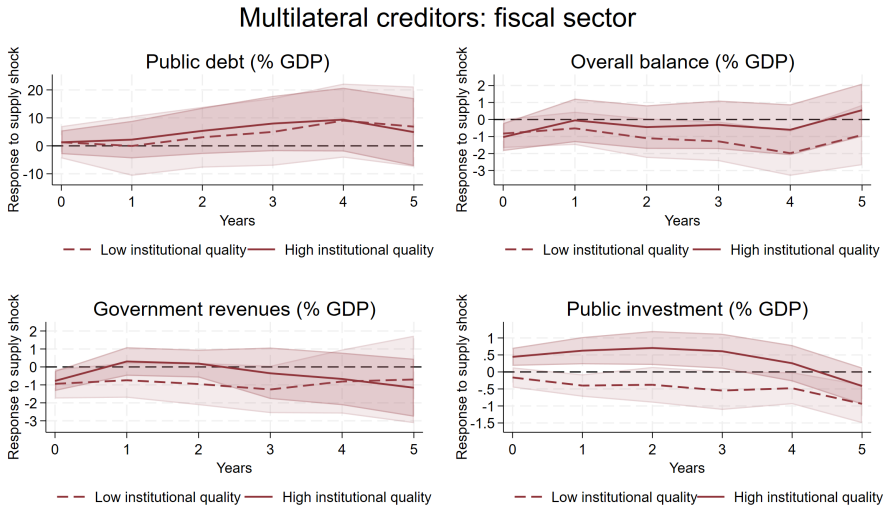
Notes: The figure reports cumulative local projection impulse responses to a positive bilateral credit supply shock over horizons $h = 0, \ldots, 5$, evaluated at low (-1.5 SD) and high ($+1.5$ SD) institutional quality. Institutional quality is measured by the standardized rolling five-year lagged average of the ICRG Political Risk Index. Bilateral, multilateral, and private credit supply shocks, as well as their interactions with institutional quality, are included jointly in the specification. Creditor-specific supply shocks are normalized by the standard deviation of the aggregate credit supply shock, allowing responses to equally sized supply innovations to be compared across creditor types. The panels show the responses of real GDP, total factor productivity (TFP), private investment, and consumption. Shaded areas denote 90 percent confidence intervals based on Driscoll–Kraay standard errors.
Sources: See Section 2.

Figure A.21: External-sector responses to bilateral credit supply shocks by institutional quality



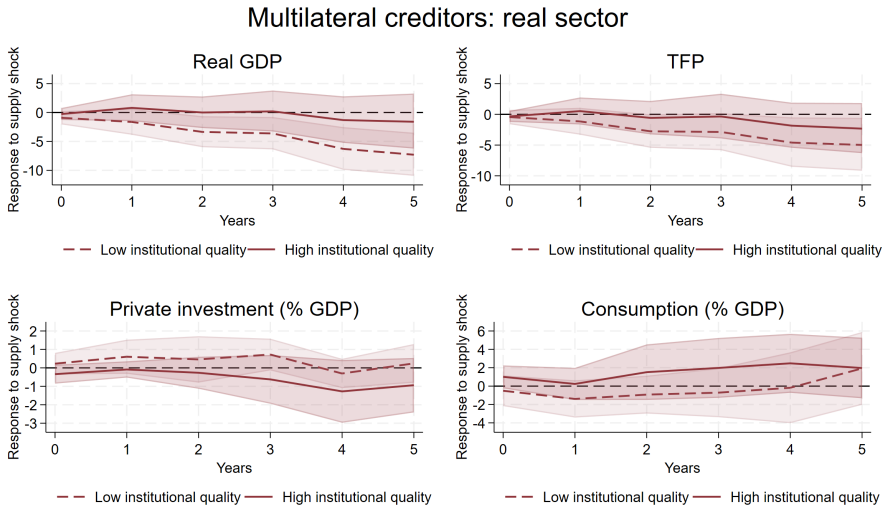
Notes: The figure reports cumulative local projection impulse responses to a positive bilateral credit supply shock over horizons $h = 0, \ldots, 5$, evaluated at low (-1.5 SD) and high ($+1.5$ SD) institutional quality. Institutional quality is measured by the standardized rolling five-year lagged average of the ICRG Political Risk Index. Bilateral, multilateral, and private credit supply shocks, as well as their interactions with institutional quality, are included jointly in the specification. Creditor-specific supply shocks are normalized by the standard deviation of the aggregate credit supply shock, allowing responses to equally sized supply innovations to be compared across creditor types. The panels show the responses of the current account balance, the real effective exchange rate (REER), exports, and imports. Shaded areas denote 90 percent confidence intervals based on Driscoll–Kraay standard errors.
Sources: See Section 2.

Figure A.22: Fiscal-sector responses to multilateral credit supply shocks by institutional quality



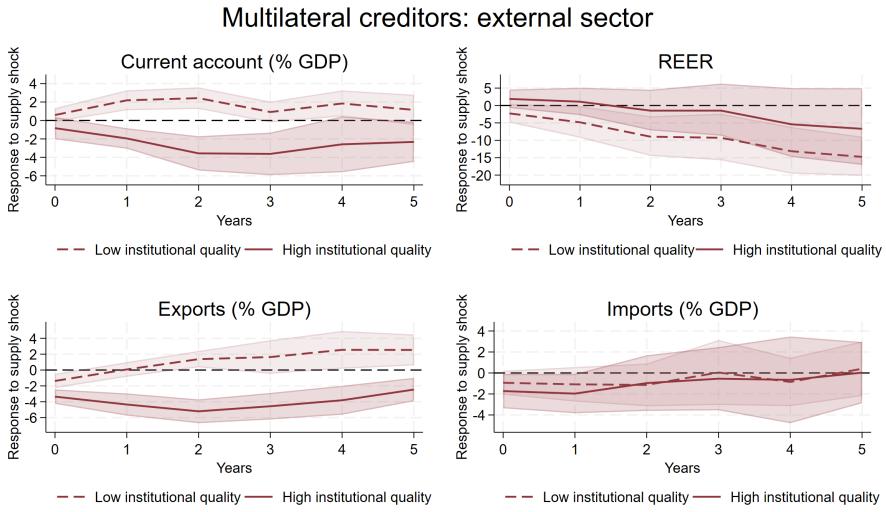
Notes: The figure reports cumulative local projection impulse responses to a positive multilateral credit supply shock over horizons $h = 0, \ldots, 5$, evaluated at low (-1.5 SD) and high ($+1.5$ SD) institutional quality. Institutional quality is measured by the standardized rolling five-year lagged average of the ICRG Political Risk Index. Bilateral, multilateral, and private credit supply shocks, as well as their interactions with institutional quality, are included jointly in the specification. Creditor-specific supply shocks are normalized by the standard deviation of the aggregate credit supply shock, allowing responses to equally sized supply innovations to be compared across creditor types. The panels show the responses of public debt, the overall fiscal balance, government revenues, and public investment. Shaded areas denote 90 percent confidence intervals based on Driscoll–Kraay standard errors.
Sources: See Section 2.

Figure A.23: Real-sector responses to multilateral credit supply shocks by institutional quality



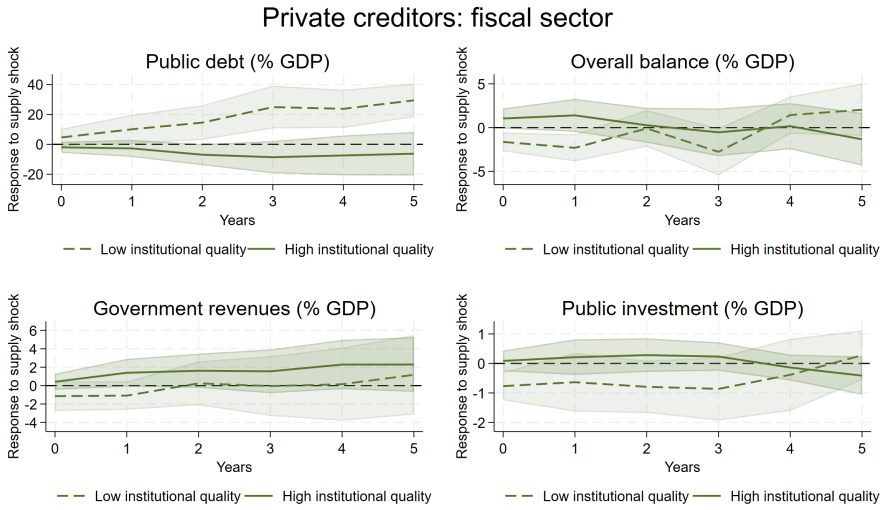
Notes: The figure reports cumulative local projection impulse responses to a positive multilateral credit supply shock over horizons $h = 0, \ldots, 5$, evaluated at low (-1.5 SD) and high ($+1.5$ SD) institutional quality. Institutional quality is measured by the standardized rolling five-year lagged average of the ICRG Political Risk Index. Bilateral, multilateral, and private credit supply shocks, as well as their interactions with institutional quality, are included jointly in the specification. Creditor-specific supply shocks are normalized by the standard deviation of the aggregate credit supply shock, allowing responses to equally sized supply innovations to be compared across creditor types. The panels show the responses of real GDP, total factor productivity (TFP), private investment, and consumption. Shaded areas denote 90 percent confidence intervals based on Driscoll–Kraay standard errors.
Sources: See Section 2.

Figure A.24: External-sector responses to multilateral credit supply shocks by institutional quality



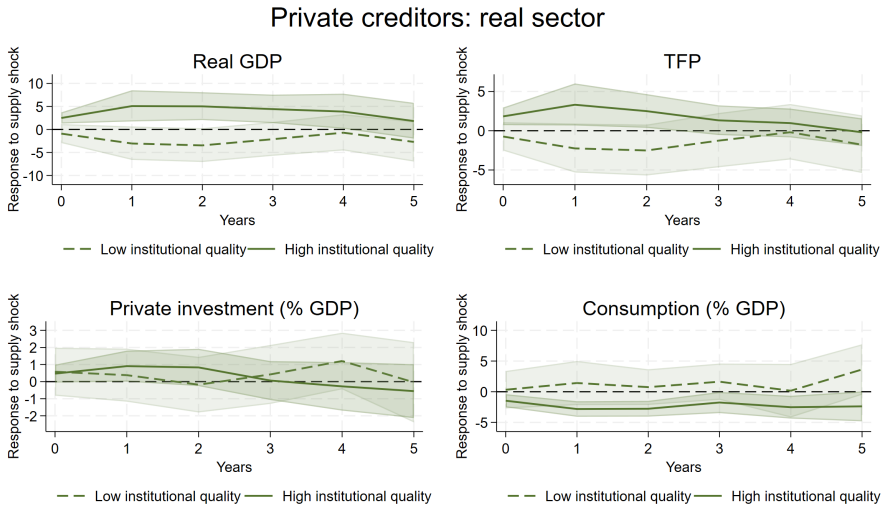
Notes: The figure reports cumulative local projection impulse responses to a positive multilateral credit supply shock over horizons $h = 0, \ldots, 5$, evaluated at low (-1.5 SD) and high ($+1.5$ SD) institutional quality. Institutional quality is measured by the standardized rolling five-year lagged average of the ICRG Political Risk Index. Bilateral, multilateral, and private credit supply shocks, as well as their interactions with institutional quality, are included jointly in the specification. Creditor-specific supply shocks are normalized by the standard deviation of the aggregate credit supply shock, allowing responses to equally sized supply innovations to be compared across creditor types. The panels show the responses of the current account balance, the real effective exchange rate (REER), exports, and imports. Shaded areas denote 90 percent confidence intervals based on Driscoll–Kraay standard errors.
Sources: See Section 2.

Figure A.25: Fiscal-sector responses to private credit supply shocks by institutional quality



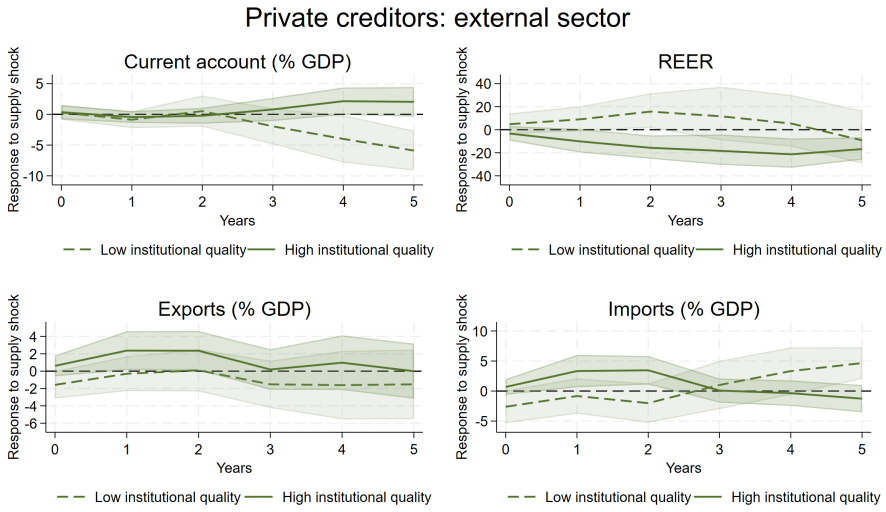
Notes: The figure reports cumulative local projection impulse responses to a positive private credit supply shock over horizons $h = 0, \ldots, 5$, evaluated at low (-1.5 SD) and high ($+1.5$ SD) institutional quality. Institutional quality is measured by the standardized rolling five-year lagged average of the ICRG Political Risk Index. Bilateral, multilateral, and private credit supply shocks, as well as their interactions with institutional quality, are included jointly in the specification. Creditor-specific supply shocks are normalized by the standard deviation of the aggregate credit supply shock, allowing responses to equally sized supply innovations to be compared across creditor types. The panels show the responses of public debt, the overall fiscal balance, government revenues, and public investment. Shaded areas denote 90 percent confidence intervals based on Driscoll–Kraay standard errors.
Sources: See Section 2.

Figure A.26: Real-sector responses to private credit supply shocks by institutional quality



Notes: The figure reports cumulative local projection impulse responses to a positive private credit supply shock over horizons $h = 0, \ldots, 5$, evaluated at low (-1.5 SD) and high ($+1.5$ SD) institutional quality. Institutional quality is measured by the standardized rolling five-year lagged average of the ICRG Political Risk Index. Bilateral, multilateral, and private credit supply shocks, as well as their interactions with institutional quality, are included jointly in the specification. Creditor-specific supply shocks are normalized by the standard deviation of the aggregate credit supply shock, allowing responses to equally sized supply innovations to be compared across creditor types. The panels show the responses of real GDP, total factor productivity (TFP), private investment, and consumption. Shaded areas denote 90 percent confidence intervals based on Driscoll–Kraay standard errors.
Sources: See Section 2.

Figure A.27: External-sector responses to private credit supply shocks by institutional quality



Notes: The figure reports cumulative local projection impulse responses to a positive private credit supply shock over horizons $h = 0, \ldots, 5$, evaluated at low (-1.5 SD) and high ($+1.5$ SD) institutional quality. Institutional quality is measured by the standardized rolling five-year lagged average of the ICRG Political Risk Index. Bilateral, multilateral, and private credit supply shocks, as well as their interactions with institutional quality, are included jointly in the specification. Creditor-specific supply shocks are normalized by the standard deviation of the aggregate credit supply shock, allowing responses to equally sized supply innovations to be compared across creditor types. The panels show the responses of the current account balance, the real effective exchange rate (REER), exports, and imports. Shaded areas denote 90 percent confidence intervals based on Driscoll–Kraay standard errors.
Sources: See Section 2.