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ABSTRACT

This dissertation studies how global financial conditions transmit to firms in emerging market economies and how the structure of borrowing and policy institutions shapes that transmission. Across two chapters, it develops and documents a constraint based view of international financial spillovers, emphasizing heterogeneity in financing contracts and the interaction between external shocks and domestic policy.

Chapter 1 examines how U.S. dollar appreciations affect firm investment when borrowing capacity depends on different forms of pledgeability. Firms that borrow against collateral face tighter credit conditions when the dollar strengthens because the local currency value of their balance sheet weakens, compressing borrowing limits tied to asset values. Firms that borrow against earnings are less exposed to this balance sheet channel, since their debt capacity depends on operating cash flows. Using bond level security data from LSEG SDC Platinum matched to firm financial statements from Worldscope for publicly listed non financial firms in emerging markets, I classify borrowing contracts as collateral based or earnings based. I show that when the dollar appreciates, investment declines among collateral based borrowers but remains stable for earnings based borrowers. Within the earnings based group, the decline in investment is smaller for firms with higher export intensity, consistent with revenue exposure mitigating the contractionary effect of global tightening. I also document shifts in contract composition toward earnings based borrowing during episodes of dollar strength. The aggregate impact of global financial shocks therefore depends on the distribution of constraint types and firm level exposure to foreign demand.

Chapter 2 studies how domestic capital controls alter corporate bond issuance and financing composition. Using cross country variation in the tightening and relaxation of capital flow management measures, the chapter shows that policy interventions reshape the debt structure of corporate borrowing. Capital controls affect not only the quantity of external finance but also the contractual form through which firms access funding. These policy in-

duced shifts interact with global dollar conditions to determine firms' exposure to external shocks.

Taken together, the two chapters show that international financial transmission operates through contract design and policy mediated financing margins. Global dollar cycles and domestic capital controls jointly shape the composition of borrowing constraints, and through them, the real responses of emerging market firms.

CHAPTER 1

DOLLAR MOVEMENTS, BORROWING CONSTRAINTS, AND FIRM INVESTMENT

1.1 Introduction

Global risk-premium shocks tighten external financing conditions worldwide and are typically accompanied by appreciations of the U.S. dollar. Such episodes are associated with contractions in real activity across emerging market economies (EMEs) (Rey, 2015; Miranda-Agrippino et al., 2020; Obstfeld et al., 2022; Jiang et al., 2024). Firms, however, do not face a uniform financial friction. Some borrow against tangible assets, tying borrowing capacity to collateral valuations; others borrow against operating revenues, linking credit availability to cash flows. Do these differences in types of borrowing matter for how the economy responds to global shocks? This is the question I address in this paper.

The nature of borrowing constraints has recently attracted renewed attention in both macroeconomics and corporate finance. Following the work of Kermani et al. (2020); Lian et al. (2021); Drechsel (2023), research has emphasized that collateral-based and earnings-based borrowing capture distinct mechanisms of financial amplification. *Collateral-based* borrowing secures repayment with tangible assets such as property, equipment, or receivables, making borrowing capacity sensitive to fluctuations in collateral valuations. *Earnings-based* borrowing, by contrast, relies on covenants tied to revenues or cash flows, linking credit access to operating performance. Building on this distinction, this paper examines how the composition of corporate borrowing shapes the transmission of global risk-premium shocks to firm investment, using movements in the U.S. dollar as an observable measure of such shocks.

When the dollar appreciates, signaling a tightening of global risk premia, it alters borrowing capacity through valuation and earnings channels that differ across firms. For firms that

borrow against collateral, a stronger dollar reduces the local-currency value of assets pledged as security. The resulting increase in loan-to-value ratios tightens collateral constraints and reduces credit availability. For firms that borrow against earnings, borrowing capacity depends instead on cash flows. If revenues are primarily domestic, dollar appreciations coincide with weaker local demand and lower earnings, tightening loan-to-earnings constraints. If revenues are dollar-linked, as in the case of exporters, earnings in local currency may rise, mitigating this effect. The overall transmission of the dollar shock to investment thus depends on the distribution of firms across constraint types and on the currency composition of their revenues.

These borrowing regimes are shaped not only by financial choice but also by legal and institutional foundations. Whether firms can borrow against earnings rather than collateral depends on the domestic framework that defines creditor rights and debt enforcement. Modern secured-transactions laws that recognize movable and future assets, together with reorganization-oriented insolvency regimes, enable cash-flow based lending by allowing creditors to claim and monitor revenue-generating assets. In contrast, weak creditor rights and liquidation-oriented regimes restrict lending to tangible collateral. This institutional heterogeneity provides the backdrop for the empirical classification and helps interpret cross-country variation in borrowing patterns.

The paper's central contribution is to open this contractual margin empirically. Using detailed security descriptions from LSEG's SDC Platinum database, I classify each bond issue as *collateral-based* if repayment is backed by identifiable assets (e.g., real estate, receivables, inventories) or as *earnings-based* if repayment relies on operating cash flows. These classifications are rolled forward to the firm–quarter level using maturity information, identifying the binding constraint on a firm's outstanding debt. This procedure extends Lian et al. (2021) from domestic U.S. loans to international bond markets, enabling a systematic decomposition of corporate borrowing constraints across EMEs. By combining this classification with

quarterly financial statements from Worldscope Fundamentals and macro-financial indicators from the IMF, BIS, and World Bank for 2001–2019, I construct a novel firm-quarter panel that links the structure of corporate borrowing to firms' investment responses to global risk-premium shocks.

The empirical analysis relates these firm-level classifications to movements in a trade-weighted U.S. dollar index against major advanced-economy currencies, which I interpret as an observable proxy for global risk-premium shocks. Since this index captures broad shifts in external financing conditions that are largely orthogonal to individual firm behavior, it provides a common external state across EMEs. I estimate within-firm regressions of investment on dollar movements interacted with borrowing-constraint type, controlling for firm, country–time, and sector–time fixed effects. Coefficients are interpreted as conditional differences in slopes across constraint types—summarizing how borrowing regimes mediate exposure to global financial tightening—rather than as causal effects of the shocks themselves.

Three empirical patterns emerge. *First*, when the dollar appreciates, investment declines for collateral-based firms but remains unchanged for earnings-based firms. The difference in response, around seventeen percent of the mean investment rate per one-standard-deviation dollar appreciation, is economically meaningful and statistically significant. *Second*, within the earnings-based group, the decline in investment is smaller for firms with higher export intensity, consistent with their earnings being more closely aligned with dollar movements. In contrast, collateral-based firms experience larger declines in investment when the dollar appreciates, consistent with falling collateral valuations. *Third*, the composition of new borrowing shifts toward earnings-based debt during dollar appreciations, indicating substitution away from asset-backed issuance when collateral values weaken. These patterns are observed within countries and sectors after absorbing rich fixed effects, suggesting that the basis of borrowing organizes heterogeneity in exposure to a common external state.

By documenting these patterns, the paper unifies two views of financial transmission.

The traditional *balance-sheet channel* emphasizes how declines in collateral values tighten credit constraints, while the emerging *earnings channel* highlights how cash-flow-based borrowing depends on firms' revenue performance. I show that both channels operate simultaneously across firms within EMEs, and that the economy's composition of collateral- versus earnings-based borrowers conditions the overall sensitivity of investment to global risk-premium shocks.

Literature Review: A large literature studies how global financial shocks transmit to firm behavior through external finance. This paper connects three strands of that work: corporate bond finance in emerging markets, the global dollar cycle, and the contract architecture of borrowing constraints, and combines them with insights from dominant-currency pricing and heterogeneous investment dynamics.

Corporate bond finance in EMEs. Non-financial corporates in emerging market economies have increasingly relied on bond markets as a source of external finance (McCauley et al., 2015). Access to bond finance is concentrated among larger firms and has measurable effects on investment and growth (Didier et al., 2014; Cortina et al., 2018). Research on denomination and currency composition highlights limits to local-currency issuance and links corporate risk to debt structure (Hale et al., 2020; Du et al., 2022; Eichengreen et al., 2005; Goldstein et al., 2004). While this work emphasizes the currency of debt, I instead focus on the *contract form*—whether repayment is secured by assets or by earnings capacity— and show that this dimension governs how common external shocks affect investment.

Global dollar cycle and spillovers. Movements in the U.S. dollar index capture broad shifts in global financial conditions. Rey (2015) and Bruno et al. (2015b) show that U.S. policy and global risk factors drive co-movements in credit and asset prices through banks' balance sheets. Subsequent work using identified shocks traces spillovers to credit spreads and capital flows in EMEs (Miranda-Agrippino et al., 2020; Avdjiev et al., 2019; Obstfeld

et al., 2022; Banerjee et al., 2020). Related research on high-frequency monetary policy shocks documents similar spillovers from U.S. policy innovations to foreign activity (Cloyne et al., 2018; Nakamura et al., 2018). Building on this evidence, I use innovations in a broad dollar index as common financial shocks and study how heterogeneity in contract type shapes the cross-firm investment response.

Borrowing constraints: collateral versus earnings. Classic theories emphasize collateral, cash flow, and net worth as the foundations of external finance (Fazzari et al., 1987; Kiyotaki et al., 1997; Bernanke et al., 1999). In emerging markets, models of external tightening highlight balance-sheet amplification and currency-mismatch dynamics (Krugman, 1999; Aghion et al., 2001; Lorenzoni, 2008; Khan et al., 2013). Recent empirical work documents that many corporate borrowers operate under earnings-based covenants rather than asset pledges (Lian et al., 2021). Models and evidence show that these two constraint types transmit shocks differently (Greenwald, 2019; Drechsel, 2023; Nini et al., 2009; Nini et al., 2012; Chaney et al., 2012). More recent work on cross-border finance links firm-level exposure to foreign-investor funding and constraint sensitivity (Liu, 2024). My contribution is to map borrowing constraints at the firm level for a rich panel of multiple EMEs. Using this mapping, I quantify how investment sensitivity to dollar shocks varies across them.

Dominant-currency pricing and revenues. A related body of work studies how export revenues comove with the dollar under dominant-currency pricing (Gopinath et al., 2020; Boz et al., 2020; Amiti et al., 2014). I use this mechanism to interpret why exporters on earnings-based contracts may experience a looser effective constraint when the dollar appreciates, even holding real export quantities fixed. This interaction between export intensity and contract form provides a testable source of heterogeneity within the earnings-based group.

Investment heterogeneity under tightening. Empirical research shows that financial tightening reduces investment unevenly across firms depending on balance-sheet strength and access to credit (Bleakley et al., 2008; Hardy, 2023; Caglio et al., 2021). I extend this het-

erogeneity to the public bond market in EMEs and show that contract form—rather than currency denomination alone— explains which firms cut investment when the global dollar strengthens.

This paper bridges macro-financial and micro-contract perspectives by linking the global dollar cycle to firm-level financing modes. While Drechsel (2023) and Lian et al. (2021) show that earnings-based and collateral-based constraints transmit shocks differently, their analyses focus on domestic loan markets—primarily in the United States. I extend this framework to the international bond market in emerging economies and demonstrate that the composition of corporate borrowing across these constraint types accounts for the heterogeneous investment responses to global dollar appreciations. By linking issuance documentation to firm-quarter financing modes, the paper moves beyond aggregate flows and identifies how contract architecture governs real adjustment within emerging-market corporate bond finance. To the best of my knowledge, this is the first study to document this mechanism in international bond data.

Roadmap. The remainder of the paper proceeds as follows. Section 1.2 defines the borrowing regimes and shows how these are constructed using bond issuance data. Section 1.3 describes the institutional setting in the countries employed in the analysis. Section 2.2 describes the construction of panel data. Section 1.5 discusses the transmission mechanism of dollar appreciations followed by empirically testing these in Section 1.6. Section 1.7 discusses robustness and extensions, Section 1.8 discusses policy implications and Section 1.9 concludes.

1.2 Borrowing Constraints: Concept and Measurement

Firms obtain external finance under different contractual arrangements that specify what limits borrowing capacity. Some contracts secure repayment with tangible assets, tying

credit availability to collateral valuations. Some contracts base repayment on operating revenues or cash flows, linking borrowing to the firm's earnings performance. I refer to these contract types as *collateral-based* and *earnings-based* borrowing, respectively.

All borrowing-constraint measures in this paper are constructed from the *public bond market*. Bank loans and other private liabilities are not observed. The earnings-based (EB) versus collateral-based (CB) distinction should therefore be viewed as a descriptive classification within *corporate bond finance*, not a decomposition of firms' total debt.

The distinction concerns the contractual basis for lending rather than an intrinsic characteristic of the firm. A given firm may issue multiple securities under different terms, but at any point in time its outstanding debt can be described by the mix of collateral-based and earnings-based contracts it holds. In the empirical analysis, I classify firm–quarters according to this composition, identifying firms that borrow *mostly on collateral*, *mostly on earnings*, or through a *mix of both*.

1.2.1 Conceptual distinction

Borrowing contracts vary in the basis on which creditors extend credit and in the mechanisms that secure repayment. Two broad regimes capture these differences.

Collateral-based debt is lending tied to the value of identifiable, tangible assets—such as property, equipment, receivables, or inventories—that can be separately valued and liquidated in default. Access to this credit depends on the market value of those assets and on the legal ability of creditors to seize and sell them. Since enforcement relies on asset liquidation, such lending is common in asset-intensive sectors and in legal environments that emphasize collateral recovery.

Earnings-based debt, also termed *cash-flow-based* or *performance-based* lending, links borrowing capacity to the borrower's ongoing ability to generate earnings rather than to spe-

cific asset values. These contracts rely on financial covenants and coverage tests based on EBITDA, leverage, or interest ratios and are monitored through periodic financial disclosures. Importantly, as Kermani et al. (2020) emphasize, the distinction between earnings- and collateral-based lending is conceptually distinct from that between unsecured and secured lending. Creditors may obtain security either against discrete assets (asset-based debt) or against the going-concern value of the firm (cash-flow-based debt secured by blanket liens). Both can be legally "secured," but they differ in the *economic basis of repayment*: asset-based credit depends on liquidation values, while earnings-based credit depends on continued performance and creditor control through covenants or liens on overall firm value.

These two regimes therefore differ along two key dimensions: (i) the *valuation basis* that determines borrowing capacity: asset value versus operating cash flows, and (ii) the *control and enforcement mechanism*: repossession of assets versus monitoring of covenant performance or operational control. Collateral-based credit links borrowing to the market value of assets, whereas earnings-based credit links it to the going-concern value of the firm.

1.2.2 Classification in bond data

To operationalize these categories, I classify bond contracts using security-level descriptions from LSEG SDC Platinum. For each bond tranche, SDC reports descriptive fields.[1] I harmonize these text fields and apply deterministic keyword rules to identify whether repayment is tied to specific collateral or to firm-wide cash flows and covenants. The classification follows the approach in Lian et al. (2021), adapted to bond documentation.

Tranches are coded as *collateral-based* (C) when descriptions contain explicit claims on discrete assets or asset pools— for example, "secured by property", "pledge of receivables", or "mortgage-backed." Tranches are coded as *earnings-based* (E) when documentation refers to senior notes, debentures, or obligations supported by coverage ratios or leverage covenants.

1. I specifically use values from these variables: `SECURITY`, `ASSETTYPE`, and `DESCRIPTION`

This mapping identifies the *basis of repayment* rather than the formal legal security status: a tranche labeled "secured" may still be classified as earnings-based if the security refers to blanket liens over all assets or to covenants tied to operating cash flow. Appendix A.1.2 provides full keyword lists used for debt classification.

1.2.3 From tranches to firm–quarter exposures

Firms may issue multiple tranches within a quarter or maintain several bonds outstanding at different maturities. I aggregate issuance to the firm–quarter level and construct both issuance *flows* and outstanding *stocks*. For each firm i and quarter t,

$$f_{it}^{E} = \sum_{\ell \in \mathcal{L}_{it}^{E}} \text{proceeds}_{\ell}, \qquad f_{it}^{C} = \sum_{\ell \in \mathcal{L}_{it}^{C}} \text{proceeds}_{\ell},$$

where $\mathcal{L}_{it}^{j}$ indexes tranches of type $j \in \{E, C\}$ priced in quarter t.

Since bond level amortization schedules are not observed, I approximate outstanding stocks by cumulating past issuance with a common survival rate inferred from observed maturities, in the spirit of Greenwood et al. (2010).

$$D_{it}^{j} = (1 - \rho^{j}) D_{i,t-1}^{j} + f_{it}^{j}, \qquad j \in \{E, C\}$$

where $\rho^{j} = \exp\big(-\ln\big(2/H^{j}\big)\big)$ and H^{j} denotes the mean remaining life (in quarters) of bonds of type j. The parameter ρ^{j} therefore represents the fraction of principal that typically remains outstanding from one quarter to the next, based on the empirical maturity profile of all bonds of that type. In practice, I compute H^{C} and H^{E} from the distribution of contractual maturities across collateral- and earnings-based tranches in the full sample, and apply the corresponding ρ^{j} uniformly across firms. This procedure produces a smooth approximation of the outstanding stock without requiring detailed amortization schedules for each bond.

A tranche is treated as outstanding from its pricing quarter until stated maturity. I assign a borrowing-constraint type at the start of each quarter ($t-1$), ensuring that exposure is predetermined with respect to contemporaneous shocks. A firm–quarter is labeled *earnings-based* if only cash-flow-based bonds are outstanding and *collateral-based* if only asset-backed bonds are outstanding. When both types remain active, the operative constraint is determined by a *last-issue rule*: the type of the most recent still-outstanding bond is taken as binding. Firm–quarters with no bonds outstanding form a third category, labeled *no-debt*, used in descriptive summaries but excluded from regressions that condition on having market debt. Robustness exercises instead (i) restrict the sample to exclusive quarters or (ii) use a continuous collateral-exposure share, $\sigma_{it} = \frac{D^C_{i,t-1}}{D^E_{i,t-1}+D^C_{i,t-1}}$

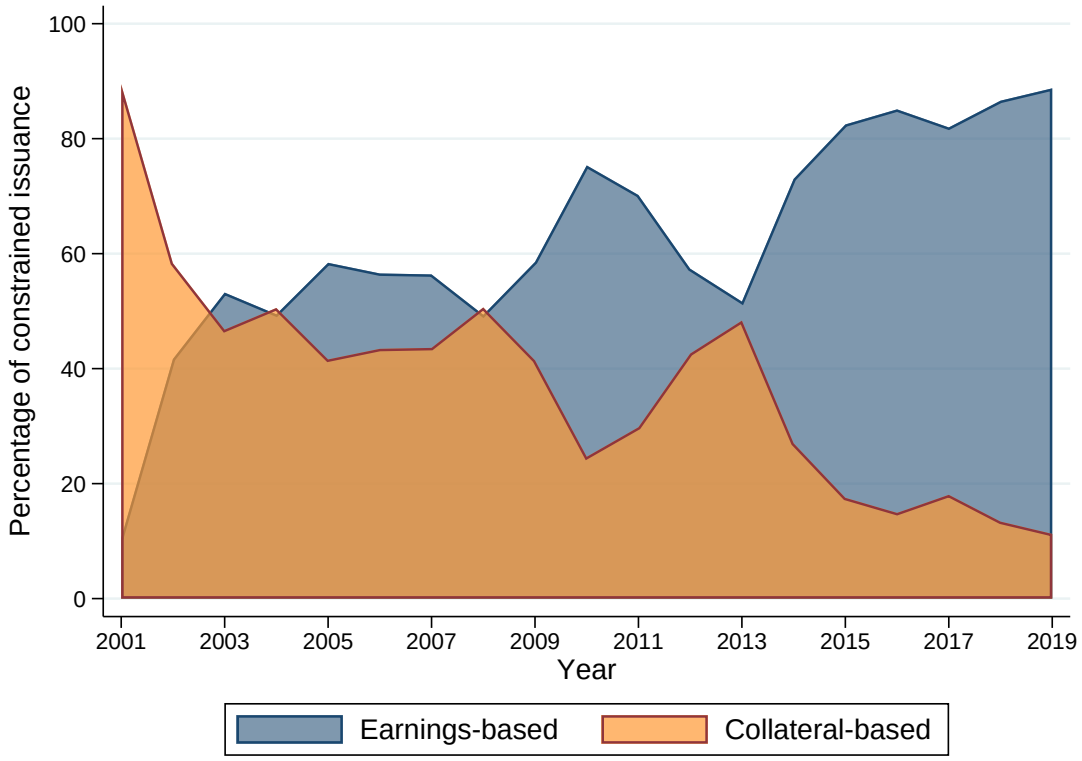
1.2.4 Descriptive patterns

This section documents how the composition of corporate borrowing evolves over time, across countries, and across sectors. Two time-varying measures are used. The first, based on *issuance flows*, captures firms' current borrowing choices in each quarter. The second, based on *outstanding debt stocks*, summarizes the composition of existing liabilities, which adjusts more gradually with maturities. A third, static measure aggregates issuance histories over the sample period to describe long-run cross-sectional differences across firms. Detailed construction of all measures is provided in Appendix A.1.2.

Issuance flows. The flow measure reflects the contractual basis of new borrowing at the firm–quarter level. For firm i in quarter t, let f^E_{it} and f^C_{it} denote the proceeds of earnings-based and collateral-based issues. Define the indicators $1(f^E_{it} > 0)$ and $1(f^C_{it} > 0)$, which take value 1 when a firm issues debt of that type. Since most firms issue only one type of bond within a quarter, these indicators capture the binding financing regime contemporaneous with global shocks. Figure 1.1 plots the share of constrained firm–quarters classified as

earnings- or collateral-based.[2] Earnings-based issuance accounts for about twenty percent of firm–quarters in the early 2000s and rises to nearly eighty percent by 2019. This flow-based measure corresponds directly to the firm–quarter classification used in the baseline regressions that relate investment to global financial shocks interacted with borrowing type.

Figure 1.1: Share of earnings-based and collateral-based issuance (flows) over time.



Notes: The figure shows the share of constrained firm–quarters classified by the contractual basis of new bond issuance. A firm–quarter is labeled earnings-based if it issued only earnings-based bonds in that quarter, and collateral-based if it issued only asset-backed bonds. Shares are computed from all firm–quarters with new issuance in the main regression sample (2001–2019).

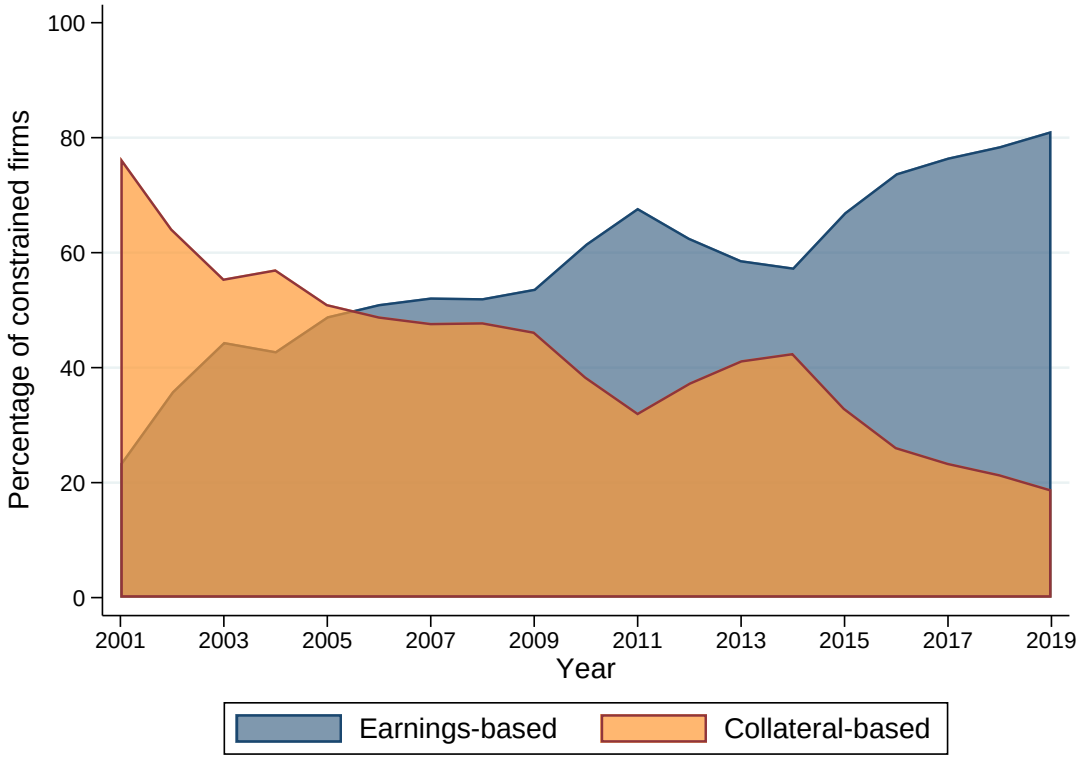
Outstanding debt stocks. Figure 1.2 reports the same shares computed from outstanding debt rather than new issuance. For each firm i and quarter t, outstanding earnings– and

2. Share of constrained firm–quarters (i,t) classified as earnings- or collateral-based:

$$\omega_t^E = \frac{\#\{i : 1(f_{it}^E > 0)\}}{\#\{i : (1(f_{it}^E > 0) + 1(f_{it}^C > 0)) > 0\}}, \qquad \omega_t^C = \frac{\#\{i : 1(f_{it}^C > 0)\}}{\#\{i : (1(f_{it}^E > 0) + 1(f_{it}^C > 0)) > 0\}}.$$

collateral–based debt ($D^E_{i,t-1}, D^C_{i,t-1}$) are constructed from issuance flows and contractual maturities as described in Section 1.2.3. A firm–quarter is classified as *earnings–based* when only earnings–based bonds are outstanding, *collateral–based* when only asset–backed bonds are outstanding, and *mixed* when both types remain active. For illustration, mixed cases are not shown in the trends plot. While flows fluctuate more strongly with global conditions, the stock composition evolves slowly. Switching between regimes is infrequent over short horizons, consistent with the persistence in financing structures and the multi-year maturity of bonds.(Table A.1.3).

Figure 1.2: Share of earnings-based and collateral-based debt (stock) over time.



Notes: The figure reports the share of constrained firm–quarters classified by the contractual basis of their outstanding debt. A firm–quarter is labeled earnings–based if only earnings–based bonds are outstanding at $t-1$, and collateral–based if only asset-backed bonds are outstanding. Observations with both types outstanding are excluded. Shares are computed from the panel of firm–quarters in the main regression sample (2001–2019).

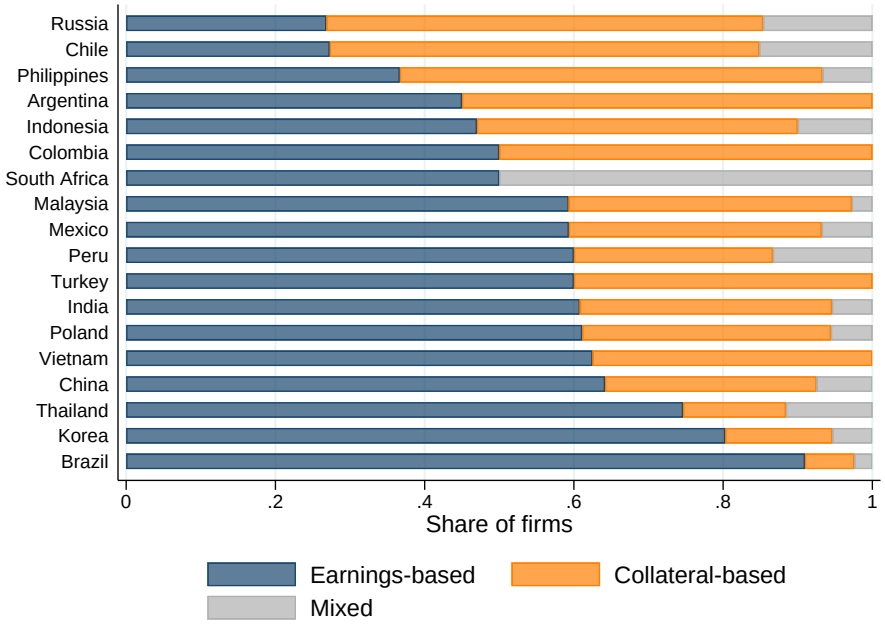
Cross-sectional composition. Figures 1.3a–1.3b show the long-run distribution of borrowing types across countries and sectors. For each firm, the lifetime share of collateral-based issuance in total proceeds is computed, and firms are classified as mostly earnings-based if this share is below 40 percent, mostly collateral-based if above 60 percent, and mixed otherwise. These firm-level classifications are then aggregated by country and sector to illustrate institutional and technological differences in borrowing structures. At the country level, earnings-based borrowing dominates in most EMEs, while collateral-based credit remains more common in economies with weaker creditor-rights regimes and in asset-intensive sectors such as energy and transportation.

Together, these patterns highlight two dimensions of heterogeneity that motivate the empirical analysis. First, most issuing firms borrow under a single contractual regime in a given quarter, allowing the use of flow-based indicators to study how global financial shocks affect investment. Second, borrowing structures evolve slowly and differ systematically across countries and sectors, reflecting the interaction between contractual design and institutional environment.

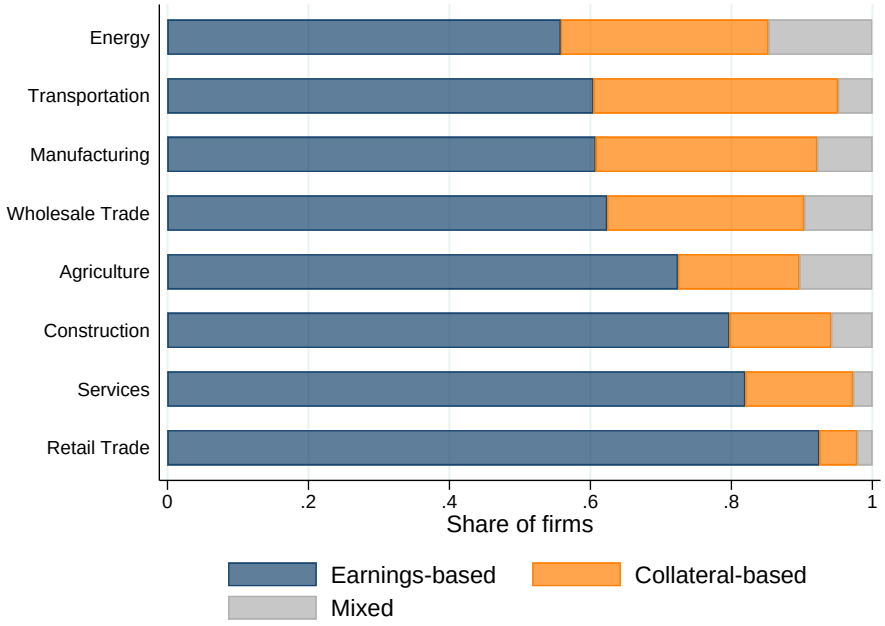
Link to institutional setting: The prevalence of earnings- versus collateral-based borrowing varies widely across economies. This variation reflects differences in the legal and institutional frameworks that determine how creditors can create and enforce security interests. In particular, bankruptcy regimes and secured-transactions laws shape whether lenders can extend credit against future income or must rely on tangible collateral. The next section documents these institutional environments across the eighteen sample economies and shows how cross-country differences in creditor-rights frameworks align with the observed composition of borrowing constraints.

Figure 1.3: Share of earnings-based and collateral-based firms

(a) Share of earnings-based and collateral-based firms by country.



(b) Share of earnings-based and collateral-based firms by sector.



Notes: The figures report the composition of firms by borrowing-constraint type across countries (Panel A) and sectors (Panel B). See Appendix A.1.2 for details.

1.3 Institutional Setting

The feasibility of borrowing against assets or earnings depends critically on the legal environment that governs creditor rights and debt enforcement. Two components of domestic law are central: the *secured-transactions framework*, which determines how security interests are created and enforced ex ante, and the *insolvency regime*, which determines how competing claims are resolved ex post. Together, these institutions define whether lenders can credibly extend credit against future income or must rely on tangible collateral as security. This section summarizes these legal foundations across the eighteen emerging-market economies in the sample and quantifies differences using the World Bank's *Strength of Legal Rights Index* (SLRI).

1.3.1 Legal foundations

Secured-transactions law specifies what forms of collateral can be pledged and how those claims are registered and enforced. In weak frameworks, creditors can take security only over physical, tangible assets, such as land, buildings, or equipment, and must rely on judicial proceedings for enforcement. Such environments limit the feasibility of cash-flow-based lending, so borrowing is predominantly asset-based. By contrast, modern secured-transactions systems permit non-possessory security interests, recognize movable and future assets such as receivables and inventory, and allow out-of-court enforcement through unified collateral registries. These features enable lending based on the firm's operating cash flows and going-concern value, supporting earnings-based or cash-flow-based borrowing.

The insolvency regime interacts with these rules by shaping creditor recovery once a borrower becomes distressed. Reorganization-oriented systems—such as those in Brazil, Mexico, Chile, and South Africa—allow firms to continue operating under court supervision and renegotiate debt while preserving going-concern value. Liquidation-oriented systems—such

as those in China, India, Indonesia, and Turkey—emphasize asset seizure and sale, reinforcing reliance on tangible collateral. Hybrid regimes (e.g., Korea, Malaysia, Thailand) fall in between. Appendix Table A.1.6 provides detailed country summaries.

1.3.2 Creditor rights and borrowing modes

The World Bank's SLRI provides a comparable measure of secured-transactions law across countries. The index, ranging from 0 (weak protection) to 12 (strong protection), summarizes whether laws permit non-possessory security interests, cover movable and future assets, provide unified collateral registries, and allow out-of-court enforcement. Higher SLRI values indicate environments in which creditors can lend against receivables, inventory, and other future cash-flow–generating assets rather than being limited to physical collateral.

Table 1.1 reports SLRI scores in 2004 and 2019 and the period average. Average values range from around 3 in Argentina, Brazil, and the Philippines, where secured lending remains confined to tangible assets, to nearly 9 in Malaysia and Poland, where modern frameworks permit floating liens and non-possessory claims on movable and future assets. Mid-range economies such as India, Russia, and Vietnam (averages around 7–8) have introduced important reforms, such as India's 2016 Insolvency and Bankruptcy Code and Russia's post-2014 modernization of movable-collateral registries, but enforcement remains uneven.

Figure 1.3a plots the composition of borrowing constraints by country. Earnings-based exposure dominates in several economies with moderately strong legal frameworks—such as Vietnam, Thailand, and Korea, while collateral-based exposure is more prevalent in others with low SLRI values, such as Russia, Chile, and the Philippines. These cross-country patterns are consistent with institutional variation but not perfectly monotonic. The point to note is that the figure reflects the composition of *public bond issuers*, a subset of large, listed firms able to issue covenant-based or unsecured bonds even in weaker legal environments. Conversely, in strong-rights countries with deep capital markets, the public bond segment

includes many asset-backed programs, which mechanically raise the share of collateral-based debt. In sum, the legal framework defines the range of feasible contract forms, whereas the observed mix in bond markets depends on which firms issue publicly and on domestic market structure.

Figure 1.4 traces the joint evolution of earnings-based borrowing (solid green line, left axis) and the Strength of Legal Rights Index (SLRI, dashed red line, right axis) for each country in the sample. The figure shows that increases in SLRI, interpreted as reforms that strengthen creditor rights, tend to coincide with increases in the share of earnings-based borrowing. In countries such as Colombia, Mexico, and Peru, the rise in SLRI after mid-2000s is followed by a visible upward shift in earnings-based financing, while in countries with declining SLRI scores such as Malaysia or South Africa, the earnings-based share remains flat or falls.

1.3.3 Empirical validation

To quantify this association, I estimate within-country regressions of the change in the earnings-based borrowing share on changes in the SLRI:

$$\Delta \text{share}_{ct}^{EB} = \gamma \, \Delta SLRI_{ct} + \alpha_c + \varepsilon_{ct}.$$

The estimated coefficient $\hat{\gamma} = 0.026$ (s.e. 0.010, $p-$value=0.018, errors clustered by country) implies that a one-point SLRI increase raises the earnings-based share by roughly 2.6 percentage points. An event-time specification around the first reform year shows flat pre-trends and a persistent post-reform increase (Figure A.1.4). These results validate the interpretation of the SLRI as an institutional measure of the feasibility of earnings-based borrowing and illustrate how legal modernization has shifted corporate financing patterns in emerging markets.

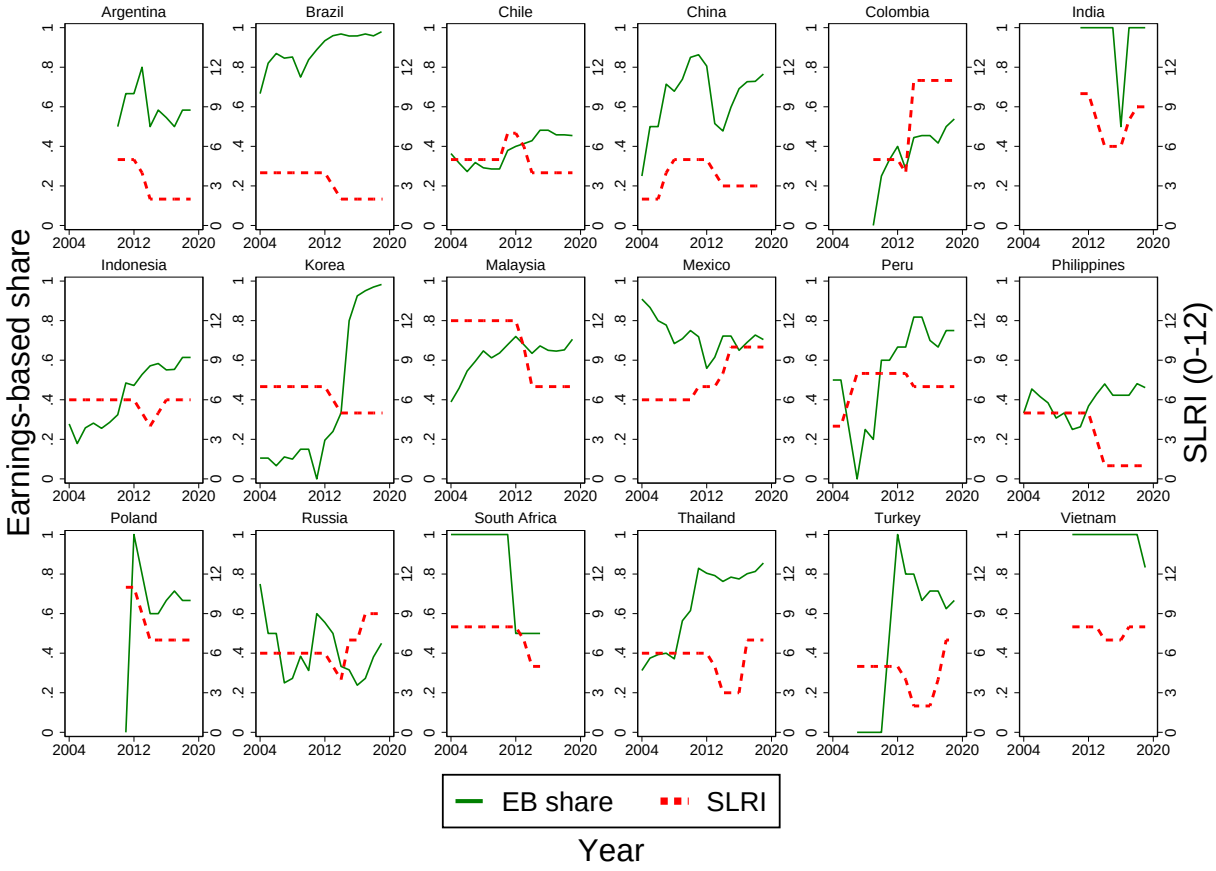
Table 1.1: Creditor Rights and Legal Frameworks in EMEs

Country	SLRI (2004)	SLRI (2019)	Average (2004–2019)
Argentina	5	2	3.81
Brazil	4	2	3.19
Chile	5	4	4.94
China	2	3	3.56
Colombia	5	11	7.19
India	7	9	8.38
Indonesia	6	6	5.75
Korea	7	5	6.19
Malaysia	12	7	10.00
Mexico	6	10	7.56
Peru	4	7	7.13
Philippines	5	1	3.38
Poland	10	7	9.06
Russia	6	9	6.50
South Africa	8	5	6.81
Thailand	6	7	5.56
Turkey	5	7	4.56
Vietnam	6	8	7.44

Notes: The table reports the World Bank *Strength of Legal Rights Index* (SLRI) for each sample economy in 2004, 2019, and the period average. The SLRI ranges from 0 to 12, with higher values indicating stronger secured-transactions and insolvency frameworks that facilitate the use of movable assets and future income as collateral. Data are from the World Bank *Doing Business* database. The index is available from 2004 onward, limiting the sample period for institutional comparisons.

Legal frameworks thus provide the institutional foundation for the two borrowing regimes defined earlier. Stronger secured-transactions laws and reorganization-oriented insolvency procedures make earnings-based borrowing feasible by allowing creditors to claim and monitor cash-flow–generating assets and by preserving going-concern value in distress. Where legal rights are weaker and enforcement depends on asset seizure, collateral-based lending dominates. In the bond-issuer sample, observed cross-country differences reflect both these institutional constraints and the composition of firms that access public debt markets. This institutional heterogeneity motivates the empirical analysis that follows, which examines how firms operating under different borrowing constraints respond to global dollar shocks.

Figure 1.4: Evolution of earnings-based borrowing and legal rights by country.



Notes: Each panel plots the share of earnings-based firms (solid green line, left axis, 0–1) and the World Bank *Strength of Legal Rights Index* (SLRI, dashed red line, right axis, 0–12) for one country. The earnings-based share is computed among constrained firms in the main regression sample. Higher SLRI values indicate stronger secured-transactions and insolvency frameworks. Upward movements in the SLRI, reflecting creditor-rights reforms, generally coincide with increases in the prevalence of earnings-based borrowing. The timeline is restricted to 2004–2019, corresponding to the period for which the SLRI is available.

1.4 Panel Data

With the institutional foundations in place, I now describe the firm-level data used to analyze how borrowing constraints shape firms' responses to global dollar shocks. The analysis combines bond-issuance data from LSEG SDC Platinum, financial statements from Worldscope Fundamentals Quarterly, and macro-financial indicators from IMF IFS, BIS, and the World Bank. These sources are linked at the firm–quarter level to construct a panel of publicly listed non-financial firms across eighteen emerging-market economies from 2001 to 2019. The

data allow me to map the conceptual distinction between *earnings-based* and *collateral-based* borrowing into observable security characteristics and to relate these borrowing modes to firms' real outcomes.

1.4.1 Sources and sample construction

Financial statements: Firm-level financial data are drawn from the Worldscope Fundamentals Quarterly database[3], including variables on capital expenditures, assets, liabilities, revenues, leverage, and profitability.[4] To supplement missing quarterly items and access variables only reported annually (e.g., exports), I additionally use the Worldscope Annual Fundamentals dataset. I exclude financial firms (SIC 6000–6999) because their funding is primarily deposits and their liability structures are different from the non-financial corporates.

Linkage to issuance records: Issuer entities in SDC are linked to Worldscope parents using ISIN, CUSIP, or SEDOL where available. When identifiers are missing or inconsistent, I use standardized name matching with manual verification. The mapping aligns issuance at the consolidated parent level so that financing and investment are measured on the same reporting perimeter. The resulting panel contains 2,173 firms across 18 EMEs and 84,353 firm–quarters. Table A.1.1 reports coverage by country and sector.[5]

Macroeconomic Controls: Country-level covariates include real GDP growth rate, CPI inflation, short-term interest rates, and bilateral exchange rates against dollar (LC/USD)

3. The data, both SDC and Worldscope, are accessed via WRDS.

4. Report dates are aligned to calendar quarters using fiscal period end dates.

5. Sectors follow the firm's primary SIC code grouped into ten broad categories: (1) agriculture, forestry, and fishing; (2) energy/mining; (3) construction; (4) manufacturing; (5) transportation, communications, and utilities; (6) wholesale trade; (7) retail trade; (8) finance, insurance, and real estate; (9) services; (10) public administration. The analysis excludes sectors 8 and 10.

sourced from IMF IFS, BIS, and World Bank. In addition to country macro controls, I also include two global stance variables to isolate the dollar component from broader financial conditions: (i) the change in ANFCI (Adjusted National Financial Conditions Index), which summarizes risk, credit, and leverage conditions adjusted for the business cycle so that higher values indicate tighter financial conditions; and (ii) the change in the U.S. shadow policy rate to capture the stance of U.S. monetary policy, especially at the effective lower bound (Wu et al., 2016). Including these two variables prevents the dollar index from proxying for general global tightening or U.S. policy shocks.

1.4.2 Global Dollar Movements as Risk-Premium Shocks

The empirical analysis treats fluctuations in the global value of the U.S. dollar as shifts in the world risk premium faced by emerging-market borrowers. A stronger dollar typically coincides with tighter global financial conditions, capital outflows from emerging markets, and an increase in the required return on risky assets (e.g., Bruno et al. (2015a); Alfaro et al. (20190); Rey (20150); Kalemli-Özcan (20190)). In this sense, dollar appreciations are interpreted as observable realizations of a global financial tightening—an increase in the shadow price of dollar funding that affects the external finance premium of non-U.S. firms.

The shock is measured as the quarterly log change in the nominal U.S. Dollar Index (UDI) against major advanced-economy currencies—euro area, Canada, Japan, the United Kingdom, Switzerland, Australia, and Sweden:

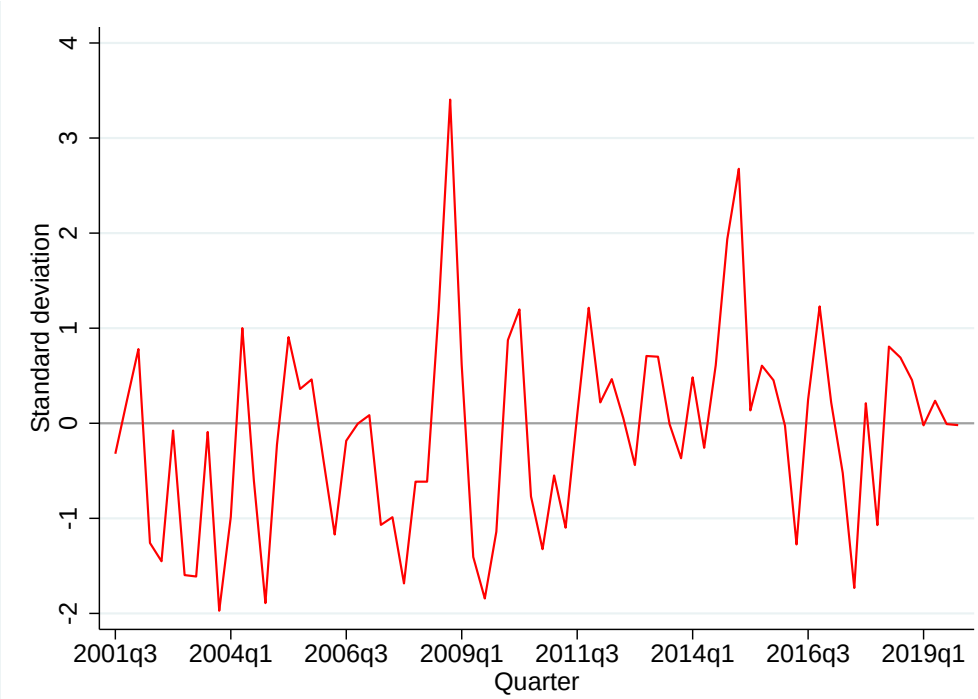
$$\Delta s_t^{\$} = \log(\mathrm{UDI}_t) - \log(\mathrm{UDI}_{t-1}),$$

so that $\Delta s_t^{\$} > 0$ denotes a global dollar appreciation. Defining the index only against advanced-economy currencies limits mechanical feedback from EME conditions and preserves the interpretation of $\Delta s_t^{\$}$ as an exogenous global factor. For regression analysis, $\Delta s_t^{\$}$ is

standardized to zero mean and unit variance over the sample so that coefficients can be interpreted in standard-deviation units. Figure 1.5 shows the standardized series.

Empirically, the index closely tracks bilateral LC/USD changes across EMEs, as shown in Figure 1.6, making it a parsimonious measure of common dollar movements.[6] As a robustness check, I replace the dollar index with the change in VIX and Excess Bond Premium as the measure of risk premium shocks (Section 1.7).

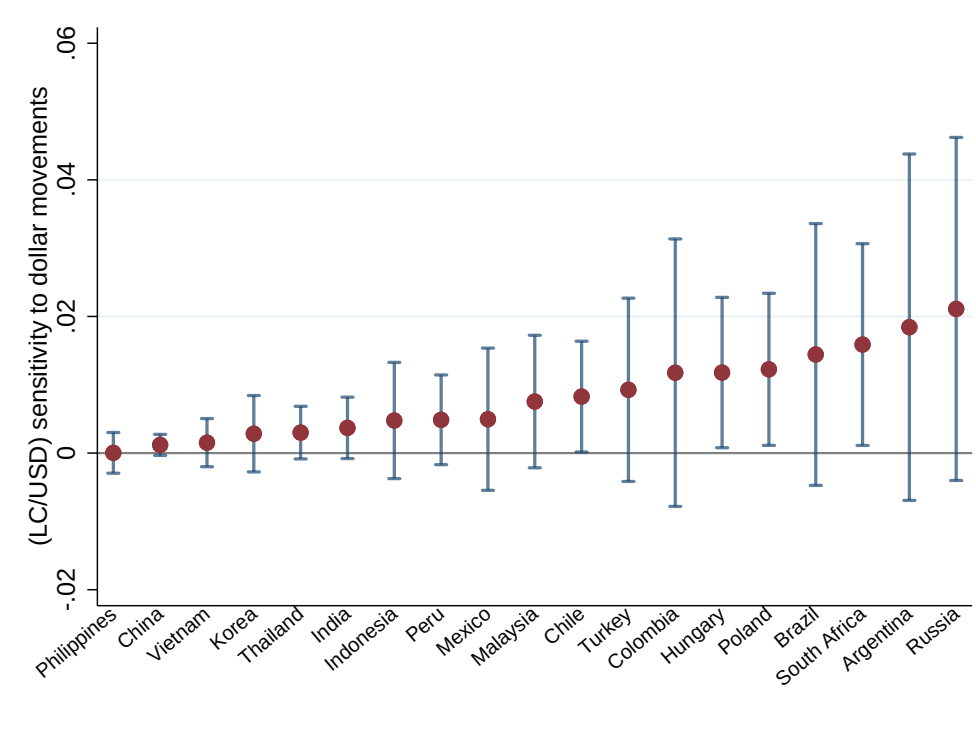
Figure 1.5: Standardized global dollar movements



Notes: The figure plots quarterly changes in the U.S. dollar index against a basket of advanced-economy currencies, standardized to have zero mean and unit variance over the sample period. Positive values indicate global dollar appreciations. The series captures broad movements in global financial conditions that are exogenous to individual emerging-market economies.

6. Figure 1.6 reports country-level elasticities from regressions of $\Delta \log e_{ct}$ on $\Delta s_t^{\$}$; coefficients are positive for nearly all countries, indicating that a higher UDI corresponds to local-currency depreciation. See also Obstfeld et al. (2022).

Figure 1.6: Country-level sensitivity of local currencies to global dollar movements



Notes: The figure reports country-specific coefficients from regressions of quarterly changes in the local currency–U.S. dollar exchange rate on standardized global dollar movements, controlling for time fixed effects ($\Delta \log(LC/USD)_{c,t} = \alpha_c + \alpha_t + \beta_c \Delta s_t^{\$} + \epsilon_{ci,t}$). Bars show estimated sensitivities with 95% confidence intervals. Larger coefficients denote currencies that depreciate more strongly when the global dollar appreciates, reflecting higher external exposure to dollar fluctuations.

1.4.3 Firm Characteristics by Constraint Type

Table 1.2 compares firm characteristics across the two borrowing-constraint types for firms in the regression sample. As in standard in the corporate finance literature, flow variables are normalized by lagged assets and stock variables are normalized by contemporaneous assets. Variables are winsorized at the 1st–99th percentiles within the analysis sample.[7]

Earnings-based firms are on average larger and hold more liquid assets, but their balance sheets are less tangible and they undertake lower investment relative to collateral-based firms. They also hold higher debt relative to earnings measured by EBITDA (Earnings Before Interest, Taxes, Depreciation, and Amortization). Collateral-based firms, in turn,

7. Refer Table A.1.4 for detailed variable definitions.

display higher tangibility, profitability, and investment intensity—patterns consistent with their reliance on pledgeable assets to secure credit. Differences in leverage and export intensity are small, suggesting that the two groups are otherwise comparable along observable balance-sheet dimensions.

Table 1.2: Firm Characteristics by Borrowing-Constraint Type

Variable	**Mean (EB)**	**Mean (CB)**	**Diff**	**t-stat**	**p-val**	**N(EB)**	**N(CB)**
Size (log Assets)	21.56	21.28	0.28	16.67	0.00	25,787	12,219
Market capitalization (log)	20.95	20.75	0.20	10.81	0.00	25,207	11,869
Profitability (ROA, pp)	4.87	5.44	-0.57	-8.76	0.00	25,787	12,219
Leverage (Debt/Assets)	0.36	0.35	0.00	3.05	0.00	25,787	12,219
Liquidity (Cash/Current Assets)	0.14	0.13	0.01	3.71	0.00	25,787	12,219
Tangibility (Net PPE/Assets)	0.33	0.39	-0.06	-23.37	0.00	25,729	12,205
Investment (CAPEX/L.Assets, pp)	1.26	1.47	-.22	-11.27	0.00	25,787	12,219
Export intensity (Foreign Sales/Total Sales)	0.18	0.21	-0.03	-8.16	0.00	22,515	9,747
EBITDA/L.Assets	0.10	0.12	-0.01	-14.03	0.00	20,896	9,843
Debt/EBITDA	4.01	3.28	0.72	5.86	0.00	20,904	9,856

Notes: The table reports firm-level averages of key financial characteristics by borrowing-constraint type—earnings-based (EB) and collateral-based (CB)—and Welch t-tests for differences in means. "Diff" is EB − CB. Each variable is first averaged over a firm's sample period and winsorized at the 1st–99th percentiles within the analysis sample. Borrowing-constraint type is determined by the contractual basis of outstanding debt at $t-1$; firms may switch type when they refinance, though such switches are infrequent. Following standard corporate-finance practice, flow variables are normalized by lagged total assets and stock variables by contemporaneous total assets. All p-values are two-sided.

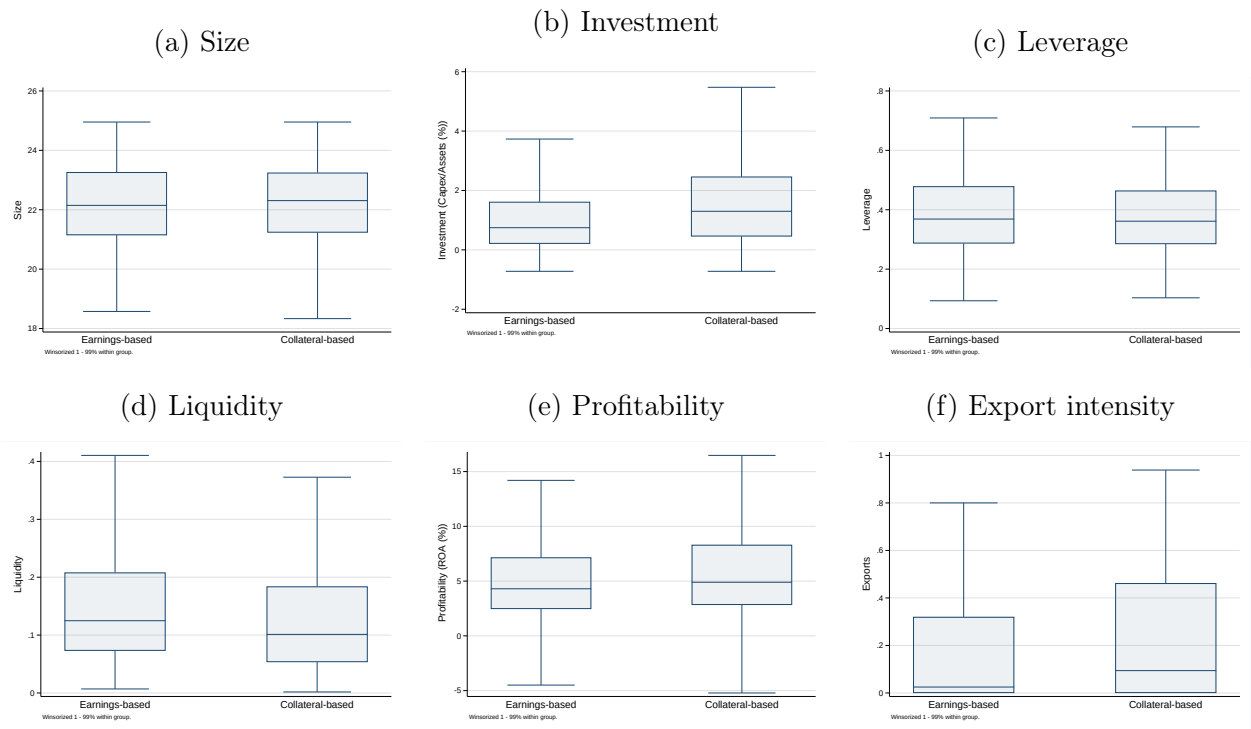
These cross-sectional patterns align with the interpretation of the constraint labels. Firms that issue collateral-based debt tend to be more capital-intensive and asset-rich, making it feasible for them to borrow against physical collateral. Firms that issue earnings-based debt are typically larger, more diversified, and more cash-flow oriented, enabling them to borrow on the basis of operating revenues rather than asset values.

Figure 1.7 illustrates the corresponding distributions for size, leverage, liquidity, profitability, investment, and export intensity. The figure shows the box medians and inter-quartile ranges[8], with whiskers at the 10th and 90th percentiles. The broad overlap in distributions indicates that, while balance-sheet composition differs along tangibility and profitability, the two groups are otherwise comparable in size and leverage. This mitigates

8. The inter-quartile range is the difference between the 75th and 25th quartiles.

concerns that subsequent differences in investment responses to dollar movements merely reflect mechanical compositional differences in observables.

Figure 1.7: Firm characteristics by borrowing-constraint type.



Notes: Box plots compare firm characteristics across borrowing-constraint types—earnings-based and collateral-based—within the main regression sample. Variables include size, leverage, liquidity, profitability (p.p.), investment (p.p.), and export intensity. Each variable is winsorized at the 1st–99th percentiles. Borrowing-constraint type is determined by the contractual basis of outstanding debt at $t-1$. Following standard corporate-finance practice, flow variables are normalized by lagged total assets and stock variables by contemporaneous total assets. Boxes show the interquartile range (25th–75th percentile), horizontal lines denote medians, and whiskers indicate the 10th and 90th percentiles. Remaining variables from Table 1.2 are plotted in Appendix Figure A.1.3.

The resulting dataset combines security-level issuance information with firm balance sheets to measure borrowing-constraint exposure at the firm–quarter level. The stock-based indicator of debt type captures whether a firm's outstanding debt is predominantly collateral- or earnings-based at the start of each quarter, providing a predetermined measure of financing structure. Together with standardized dollar shocks and comprehensive macro controls, these data allow me to test the paper's central prediction: that global risk-premium shocks, proxied by dollar appreciations, have systematically different effects on investment depending

on the binding borrowing constraint.

Building on these firm-level balance-sheet characteristics, I now outline how a dollar appreciation ($\Delta s_t > 0$) alters borrowing capacity under each constraint type through its effects on collateral values, earnings, and net worth.

1.5 Transmission Mechanisms of Dollar Appreciations

A dollar appreciation corresponds to an increase in the price of the U.S. dollar in terms of domestic currency ($\Delta s > 0$), implying that one dollar buys more units of local currency. Such movements, which proxy global financial tightening, affect firms' borrowing capacity through both valuation effects and general-equilibrium adjustments. Three ratios summarize the relevant constraints:

1. Loan-to-Value (LTV)= $\frac{\text{Debt } (D^C)}{\text{Collateral Value } (V^C)}$
2. Loan-to-Earnings (LTE) = $\frac{\text{Debt } (D^C)}{\text{Earnings } (E^C)}$
3. Net Worth-to-Assets (NW/A) = $\frac{\text{Net Worth}}{\text{Total Assets}}$

where C is the currency of measurement: U.S. dollars (USD) or local currency (LC).

Dollar appreciations influence these ratios through linked channels: the exchange rate, domestic asset prices, local demand, and global demand. The sign and strength of these channels depend on the contractual basis of borrowing: collateral versus earnings, and on the currency composition of assets, liabilities, and revenues.

Collateral-based borrowing: For firms that borrow against tangible assets, borrowing capacity depends on collateral valuations relative to debt. When debt is denominated in dollars and collateral consists of domestic assets priced in local currency, a dollar appreciation lowers the dollar value of collateral one-for-one, while the dollar value of liabilities is

unchanged. The loan-to-value ratio therefore rises,

$$LTV^{USD} = \frac{D^{USD}}{V^{LC}/(1+\Delta s)} \uparrow,$$

tightening collateral constraints and reducing access to external finance.

If debt is instead denominated in local currency, there is no direct mechanical effect from the exchange rate. However, dollar appreciations are typically accompanied by tighter global financial conditions, capital outflows from emerging markets, and a rise in local credit spreads. These forces depress domestic asset prices, lowering collateral values even in local-currency terms:

$$LTV^{LC} = \frac{D^{LC}}{V^{LC}} \uparrow \quad \text{if } \frac{dV^{LC}}{d\Delta s} < 0.$$

Hence, collateral-based borrowers experience tighter constraints under both debt currencies—directly through valuation and indirectly through domestic-asset repricing.

Earnings-based borrowing: For firms whose borrowing limits depend on operating cash flows rather than asset values, constraints take the form

$$B_{it} \leq \phi_E E_{it},$$

where E_{it} denotes earnings in local currency. If a dollar appreciation coincides with weaker domestic demand or tighter credit conditions, earnings fall, raising the loan-to-earnings ratio and tightening credit access. This is the general-equilibrium channel operating through local demand and credit availability.

Among earnings-based firms with dollar-linked revenues, typically exporters, local-currency earnings may rise mechanically as dollar revenues translate into more domestic

currency per unit of sales. The loan-to-earnings ratio can therefore decline,

$$LTE^{LC} = \frac{D^{LC}}{E^{LC}} \downarrow,$$

partially offsetting the contractionary effect of tighter global conditions. Whether credit constraints ultimately tighten or relax depends on the relative strength of the valuation gain versus the decline in global demand for exports.

Net worth and balance-sheet effects: Each of these mechanisms also affects firms' net worth,

$$NW = \text{Assets} - \text{Liabilities},$$

For dollar borrowers, liabilities are fixed in dollar terms while assets are largely domestic, so a dollar appreciation reduces net worth in dollar terms and raises leverage (measured in dollars), tightening firms' external financing constraints. For exporters with dollar-denominated revenues or assets, this deterioration is muted or reversed, since their cash flows and asset values co-move with the dollar. Net worth measured relative to total assets thus falls more for collateral-based, dollar-indebted firms and less for exporters with earnings-based borrowing.

The combined effect of these channels implies heterogeneous investment responses to dollar appreciations. Collateral-based borrowers face tighter constraints as collateral values fall in both dollar and local-currency terms. Earnings-based borrowers relying on domestic sales experience weaker cash flows and reduced credit access. Exporters with dollar-linked earnings are relatively insulated, as the currency valuation of revenues offsets part of the global-demand contraction. The empirical analysis in Section 1.6.1 tests these implications by interacting global dollar shocks with firm-level borrowing-constraint type, while controlling for country–time and sector–time conditions that capture aggregate demand and financial spillovers.

1.6 Empirical Strategy

This section empirically tests how dollar appreciations transmit to firm outcomes through heterogeneous borrowing constraints. The analysis proceeds in four steps.

Section 1.6.1 estimates the heterogeneous impact of dollar appreciations on firm investment across constraint types, establishing the baseline real effect. Section 1.6.2 tests whether dollar appreciations erode net worth and tangible capital specifically for collateral-based firms, as implied by a collateral-valuation mechanism. Section 1.6.3 tests the earnings buffer mechanism by examining whether export revenues mitigate the contraction for earnings-based borrowers when the dollar strengthens. Section 1.6.4 analyzes the composition margin, asking whether firms adjust the type of new borrowing toward earnings-based contracts following dollar appreciations.

All regressions are estimated at the firm–quarter level using the panel described in Section 2.2. The common shock is the standardized quarterly change in the advanced-economy dollar index, $\Delta s_t^{\$}$. The empirical variation comes from cross-sectional differences in how firms' investment co-moves with dollar appreciations, conditional on fixed effects and controls. The baseline specification includes firm fixed effects (α_i), country×time fixed effects (α_{ct}), and sector×time fixed effects (α_{st}), absorbing all average differences in macroeconomic conditions or sectoral shocks. Standard errors are two-way clustered by firm and quarter to allow for arbitrary serial correlation and common time shocks.

1.6.1 Baseline: Investment Response to Dollar Appreciations

Specification. The outcome variable is investment, defined as capital expenditure scaled by lagged assets and measured in percentage points (p.p.):

$$\text{Inv}_{i,t} \equiv 100 \times \frac{\text{CAPEX}_{i,t}}{\text{Assets}_{i,t-1}}.$$

Within each quarter, all firms in the sample experience the same change in the global U.S. dollar index, $\Delta s_t^{\$}$. The analysis therefore exploits cross-sectional differences in how firms' investment co-moves with this common movement in the dollar, conditional on firm, country, and sector characteristics.

The baseline regression relates investment to the interaction between the dollar movement and the firm's most recent bond-issuance type:

$$\begin{aligned} \text{Inv}_{it} = \beta_E^{\text{flow}}\big(\Delta s_t^{\$} \times 1\{\text{Flow}_{i,t-1} = E\}\big) + \beta_C^{\text{flow}}\big(\Delta s_t^{\$} \times 1\{\text{Flow}_{i,t-1} = C\}\big) \\ + \theta' X_{i,t-1} + \alpha_i + \gamma_{c(i),t} + \gamma_{s(i),t} + \varepsilon_{it}, \end{aligned} \tag{1.1}$$

where $\text{Flow}_{i,t-1} \in \{E, C\}$ indicates whether the firm's most recent bond issue was earnings-based (E) or collateral-based (C). The vector $X_{i,t-1}$ includes predetermined firm-level controls—log assets (size), leverage, profitability (ROA), liquidity, and lagged investment—and lagged macroeconomic variables (real GDP growth, CPI inflation, short-term interest rates, and the bilateral LC/USD rate).[9] Firm fixed effects (α_i) capture persistent differences in investment propensities, while country×time ($\gamma_{c(i),t}$) and sector×time ($\gamma_{s(i),t}$) effects absorb local macroeconomic and sectoral shocks. Standard errors are two-way clustered by firm and quarter.

Why the most recent issuance (flow) rather than the debt stock? For investment, the relevant constraint is the *marginal* financing condition a firm faces when raising new funds, not the legacy composition of its balance sheet. Outstanding debt changes infrequently—only about five percent of firms switch constraint type per quarter—so it mainly reflects historical borrowing relationships. By contrast, the firm's most recent bond issue captures the contractual terms governing current financing capacity, i.e. whether borrowing depends on collateral values or on operating earnings. Since new investment typically co-

9. Once country×time fixed effects are included, macro controls are absorbed.

incides with refinancing or new issuance, the lagged flow provides a sharper proxy for the operative constraint. Using issuance type at $t-1$ also ensures that the variable is predetermined relative to the contemporaneous dollar movement, mitigating simultaneity concerns.

Empirical design and interpretation. The empirical variation comes from cross-sectional differences in how firms' investment co-moves with the global dollar appreciation, holding fixed time-varying country and sector factors. Since $\Delta s_t^{\$}$ varies only over time, its level effect is absorbed by the high-dimensional fixed effects; the coefficients β_E^{flow} and β_C^{flow} therefore summarize *relative slopes* capturing how investment responds to the dollar across financing modes. Firms with no issuance in $t-1$ serve as the omitted group. The contrast $\Delta\beta \equiv \beta_E^{\text{flow}} - \beta_C^{\text{flow}}$ captures the differential sensitivity of investment between earnings-based and collateral-based borrowers. To allow for flexible heterogeneity, I also interact $\Delta s_t^{\$}$ with the firm covariates in $X_{i,t-1}$, ensuring that these coefficients capture conditional rather than compositional differences across firms.[10]

Results. Table 1.3 reports estimates of Equation (1.1) under progressively richer fixed-effects structures. Columns (1)–(3) use the full sample with "no issuance" as the reference group, while Column (4) restricts to firm–quarters that issued a bond in $t-1$. Across all specifications, the coefficient on collateral-based issuance is negative ($\widehat{\beta}_C < 0$), while the earnings-based coefficient is small and statistically indistinguishable from zero. The estimated difference $\widehat{\Delta\beta} = \widehat{\beta}_E - \widehat{\beta}_C$ is positive, implying that collateral-constrained firms reduce investment more when the dollar appreciates. Quantitatively, a one–standard–deviation dollar appreciation is associated with collateral-based firms reducing investment by about 0.10–0.23 percentage points (roughly 6–17 percent of the sample mean) more than earnings-based firms.

10. If the response to $\Delta s_t^{\$}$ systematically varies with firm characteristics that also correlate with financing mode, omitting these interactions would bias β_E^{flow} and β_C^{flow}.

Table 1.3: Impact of a one–standard–deviation dollar appreciation on investment by flow–based constraint at $t-1$.

	$Flow_{i,t-1} \in \{N, EB, CB\}$			$Flow_{i,t-1} \in \{E, C\}$
Y_{it} : Investment$_{it} \equiv$ CAPEX$_{it}$/Assets$_{it-1}$(%)	(1)	(2)	(3)	(4)
$\Delta s_t^{\$} \times 1\{\text{Flow}_{i,t-1} = EB\}$	-0.012	-0.017	-0.011	
	(0.018)	(0.019)	(0.019)	
$\Delta s_t^{\$} \times 1\{\text{Flow}_{i,t-1} = CB\}$	-0.094*	-0.088*	-0.086*	-0.225***
	(0.050)	(0.047)	(0.049)	(0.069)
Firm Controls	✓	✓	✓	✓
Economy Controls	✓	–	–	–
Firm FE	✓	✓	✓	✓
Time FE	✓	×	–	–
CountryxTime FE	×	✓	✓	✓
SectorxTime FE	×	×	✓	✓
Observations	81929	81920	81920	6655
Adj. R-sq	0.330	0.339	0.341	0.529
$\widehat{\Delta_{E-C}\beta}$	0.082	0.071	0.075	0.225
p($\widehat{\Delta_{E-C}\beta}$)	0.124	0.162	0.140	0.002
Mean Y_{it} (p.p.)	1.451	1.451	1.451	1.362
SD Y_{it}	1.971	1.971	1.971	1.775

Notes: The table reports OLS estimates of Eq. (1.1). The dependent variable is next–quarter investment, measured as capital expenditures divided by lagged total assets (percentage points). The dollar shock $\Delta s_t^{\$}$ is standardized to have zero mean and unit standard deviation over the sample. Reported coefficients correspond to the interactions $\Delta s_t^{\$} \times 1\{\text{Flow}_{t-1} = EB\}$ and $\Delta s_t^{\$} \times 1\{\text{Flow}_{t-1} = CB\}$; the omitted category is firms with no outstanding issuance in $t-1$. Predetermined firm controls $X_{i,t-1}$ include log assets (size), leverage, return on assets, liquidity (cash/assets), and lagged investment. Macroeconomic controls comprise lagged real GDP growth, CPI inflation, the log bilateral LC/USD exchange rate, and the short-term interest rate. Columns (1)–(3) use the full sample; Column (4) restricts to observations with positive issuance in $t-1$. Fixed effects are specified as indicated in the column headers. Standard errors are two–way clustered by firm and quarter. $\widehat{\Delta_{E-C}\beta}$ denotes the difference between earnings– and collateral–based slopes, reported with corresponding standard errors and p–values. $^{*}p < 0.10$; $^{**}p < 0.05$; $^{***}p < 0.01$.

Continuous and persistent financing composition. The preceding results rely on the most recent issuance type as a discrete indicator of the firm's operative borrowing constraint. As a complementary test, I construct a continuous measure of the firm's exposure to collateral-based financing, defined as the decayed share of past collateralized issues,

$$s_{i,t}^{C} = (1-\delta)s_{i,t-1}^{C} + \text{Flow}_{i,t-1}^{C},$$

where $\delta = 0.15$ governs the quarterly decay of past flows. Replacing the discrete dummies in Eq. (1.1) with the interaction $\Delta s_t^{\$} \times s_{i,t-1}^{C}$ yields a coefficient of -0.025 (s.e. = 0.010), implying that investment declines almost proportionally with the firm's reliance on collateral-based debt. Varying the decay rate between 0.10 and 0.25 produces nearly identical results, with estimated coefficients between -0.024 and -0.027 and p–values below 0.05 in all cases (Appendix Table A.2.1). These findings confirm that the differential response of investment across borrowing types is robust to how the persistence of financing relationships is modeled.

The results highlight an asymmetry in how financing modes shape firms' sensitivity to global financial conditions. When the dollar appreciates, the external borrowing capacity of collateral-based firms contracts because the value of pledgeable collateral in foreign-currency terms declines. Earnings-based firms, whose borrowing limits depend on operating cash flows rather than asset valuations, are largely insulated. The next subsection examines this balance-sheet channel directly by tracing how dollar appreciations affect firms' net worth and tangible capital.

1.6.2 Balance-Sheet Channel and Net-Worth Effects

This subsection examines whether the investment asymmetry documented above operates through firms' balance sheets. When the dollar appreciates, the domestic-currency value of collateral falls, potentially reducing the net worth of firms whose borrowing capacity depends on asset valuations. Following the balance-sheet channel of Kiyotaki et al. (1997), I test whether such effects are concentrated among collateral-based borrowers. Firm net worth is defined as

$$\text{Net Worth}_{it} = \frac{\text{Total Assets}_{it} - \text{Total Liabilities}_{it}}{\text{Total Assets}_{i,t-1}},$$

measuring the residual value of assets after debt obligations, scaled by lagged assets.

The baseline regression relates changes in the dollar index to firm-level net worth:

$$\text{Net Worth}_{it} = \alpha_i + \gamma_t + \beta_1 \, \Delta s_t^{\$} + \beta_2 \, (\Delta s_t^{\$} \times \text{CB}_{i,t-1}) + \theta' X_{i,t-1} + \varepsilon_{it}, \tag{1.2}$$

where $\Delta s_t^{\$}$ is the standardized quarterly change in the U.S. dollar index, $\text{CB}_{i,t-1}$ indicates that the firm's outstanding debt at the start of the quarter is collateral-based, and $X_{i,t-1}$ includes lagged controls (size, leverage, profitability, and liquidity). Firm and time fixed effects absorb persistent heterogeneity and aggregate shocks. Standard errors are two-way clustered by firm and quarter.

Table 1.4 reports the estimates in Columns (1) and (2). Dollar appreciations are associated with a significant erosion of net worth for collateral-based firms relative to earnings-based firms. Column (1) includes all firms, while Column (2) restricts the sample to firms with positive debt stocks at $t-1$. In Column (2), the interaction coefficient $\widehat{\beta}_2 = -0.020$ (s.e. $= 0.010$) indicates that a one–standard-deviation dollar appreciation reduces the liabilities-adjusted net-worth ratio of collateral-based firms by roughly two percentage points. By contrast, earnings-based firms' net worth remains largely unchanged. These patterns are consistent with the view that dollar appreciations tighten collateral constraints through balance-sheet valuation effects.

Tangible capital. To assess how these balance-sheet effects translate into real outcomes, I re-estimate the specification with the log of net property, plant, and equipment (PPE) as the dependent variable:

$$\begin{aligned} \log(\text{PPE}_{it}) = \alpha_i + \gamma_{c(i),t} + \gamma_{s(i),t} + \beta_1 \, \Delta s_t^{\$} + \beta_2 \, (\Delta s_t^{\$} \times \text{CB}_{i,t-1}) \\ + \phi \, \log\big(\text{PPE}_{i,t-1}\big) + \theta' X_{i,t-1} + \varepsilon_{it}. \end{aligned} \tag{1.3}$$

The estimates are reported in Columns (3) and (4) in Table 1.4. Column (3) includes all firms, while Column (4) restricts the sample to firms with positive debt stocks at $t-1$. Under the preferred fixed-effects bundle (firm, country×time, and sector×time), the coefficient on $\Delta s_t^{\$} \times \text{CB}_{i,t-1}$ in Column (4) equals -0.008 (s.e. $= 0.003$) , implying that collateral-constrained firms reduce tangible capital following a dollar appreciation.

The results point to a balance-sheet channel consistent with the transmission mechanism. When the dollar strengthens, collateral-based firms experience a decline in net worth and a contraction of tangible capital, indicating that their financing capacity is tied to the local-currency value of pledged assets. Earnings-based firms—whose borrowing depends on cash flows rather than collateral—show no comparable deterioration. Together, these findings suggest that the heterogeneous investment responses in Section 1.6.1 operate through valuation effects on firms' balance sheets rather than differences in real profitability or demand.

1.6.3 Earnings channel within earnings-based borrowers

Section 1.6.1 showed that earnings-based (EB) borrowers maintain investment levels during dollar appreciations, in contrast to the contraction observed among collateral-based (CB) firms. This subsection examines whether that resilience operates through an *earnings channel*: whether EB firms with greater exposure to export revenues respond more favorably to local-currency depreciations. If repayment capacity for EB debt depends on earnings rather than on the liquidation value of collateral, firms whose revenues increase with export competitiveness should experience a relaxation of borrowing constraints when their currencies depreciate.

The analysis focuses on the subsample of earnings-based firms. The dependent variable is the average of investment over the current and next two quarters, $\bar{\text{Inv}}_{it} = (\text{Inv}_{it} + \text{Inv}_{i,t+1} + \text{Inv}_{i,t+2})/3$, which smooths out short-term noise in investment measurement. Export exposure, $\text{Exp}_i^{\star}$, is measured using firms' average pre-2008 export shares. If firm-level data

Table 1.4: Net worth and tangible fixed assets

	Net Worth		Tangible Fixed Assets	
	(1) All	(2) $\{EB_{i,t-1}, CB_{i,t-1}\}$	(3) All	(4) $\{EB_{i,t-1}, CB_{i,t-1}\}$
$\Delta s_t^{\$} \times \text{EB}_{i,t-1}$	-0.004		0.002	
	(0.013)		(0.003)	
$\Delta s_t^{\$} \times \text{CB}_{i,t-1}$	-0.028**	-0.020*	-0.006***	-0.008**
	(0.013)	(0.010)	(0.002)	(0.003)
Firm Controls	✓	✓	✓	✓
Firm FE	×	✓	×	✓
Time FE	×	✓	×	×
CountryxTime FE	×	×	×	✓
SectorxTime FE	×	×	×	✓
Observations	82060	37961	73904	34319
Adj. R-sq	0.719	0.780	0.992	0.994
Mean Y_{it}	4.320	4.080	22.694	23.454
SD Y_{it}	1.894	1.775	3.191	3.320

Notes: The table reports OLS estimates of the effects of dollar appreciations on firms' balance-sheet components by borrowing-constraint type. Dependent variables are (i) net worth, measured as 1−Liabilities/Assets, and (ii) the log of property, plant, and equipment (PPE). The main regressors are interactions between the standardized dollar appreciation $\Delta s_t^{\$}$ and firm type as defined by the outstanding stock of bond debt. Columns (1) and (3) use the full sample, while Columns (2) and (4) restrict the sample to earnings-based and collateral-based firms, excluding observations with no outstanding bond debt at the start of the quarter. All specifications include lagged firm controls—log assets (size), leverage, return on assets, and liquidity (cash/assets)—and fixed effects as indicated in the column headers. Standard errors are two-way clustered by firm and quarter. $^{*}p < 0.10$; $^{**}p < 0.05$; $^{***}p < 0.01$.

are missing, exposure is imputed from the mean at the country×2-digit-sector level, then by country or sector. The variable is winsorized at the 1st and 99th percentiles and standardized within the EB sample:

$$\text{Exp}_i^{\star} = \frac{\text{Exp}_i - \overline{\text{Exp}}_{\text{EB}}}{\sigma(\text{Exp}_{\text{EB}})}.$$

Two measures of exchange-rate movements are used. The baseline is the global dollar index against advanced-economy currencies, $\Delta s_t^{\$}$, which captures broad dollar fluctuations. As an alternative more relevant for exporters' revenues, I use the bilateral LC/USD exchange rate, Δs_{ct}^{B}, standardized within each country.

The baseline regression, restricted to EB firms, is:

$$\bar{\text{Inv}}_{it} = \beta_1 \big(\mathbf{E}_t \times \text{Exp}_i^{\star}\big) + \Gamma' X_{i,t-1} + \mu_i + \mu_{ct} + \mu_{st} + \varepsilon_{it}, \qquad \mathbf{E}_t \in \{\Delta s_t^{\$}, \Delta s_{ct}^{B}\}, \tag{1.4}$$

where $X_{i,t-1}$ includes lagged firm size, leverage, profitability (ROA), and liquidity. The specification includes firm fixed effects (μ_i), country×time fixed effects (μ_{ct}), and sector×time fixed effects (μ_{st}). Standard errors are two-way clustered by firm and quarter.

Table 1.5 presents the results, tracing how the earnings channel operates among earnings-based (EB) borrowers. Each column adds an additional layer of identification to isolate how firms with higher pre-crisis export exposure respond to exchange-rate changes through their earnings and investment behavior.

The first two columns use the broad U.S. dollar Index—the same measure of dollar strength used in the baseline analysis—as the exchange-rate shock. The interaction between dollar appreciation and pre-period export exposure is positive but statistically insignificant. This pattern is unsurprising. The dollar index reflects global financial tightening that is largely common across emerging markets and thus absorbed by the country×time fixed effects. Since these global movements affect all firms simultaneously, they offer little within-country variation to identify differential exposure among earnings-based borrowers.

Columns (3)–(5) switch to the bilateral change in the log local-currency exchange rate against the U.S. dollar, Δs^B_{ct}. This measure varies across countries and quarters, capturing differences in trade competitiveness and export revenues. The interaction between local depreciation and pre-period export exposure is positive and statistically significant ($\widehat{\beta}_1 \approx 0.028$, $p = 0.02$), implying that a one–standard-deviation depreciation of the local currency raises investment by about 0.03 units more for high-export EB firms relative to low-export EB firms.

Column (4) adds contemporaneous revenue growth, $\Delta \log(\text{Revenue})_{it}$, to examine whether the exchange-rate effect operates through earnings. Revenue growth enters strongly and positively, consistent with the idea that depreciation raises firms' sales and cash flows in local-currency terms. The interaction term remains virtually unchanged ($0.028 \rightarrow 0.028$), indicating that the earnings channel continues to operate even after controlling for realized

revenues, consistent with an easing of the earnings-based financing constraint rather than a purely mechanical profit effect. In Column (5), I exclude the Global Financial Crisis (2008–09) episodes. The coefficient on $\Delta s^B_{ct} \times \text{Exp}^*_i$ slightly increases in magnitude ($\widehat{\beta}_1 = 0.030$, $p = 0.017$).

Instrumental variable specification. Column (6) addresses potential endogeneity in the firm-level interaction term $ZX_{it} = \Delta s^B_{ct} \times \text{Exp}^*_i$, which captures the sensitivity of firm i's earnings to local currency movements. Although the exchange-rate shock Δs^B_{ct} is determined at the country level, firms' pre-existing export exposure $\text{ExportExposure}^\star_i$ may be correlated with unobserved factors affecting investment, such as sectoral trends or policy interventions. To isolate the exogenous component of this interaction, I instrument ZX_{it} with its leave-firm-out country×sector analogue:

$$Z_{cst} = \Delta s^B_{ct} \times \overline{\text{ExportExposure}}^\star_{cs},$$

where $\overline{\text{ExportExposure}}^\star_{cs}$ is the average pre-period export exposure of all other firms in the same country–sector (c, s), excluding firm i. This design exploits variation in the export orientation of a firm's peers to predict the magnitude of the exchange-rate-induced earnings shock, while ensuring the instrument is orthogonal to firm-specific investment shocks.

The first stage is strong (Kleibergen–Paap Wald $F = 402$), confirming that the country × sector instrument explains substantial variation in the firm-level exposure term. The 2SLS coefficient on ZX_{it} remains positive and of similar magnitude to the OLS estimate ($\widehat{\beta}_{\text{IV}} = 0.027$, $p = 0.08$), reinforcing the interpretation that local-currency depreciation relaxes earnings-based borrowing constraints for export-intensive firms through higher local-currency revenues.

The results point to a earnings-based buffer channel. Among earnings-based borrowers, export-oriented firms invest more when their local currency depreciates, consistent with a

relaxation of borrowing constraints as domestic-currency revenues rise. The stability of the coefficient after controlling for realized revenue growth suggests that the channel operates through both current and expected earnings rather than mechanical accounting effects. In contrast, the same interaction among collateral-based firms (Table A.2.3) is small and statistically insignificant, consistent with their borrowing capacity being tied to collateral values rather than cash-flow performance.

Table 1.5: Earnings channel within earnings-based borrowers

Inv_{it}	(1)	(2)	(3)	(4)	(5)	(6)
$\Delta s_t^{\$} \times \text{Exp}_i^*$	0.007	0.004				
	(0.016)	(0.016)				
$\Delta \log(\text{Revenue})$		0.068***		0.068***	0.062***	
		(0.024)		(0.024)	(0.023)	
$\Delta s_{ct}^B \times \text{Exp}_i^*$			0.028**	0.028**	0.030**	
			(0.012)	(0.012)	(0.012)	
$\Delta s_{ct}^B \times \overline{\text{ExportExposure}}_{cs}^{\star}$						0.027*
						(0.015)
N	16522	15941	16522	15941	14836	13545
Adj. R-sq.	0.566	0.565	0.566	0.565	0.587	0.014

Standard errors in parentheses

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

Notes: The table reports OLS and IV estimates from regressions of average investment over t–$t+2$ on exchange-rate movements interacted with firms' pre-2008 export exposure. The dependent variable is the three-quarter average of investment (capital expenditures divided by lagged assets). The sample is restricted to earnings-based firms based on the stock of outstanding bond debt. The global shock, "$\Delta s_t^{\$}$," measures the appreciation of the U.S. dollar against advanced-economy currencies; the "Bilateral LC/USD change, Δs_{ct}^B" is the standardized change in log(LC/USD) within each country. Export exposure is a firm's average pre-2008 export share, winsorized at the 1st–99th percentiles and standardized within the earnings-based (EB) sample. Controls include lagged firm size, leverage, return on assets, and liquidity. All specifications include firm, country×time, and sector×time fixed effects, and standard errors are two-way clustered by firm and quarter. Columns (1)–(2) use the global dollar index; Columns (3)–(5) use bilateral exchange-rate changes; Column (4) adds contemporaneous revenue growth $\Delta \log(\text{Revenue})_{it}$; Column (5) excludes the global financial crisis (2008–09) quarters; Column (6) instruments $ZX_{it} = \Delta s_{ct}^B \times \text{Exp}_i^{\star}$ with its leave-firm-out country×sector analogue $Z_{cst} = \Delta s_{ct}^B \times \overline{\text{ExportExposure}}_{cs}^{\star}$. $^*p < 0.10$; $^{**}p < 0.05$; $^{***}p < 0.01$.

Relation to the balance-sheet channel. Together with the preceding section, these results underscore the asymmetric nature of the dollar's transmission. Collateral-based firms face a tightening of borrowing constraints as asset values fall during dollar appreciations, whereas earnings-based exporters benefit from higher local-currency revenues when their currency depreciates. These two mechanisms, collateral valuation losses and earnings-based buffers, jointly shape how global dollar movements propagate to real investment across firms.

1.6.4 Reallocation Toward Earnings-Based Debt

The preceding results show that dollar appreciations contract investment among collateral-based firms through balance-sheet tightening, while earnings-based borrowers—particularly exporters—are partly insulated by higher local-currency revenues. This subsection examines the corresponding adjustment on the financing side. In particular, I now examine, how firms reallocate new borrowing across contract types when the dollar strengthens.

Let $\text{Flow}_{it} \in \{N, E, C\}$ denote whether firm i in quarter t issues no new debt (N), earnings-based debt (E), or collateral-based debt (C). To study how the dollar movement influences this choice, I estimate a multinomial logit model:

$$\Pr(\text{Flow}_{it} = k) = \frac{\exp\Big(\gamma_k \, \Delta s_t^{\$} \cdot \sigma_{i,t-1} + \beta_k' X_{i,t-1} + \tau_{s(i)} + \tau_t + \alpha_k\Big)}{\sum_{\ell \in \{N,E,C\}} \exp\Big(\gamma_\ell \, \Delta s_t^{\$} \cdot \sigma_{i,t-1} + \beta_\ell' X_{i,t-1} + \tau_{s(i)} + \tau_t + \alpha_\ell\Big)}, \qquad k \in \{N, E, C\}, \tag{1.5}$$

where $\sigma_{i,t-1} \equiv D^C_{i,t-1}/(D^E_{i,t-1} + D^C_{i,t-1})$ is the collateral-based share of outstanding debt at the start of the quarter, $\Delta s_t^{\$}$ is the standardized quarterly change in the global dollar index, and $X_{i,t-1}$ includes lagged firm characteristics (size, leverage, profitability, liquidity) and country-level macro controls. Sector fixed effects ($\tau_{s(i)}$) capture structural differences in

financing technology, and time fixed effects (τ_t) absorb aggregate movements in the dollar and global conditions. The sample is limited to firms with positive outstanding debt at $t-1$, ensuring that $\sigma_{i,t-1}$ is defined. The base category is N (no issuance).

Since $\Delta s_t^{\$}$ varies only over time, time fixed effects absorb its level effect. The coefficients γ_k therefore capture how the cross-sectional relationship between the dollar appreciation and the probability of issuing each contract type depends on a firm's prior collateral share. A negative γ_C implies that firms with more collateralized balance sheets are less likely to issue collateral-based debt when the dollar appreciates; a positive γ_E indicates a relative shift toward earnings-based borrowing.

Table 1.6 reports the multinomial logit coefficients, and Figure 1.8 plots the corresponding average marginal effects (AMEs) of a one–standard-deviation dollar appreciation on issuance probabilities. Two systematic patterns emerge:

1. *Persistence in contracting:* The collateral share of outstanding debt at $t-1$ strongly predicts issuance type at t. Firms that were previously collateral-based are substantially more likely to issue collateral-secured debt again, reflecting state dependence in financing relationships.

2. *Reallocation under dollar tightening.* The interaction $\Delta s_t^{\$} \times \sigma_{i,t-1}$ enters positively in the earnings-based equation and negatively in the collateral-based equation. For a firm that was fully collateralized at $t-1$, a one–standard-deviation dollar appreciation raises the probability of issuing earnings-based debt by roughly 10% and lowers the probability of issuing collateral-based debt by about 8%.

The observed reallocation of issuance complements the firm-level investment patterns documented earlier. When the dollar appreciates, collateral-based firms face balance-sheet tightening and reduced borrowing capacity, while earnings-based firms—particularly exporters—retain access to credit through stronger earnings coverage. Consequently, the com-

Table 1.6: Multinomial logit: flow choice among firms with outstanding debt at $t-1$.

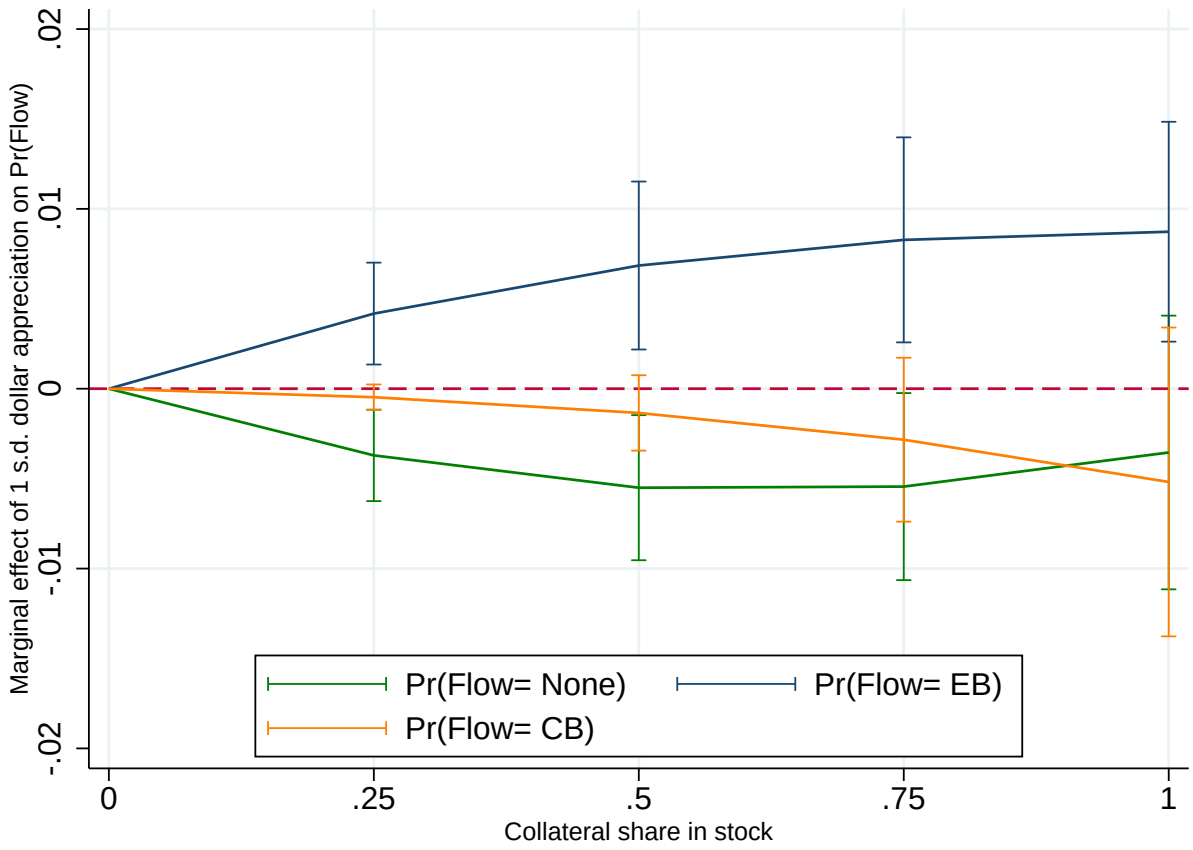
	(1) $k = E$	(2) $k = C$
$\Delta s_t^{\$} \times \sigma_{i,t-1}$	0.142**	-0.097
	(0.065)	(0.093)
$\sigma_{i,t-1}$	-0.980***	1.720***
	(0.075)	(0.097)
L.Size	0.440***	0.443***
	(0.031)	(0.038)
L.Leverage	1.691***	1.317**
	(0.638)	(0.580)
L.Profitability	0.021***	0.021***
	(0.006)	(0.007)
L.Liquidity	0.608	0.637
	(1.634)	(1.631)
L.Real GDP Growth	-0.141***	-0.090***
	(0.018)	(0.022)
L.Log(LC/USD)	0.090***	0.058***
	(0.010)	(0.017)
L.CPI Inflation	-0.159***	0.050***
	(0.031)	(0.019)
L.Short Term Interest Rate	0.010	-0.045***
	(0.016)	(0.016)
Constant	-10.560***	-28.383***
	(0.845)	(1.280)
Observations	35832	35832

Notes: The table reports coefficients from a multinomial logit model of debt-type choice among firms with outstanding bond debt at the start of the quarter $(t-1)$. The dependent variable is $\text{Flow}_{it} \in \{N, E, C\}$, where N denotes no new issuance, E issuance of earnings-based debt, and C issuance of collateral-based debt. Coefficients are reported as log-odds relative to the base category N. The key regressor is $\Delta s_t^{\$} \times \sigma_{i,t-1}$, the interaction of the standardized global dollar appreciation with the collateral-based share of a firm's outstanding debt ($\sigma_{i,t-1} = D_{i,t-1}^C / (D_{i,t-1}^E + D_{i,t-1}^C)$). Lagged firm controls include log assets (size), leverage, profitability (ROA), and liquidity (cash/assets); macro controls are added where available. Sector and time fixed effects are included. The sample is restricted to firms with positive outstanding debt at $t-1$ to ensure $\sigma_{i,t-1}$ is defined. Standard errors are clustered by quarter. $^{*}p < 0.10$; $^{**}p < 0.05$; $^{***}p < 0.01$.

position of new borrowing tilts toward earnings-based contracts, the financing mode less exposed to collateral-valuation losses.

This substitution reinforces cross-sectional heterogeneity yet stabilizes aggregate financing capacity. Firms shift toward contracts underpinned by ongoing cash flows rather than tangible assets, allowing credit to reallocate rather than collapse during periods of dollar

Figure 1.8: Average marginal effects of dollar appreciation on the probability of new debt type.



Notes: The figure plots average marginal effects (AMEs) implied by the multinomial logit estimates in Table 1.6. The horizontal axis shows the collateral-based share of outstanding debt at the start of the quarter ($\sigma_{i,t-1}$); the vertical axis shows the marginal effect of a one–standard–deviation appreciation of the global U.S. dollar index on the probability of issuing each debt type. The caps denote 90% confidence intervals, with standard errors clustered by quarter. A positive AME for earnings-based issuance and a negative AME for collateral-based issuance indicate a reallocation toward earnings-based debt when the dollar strengthens.

strength.

Taking Stock

Taken together, the evidence reveals a pattern linking global dollar movements to firm financing and investment. Dollar appreciations tighten borrowing constraints for firms whose credit capacity depends on the value of collateral, leading to declines in net worth, tangi-

ble capital, and investment. Earnings-based borrowers, by contrast, are largely insulated from these valuation effects; among them, export-oriented firms experience a relaxation of constraints when local-currency revenues rise, sustaining investment despite tighter global conditions. In aggregate, these asymmetric responses manifest in a compositional reallocation of new borrowing toward earnings-based contracts, which cushions overall credit supply. The results thus highlight how the structure of domestic credit markets, specifically, the prevalence of collateral- versus earnings-based lending, shapes the transmission of global financial shocks to real activity in emerging economies.

1.7 Robustness and Extensions

This section evaluates the robustness of the baseline results to alternative definitions of financing constraints, risk-premium shocks, and outcome variables. Across all specifications, the main finding remains unchanged: dollar appreciations contract investment for collateral-constrained firms, while earnings-based and export-oriented borrowers remain comparatively insulated. The robustness exercises confirm that this heterogeneity is not an artifact of the constraint classification, the shock measure, or the specific definition of investment. Detailed tables and placebo tests are reported in Appendix A.2.

Alternative decay rates

The continuous decayed-share specification weights past borrowing flows by a quarterly persistence parameter δ. Table A.2.1 reports estimates for $\delta \in \{0.10, 0.15, 0.20, 0.25\}$, corresponding to half-lives between six and three quarters. Across all values of δ, the interaction between the dollar appreciation and the lagged collateral-share remains negative and significant, with point estimates ranging from -0.024 to -0.027 (standard errors ≈ 0.010). The implied earnings–collateral gap, $-\hat{\beta} \approx 0.025$, is stable across specifications. These results show that the estimated heterogeneity in investment responses is robust to the assumed per-

sistence of financing relationships: whether past borrowing decays slowly or rapidly, firms that rely more on collateral-based debt consistently reduce investment more when the dollar appreciates.

Alternative risk-premium shocks

The baseline analysis uses changes in the trade-weighted U.S. dollar index against advanced-economy currencies as the benchmark risk-premium shock for emerging markets. As robustness, I re-estimate the specification in Eq. (1.1) using two alternative global risk indicators. The first is the quarterly change in the *VIX*, a widely used proxy for global risk aversion and uncertainty.[11] The second is the change in the *excess bond premium* (EBP), which isolates movements in credit spreads that are not explained by expected defaults and is therefore a cleaner measure of investors' risk appetite.[12] Both variables are standardized to have mean zero and unit variance over the sample, and I maintain the same regression specification and fixed-effect structure as in the baseline.

Across both shocks, the results are consistent with those based on the dollar index: collateral-based firms experience significantly larger declines in investment when global risk premia rise, while earnings-based firms remain comparatively less affected. Table A.2.2 reports the estimates. A one–standard-deviation increase in either the VIX or the EBP is associated with an additional 0.2–0.3 p.p. decline in investment among collateral-based firms relative to earnings-based firms, confirming that the baseline heterogeneity is not specific to the choice of risk-premium measure.

11. See Miranda-Agrippino et al. (2022), who show that the VIX is the dominant common factor across international risk indicators.

12. EBP is constructed following Gilchrist et al. (2012).

1.8 Policy Implications

The evidence indicates that dollar appreciations are transmitted to real activity through the composition of corporate financing. New borrowing shifts toward earnings-based contracts, and the near-term contraction in investment is concentrated among firms that rely on collateral-based borrowing. Among earnings-based issuers, higher export intensity attenuates this contraction, consistent with borrowing limits that scale with operating earnings. These patterns are not interpreted as causal effects, but as conditional differences in how a common dollar shock passes through alternative contracting margins. They nonetheless point to a central policy principle: amplification is strongest when borrowing capacity is tied to collateral valuations that deteriorate in strong-dollar states, and weakest when borrowing capacity is tied to cash flows that move with foreign-currency revenues.

Macroprudential design. Where corporate credit is heavily collateralized, the parameters that govern collateral usage, such as advance rates, haircuts, and effective loan-to-value ratios, can be made explicitly state-contingent on external dollar conditions. When the dollar strengthens, these parameters could tighten to lean against pro-cyclical expansions of secured credit that later require sharp contractions; when the dollar eases, they would normalize. On the intermediary side, the risk-weighted treatment of secured corporate exposures could be calibrated to the external dollar state without imposing uniform constraints on all lending. Such adjustments do not require new instruments: supervisory guidance referencing a standardized dollar index and firms' observable exposures can achieve the same outcome.

Contract design and market development. Since earnings-based borrowing transmits less of the dollar shock to investment, particularly for exporters, standardizing earnings-linked covenants in local-currency bond and loan markets could reduce sensitivity to collateral valuations. Facilities that advance against realized export receivables, with transparent haircut schedules, similarly align borrowing capacity with cash flows that co-move with the

dollar. The objective is not to expand leverage, but to reallocate a given volume of credit toward contracts whose borrowing limits move with operating earnings rather than with asset prices.

Operational and supervisory practice. FX-liquidity facilities activated in periods of dollar strength are most effective when targeted at corporate segments with high collateral exposure, rather than applied uniformly. Stress-testing frameworks should combine dollar-shock scenarios with issuance-composition dynamics, since the impact of the dollar depends on the prevailing financing mode. Disclosure can support these assessments. Systematic reporting of issuance composition (earnings- versus collateral-based), currency denomination, and export intensity would allow policy-makers and investors to map dollar movements into firm-level investment risk using observable exposures. At the firm level, treasury policies that match financing mode to the source of cash-flow resilience follow directly. Exporters can tilt marginal issuance toward earnings-based contracts when external conditions tighten, while non-exporters can reduce reliance on collateral-based borrowing in strong-dollar states.

Caveats and sequencing. Two qualifications discipline these implications. First, the analysis is partial equilibrium and conditions on realized financing choices; broad shifts toward earnings-based borrowing could reprice that margin or redistribute credit toward different firms. Second, earnings-linked borrowing can be procyclical when domestic demand weakens and cash flows fall for reasons unrelated to the dollar. Hence, policy design should be symmetric across states of the world and revisable as market depth evolves. A practical sequencing is to establish a registry of contract type at issuance, integrate issuance-composition modules into corporate stress tests, and adopt supervisory guidance that links collateral parameters and sectoral capital buffers to external dollar conditions.

Taken together, the results suggest a practical orientation: in strong-dollar states, lean against collateral-based amplification while enabling earnings-linked funding that ties bor-

rowing capacity to cash flows rather than to collateral marks, with particular attention to export intensity that shapes conditional transmission. This approach mitigates external amplification without relying on blanket credit expansion or exchange-rate management, and it is implementable within existing prudential and market-development toolkits.

1.9 Conclusion

This paper studies how dollar appreciations transmit to corporate investment in emerging market economies through the composition of external finance. The analysis distinguishes two contractual regimes—earnings-based and collateral-based borrowing—that differ in how repayment capacity is defined and constrained. Firms borrowing against tangible assets face credit limits tied to collateral valuations, while those borrowing against operating earnings face limits tied to cash flows. Linking primary-market bond prospectuses to quarterly firm-level financials reveals how these borrowing modes shape the transmission of a common global shock.

Three main empirical patterns emerge. First, when the dollar appreciates, issuance composition shifts away from collateral-based and toward earnings-based instruments: the probability of collateralized borrowing declines, while the probability of earnings-based issuance rises, with little change in the no-issuance margin. Second, conditional on the prevailing financing mode, investment falls more for collateral-based firms and remains stable for earnings-based borrowers. Third, among earnings-based firms, decline in investment is smaller for firms with higher export intensity, consistent with borrowing limits that scale with revenues denominated in or linked to the dollar. These estimates represent conditional differences in exposure to a common external shock after controlling for fixed effects and predetermined balance-sheet characteristics.

The findings suggest a policy orientation that targets the margin along which amplification is strongest. In strong-dollar states, credit contractions arise primarily where borrowing

is tied to collateral valuations that deteriorate in domestic-currency terms. Policies that make collateral parameters—advance rates, haircuts, or effective loan-to-value ratios—state-contingent on external dollar conditions can therefore reduce amplification. Conversely, the relative stability of earnings-based borrowing, particularly among exporters, points to the value of developing local-currency markets with standardized earnings-linked covenants that align borrowing capacity with cash flows rather than collateral values.

Several limitations qualify these results. The analysis is partial equilibrium and conditions on realized financing choices; it does not model general-equilibrium feedbacks or equilibrium pricing across margins. Contract classification is based on prospectus descriptions rather than full covenant texts, and flow choices may reflect unobserved firm characteristics beyond those controlled for in the interacted-slope design. Future work can extend the framework using covenant-level data, incorporate bank–issuer relationships to capture credit-supply responses, and examine the role of currency hedging and input dollarization in shaping firm-level exposures.

Taken together, the framework and evidence map a common dollar innovation into financing composition and investment, identifying borrowing mode and export intensity as observable state variables that summarize heterogeneity in transmission across firms. These results highlight that the global dollar cycle operates not only through currency denomination but also through the contractual architecture of credit, linking international financial conditions to real activity through the structure of domestic balance sheets.

CHAPTER 2

CAPITAL CONTROLS, FIRM LEVERAGE AND PROFITABILITY: EVIDENCE FROM CORPORATE BOND ISSUANCE

2.1 Introduction

Capital inflows are central to emerging market economies (EMEs), fostering growth and facilitating the allocation of capital to productive uses (Levine, 1997; Henry, 2000a; Henry, 2000b; Larrain et al., 2017; Varela, 2018). Yet large capital inflows can also fuel credit booms and amplify the risk of financial crises (Carmen M Reinhart et al., 2009a; Jordà et al., 20110; Mendoza et al., 20120). As a result, managing capital flows poses a delicate trade-off between supporting growth and safeguarding financial stability (Bianchi et al., 2020; Ma, 2020). On the one hand, capital flow management policies can, in principle, reduce the likelihood and severity of financial crises by curbing riskier borrowing and encouraging prudential deleveraging (Jeanne et al., 2010; Bianchi et al., 2022; Zeev, 2017; Fabiani et al., 2023). On the other hand, such policies may impose efficiency losses due to capital misallocation, particularly when they disrupt the optimal allocation of resources across firms by depriving productive firms from the funding they need to reach their efficient scale (Johnson et al., 2003; Rajan et al., 2003; Forbes, 2007b; Alfaro et al., 2017; Andreasen et al., 2023; Andreasen et al., 2024a). While this trade-off has long featured in both academic and policy discussions (IMF, 2012 and 2022), systematic cross-country evidence on how it operates in practice remains limited.

Motivated by these observations, this paper asks three central questions about how controls on capital inflows (CCIs) impact firms in EMEs. First, we examine whether a specific form of CCIs –restrictions on nonresident purchases of domestically issued bonds–reduce firms' *local* issuance. Second, we investigate the mechanisms behind any observed reduction, focusing on two channels that capture heterogeneous effects of CCIs across firms. A

prudential channel tests whether the impact is stronger for more leveraged firms, while a *profitability channel* asks whether firms with relatively higher returns on assets (ROA) are disproportionately more affected. Third, we assess the real consequences of these policy actions by studying how CCIs alter firms' total debt and investment, thereby linking financing constraints to broader economic outcomes.

To address these questions, we put together a novel dataset that combines cross-country data on capital controls with detailed firm-level data. We complement the empirical analysis with a simple model that clarifies the mechanisms behind the empirical findings we document. Specifically, we begin by drawing on granular bond-inflow capital control measures from Fernández et al. (2016), which capture restrictions on nonresident purchases of domestically issued corporate bonds. We merge this with issuance data from Thomson Reuters SDC Platinum, which provides firm-level information on bond deals across EMEs, and with balance sheet data from Worldscope, which covers firm characteristics and financing decisions. Our panel includes 2,695 firms across various sectors, in 18 EMEs observed at a quarterly frequency over 1998–2019, yielding more than 72,000 firm–quarter observations. We harmonize the policy series using bond-inflow CCI that account for the existence of restrictions on nonresident purchases of *domestically issued* corporate bonds. We complement this with data on CCIs on other instruments (equity, derivatives, money-market instruments, financial credit, and direct investment), along with a measure of countries' macroprudential stance.

Bond deals from SDC include issue-level identifiers as well as several other bond characteristics (issuer name, ISIN/CUSIP, currency, market of issuance, etc.). We classify an issuance as *domestic* if it is placed in the firm's home market, and as offshore otherwise. We focus on domestic issuance because this segment has expanded most rapidly in EMEs during our sample period, consistent with trends in C. Bertaut et al. (2025). Moreover, the bond-inflow CCI we study explicitly targets nonresident purchases of domestically issued bonds, aligning the treatment with the outcome studied, improving the identification of the

policy effect. We link SDC to Worldscope at the ultimate-parent level using firm identifiers where available, suplemented by fuzzy string matching and manual checks. Worldscope provides balance-sheet variables (total assets/liabilities, leverage, ROA, capex), which we use to construct leverage and profitability quartiles, and to measure total-liability and investment responses.

This combination of datasets enables us to analyze both cross-sectional and time-series variation in capital controls and bond issuance. To quantify the impact of CCIs on firms' bond issuance, we estimate a firm-quarter linear probability model where the outcome is an indicator for domestic bond issuance. The key regressor is a lagged country-level indicator for bond-inflow CCIs. Following Becker et al. (2014), we restrict the sample to firm-quarters in which the total debt of the firm rises, ensuring that demand for external finance is positive and that changes in composition reflect credit-supply drivers rather than demand. We include firm characteristics and macro-financial controls, plus dummies for CCIs on other instruments and other macroprudential tools. Firm and sector*time fixed effects absorb time-invariant heterogeneity and net out time-invariant firm heterogeneity and sectoral shocks that are common across countries, respectively.

To measure heterogeneous impacts, we interact the CCI indicator with pre-determined firm characteristics, namely leverage and ROA quartiles. These interactions reveal whether tighter bond-inflow controls curb issuance more for highly leveraged firms—a prudential channel—, and whether higher-ROA firms also pull back—a profitability channel. Lastly, to assess real effects, we replace the issuance outcome with growth in total liabilities and investment, testing whether reduced bond issuance leads to deleveraging and lower capex, or if, instead, it is offset by substitution toward domestic credit. We also explore the extent to which firms draw from retained earnings. All specifications retain the same identification strategy ensuring that the heterogeneity and real-effects estimates are directly comparable to the baseline issuance results.

Results from our empirical analysis highlight three key findings. First, we provide evidence of a bond channel of capital controls: CCIs significantly reduce the likelihood of firms' domestic bond issuance. On average, the probability of issuance falls by 1.7 percentage points, equivalent to 33 percent of the historical mean. Moreover, we find that controls on other instruments, such as equity issuance, are associated with higher bond issuance, suggesting substitution across sources of finance. Second, the reduction in bond issuance is consistent with both channels: the effect is stronger for more leveraged firms, but also present –though smaller–for high-ROA firms. Finally, we show that the prudential channel extends to total debt and investment decisions: among riskier firms, total liabilities decline by up to 2%, and quarterly investment by 0.2%. Crucially, by contrast, we do not find reductions in total liabilities or investment among more profitable firms. These firms maintain investment by substituting away from bond finance and tapping alternative domestic banks' funding sources.

We extend the baseline empirical results along four dimensions. First, we study additional substitution margins and provide evidence that dividend-payout cuts act as an internal-finance valve for profitable firms. Second, we re-estimate heterogeneity using alternative profitability and efficiency measures. On the former, we substitute ROA measures for return on equity (ROE). On the latter, lack of employment levels at the firm level prevent us from computing direct measures of firms' total factor productivity. Instead, we explore substituting firms' ROA with average revenue product of capital (ARPK). These alternative measures are consistent with capital controls inhibiting profitable firms' bond issuance. They also corroborate the relative stronger effects of the prudential channel that operates through leverage. Third, we also control for the country-specific cumulative macroprudential stance (in addition to lagged changes in other macroprudential measures) to account for the possibility that countries with relatively tighter or looser macroprudential frameworks may differ in their underlying need to resort to capital controls in the first place. Reassuringly,

our results remain robust to this modification too. Fourth, we examine state dependence by interacting the CCI measures with the financial cycle, separating domestic (EMBI) from global drivers (broad and AE dollar indices). We find that the prudential channel is strongest when domestic conditions are loose. Under globally loose conditions both prudential and productivity channels continue to operate.

To interpret these findings, the paper develops a simple model of capital inflow controls and firm heterogeneity. The model features a small open economy with ex ante identical firms that finance investment through foreign borrowing before firm-level productivity is realized. Firms and their foreign lenders hold optimistic beliefs about future outcomes, both regarding the likelihood of being highly productive and the severity of adverse aggregate states. These beliefs distort borrowing decisions upward, leading firms to take on more external debt than would be warranted by true risks.

A central implication of the model is that excessive borrowing exposes firms with lower realized productivity to default in adverse aggregate states, generating financial fragility and output losses. This mechanism provides a natural interpretation of the empirical evidence that capital inflows raise leverage disproportionately among weaker firms and are associated with heightened downside risk. At the same time, more productive firms remain solvent even in bad states, but their borrowing decisions are tied to the same ex ante incentives and financing conditions as those of weaker firms.

Within this environment, a uniform capital inflow control plays a dual role. On the one hand, by raising the cost of external borrowing, it curbs excessive leverage among low-productivity firms, delivering prudential benefits that operate primarily through the leverage channel documented in the data. On the other hand, because policy cannot be conditioned on firm characteristics, the same control also constrains borrowing by high-productivity firms that would not default even in the absence of regulation, preventing them from operating at their efficient scale. A simple extension of the model shows that when external borrowing

becomes more costly, firms optimally substitute away from payouts toward retained earnings, with this margin operating more strongly for high profitability firms. The model therefore rationalizes the heterogeneous firm-level responses observed in the empirical analysis and highlights the fundamental trade-off policymakers face between reducing financial fragility and preserving productive efficiency.

Overall, our findings entail important policy implications for the management of capital flows in EMEs. The results highlight the trade-off policymakers face between financial stability and long-run efficiency. On the one hand, the prudential channel shows that CCIs can mitigate financial stability risks by curbing excessive bond issuance among riskier and more-leveraged firms. On the other hand, the productivity channel warns of potential longer-term costs if measures disproportionately constrain high-ROA firms, with implications for aggregate growth. Our evidence on real outcomes, however, shows that productive firms maintain investment by substituting away from bond finance. This suggests that the absence of a profitability penalty depends critically on the availability of substitutes. A key lesson, therefore, is to use CCIs only insofar as the conditions for firms with high growth potential to tap into alternative sources of finance exist. Such conditions include the existence of deep local-currency markets, developed financial systems, and measures incentivize the use of internal funds for investment. Finally, because our analysis focuses on large, listed firms that regularly tap capital markets, policymakers should recognize that smaller firms–more dependent on bank credit–may be affected through different channels. CCIs that impact bank intermediation should thus be calibrated with this credit in mind and coordinated with macroprudential tools, so prudential benefits are realized without suppressing high-productivity investment. The effectiveness of such measures may also depend on the state of the financial cycle, calling for a calibration that differs between periods of domestic vs. global loosening of financial conditions.

Literature Review. Our work contributes to two strands of the empirical literature

on capital controls. The first documents the microeconomic costs these policies can impose on firms. In a seminal contribution, Forbes (2007a) shows that during the Chilean encaje in the 1990s, smaller traded firms faced significant financial constraints, which eased as firm size increased. In a companion survey, Forbes (2007b) summarizes early microeconomic studies, concluding that capital controls increase financial constraints, especially for smaller firms and those without international market access, and can distort investment decisions. Alfaro et al. (2017) find that Brazilian firms experienced lower returns after capital control announcements, consistent with higher financing costs, with effects concentrated among firms more dependent on external finance. Building again on the Chilean experience, Andreasen et al. (2024a) document that controls had heterogeneous effects on firms as exporting firms operating in more capital-intensive sectors were more negatively affected than those operating in less capital-intensive sectors. Using a structural model, they relate their findings to the increase in financing costs, the depreciation of the real exchange rate, and compositional effects on the mass of exporters and non-exporters. Extending this analysis, Andreasen et al. (2023) show that capital controls raise misallocation and welfare costs, particularly for exporters and highly productive firms with large optimal scale gaps. New cross-country evidence from Andreasen et al. (2024b) indicates that capital controls tighten firm-level financing constraints, while macroprudential policies tend to alleviate them.

The second strand of literature investigates the potential benefits of controls for financial stability. While the debate remains unsettled, Erten et al. (2021) conclude in their comprehensive survey that empirical evidence generally supports a stabilizing role, particularly when controls are used countercyclically. At the firm level, Gallego et al. (2003) find that Chilean firms reduced leverage and increased reliance on retained earnings in the 1990s, thereby lowering vulnerability to short-term speculative flows during the Asian and Russian crises. Using Colombian microdata, Fabiani et al. (2022) show that capital controls taxing FX debt break the carry-trade, reducing risky credit supply from FX-indebted banks to

riskier firms. In subsequent work, Fabiani et al. (2023) further show that controls slow firm debt growth during booms, improve firm performance during crises, and do not significantly distort credit allocation between productive and unproductive firms. The debate, however, is far from closed. Keller (2019), for instance, documents that Peru's limits on banks' FX forward positions shifted exchange rate exposure from foreigners onto domestic firms, while Andreasen et al. (forthcoming) find that higher FX reserve requirements in Peru reduced overall credit supply.

Our work contributes to both strands of the literature. To some extent, the firm-level costs and the stability benefits are two sides of the same coin: deleveraging that strengthens balance sheets at the macro level may also mean firms cutting expenditures and facing tighter constraints. The relevant question is therefore whether controls disproportionately affect firms with high potential, leaving scars that weigh on long-run growth. This is where our paper makes its main contribution: we *jointly* test the prudential and profitability channels in a large cross-country firm panel, linking financing outcomes to real investment responses. By assembling the largest cross-section of EME firms with detailed balance sheet information, we move beyond single-country case studies—where firm-level financial data are often missing—and provide systematic evidence on both the benefits and costs of CCIs across heterogeneous firms and economic conditions. To the best of our knowledge, ours is the first study to assess these firm-level CCI-induced trade-offs jointly across a broad EME sample with rich information of firms' balance sheet and real outcomes.

Our work is also the first to shed light on the bond channel of capital controls, offering a cleaner identification of how these policies affect firms. We do this by expanding the dataset with bond-level information on domestic issuance, a dimension that has not been unexplored in prior work. Focusing on the bond channel allows us to directly align the policy measure—restrictions on nonresident purchases of domestic bonds—with the outcome of interest, firms' domestic bond issuance. This focus also helps us bypass a common concern

in the literature: small firms are largely absent from bond markets. As we show, our sample is indeed tilted toward larger listed firms, which makes the bond channel especially relevant.[1]

Our modeling framework is also related to a growing literature that emphasizes the role of beliefs and optimism in shaping capital flows and external borrowing. A long-standing theme, dating back at least to Carmen M. Reinhart et al. (2009b)' *This Time Is Different*, is that episodes of large capital inflows are often accompanied by overly optimistic expectations about future growth prospects and the likelihood or severity of adverse states. More recently, this intuition has been formalized in models where shifts in sentiment or news about future productivity drive capital inflows and borrowing booms. In this vein, Benhima et al. (2022) develop a model in which optimistic news and sentiment generate excessive capital inflows, amplify leverage, and increase vulnerability to sudden reversals. Our model shares with this literature the emphasis on belief-driven overborrowing but differs in focus by explicitly linking optimism-induced borrowing to firm-level heterogeneity and the differential real effects of capital inflow controls across firms.

At the same time, our theoretical mechanism is complementary to, but distinct from, existing rationales for prudential capital controls based on pecuniary and aggregate demand externalities.[2] In contrast to these approaches, which rely on distortions arising from price effects or aggregate demand spillovers, our framework highlights how distorted beliefs at the firm level can lead to excessive external borrowing and financial fragility even in the absence of such externalities. This allows us to rationalize why uniform capital inflow controls may reduce fragility while simultaneously generating heterogeneous real effects across firms, a pattern that closely aligns with our empirical findings. To the best of our knowledge, this is the first model that jointly accounts for the trade-offs associated with capital inflow controls

1. The exclusion of small firms remains a caveat, which we addressed explicitly when discussing the policy implications of our work in the Introduction.

2. See references in the surveys by Erten, Korinek, and Ocampo (2021) and Bianchi and Lorenzoni (2021), among others.

by capturing both their prudential benefits in curbing financial fragility and their efficiency costs arising from constrained firm scale under firm-level heterogeneity.

The remainder of the paper is structured as follows. Section 2 introduces the dataset and provides descriptive statistics. Section 3 outlines the empirical strategy and identification approach. Section 4 presents the baseline empirical results, while Section 5 extends the analysis and reports robustness exercises. Section 6 develops the simple model of capital inflow controls under firm heterogeneity. Section 7 concludes. Additional technical material is provided in the Appendix.

2.2 Dataset

This section describes the dataset constructed for our empirical analysis. We first report the main data sources and discuss the variables in our analysis and the related summary statistics. The last subsection describes trends in domestic and international bond issuance by non-financial EMEs firms in the dataset.

2.2.1 Data sources

Our study focuses on bond issuance by non-financial companies in 18 EMEs.[3] We retrieve transaction-level information on bond issuance from LSEG's Securities Data Company (SDC) Platinum, including data on issuance volume, date, the market in which the bond was issued and firm-level identifiers. SDC Platinum is a standard database for analyzing bond issuance in a cross-country setting and especially by non-US firms (Boyarchenko et al., 2023). Importantly, SDC Platinum links each issuing firm to its ultimate parent company.[4] We assign

3. We identify Emerging Economies as those countries with an active EMBI index, namely: Argentina, Brazil, Chile, China, Colombia, Hungary, India, Indonesia, Kazakhstan, Malaysia, Mexico, Peru, Philippines, Poland, Russian Federation, Thailand, Turkey, and Vietnam. Appendix Table B.1.1 reports the precise available sample coverage for each country.

4. Whenever the parent company is not reported, we assume the issuing firm is the parent company itself, which occurs in 16 percent of the cases.

firm-level attributes to the issuing firm according to the parent company's identifier. Hence, our sample includes all bond issues by firms with parent company headquartered in the 18 emerging economies in our sample. We then compare the nationality of the parent company with the market in which the bond was issued to define the transaction as "domestic" or "international". For concreteness, consider the example of a bond issued by a firm with Brazilian parent. We label it as domestic if it is issued in a Brazilian bond market, and as international if issued in any non-Brazilian bond market. We exclude issuance of commercial paper by retaining only transactions that SDC categorize as bond issuance, involving maturity equal to or above one year.[5]

Next, we gather quarterly balance sheets for publicly listed firms from Worldscope.[6]

We retain information on leverage (total debt/assets), profitability (ROA, ROE),[7] size (log total assets) and the liquid assets ratio. We merge SDC and Worldscope data through a three-stage process. First, as already explained, we identify the parent company for each issuing firm in the SDC dataset. Second, for each parent company in SDC, we look for the corresponding information in Worldscope through three common identifiers, namely the CUSIP, SEDOL, and ISIN codes. Finally, we employ a fuzzy name-matching algorithm for the remaining unmatched issuers, followed by manual verification to ensure exact matching. The initial dataset from SDC Platinum identifies approximately 4,256 non-financial corporate issuers of domestic bonds whose parent firms are located in EMEs. Following our matching procedure, we successfully merge 4,045 of these issuers.[8]

5. Formally, we retain transactions that are attributed the following security types in SDC: bonds, notes, and debentures. We exclude convertible bonds as they represent a hybrid between equity and debt securities.

6. While similar information is also available in Compustat Global, we rely on Worldscope given its broader coverage of listed firms in Emerging Market Economies and its smoother integration with SDC identifiers (CUSIP, SEDOL, ISIN).

7. For ROA and ROE, we use annual data both because of severe attrition in quarterly information and because quarterly fluctuation in such measures may reflect seasonal dynamics.

8. Attrition is due to two reasons. First, bonds may be issued by private firms, that are not covered in Worldscope. Second, a publicly listed firm may be covered in SDC but not in Worldscope. The very low attrition rate (close to 5%) associated with merging the two datasets implies that neither of the two issues

Our analysis also exploits a wide variety of country-level time-series variables. Most importantly, we obtain data on capital controls from Fernández et al. (2016), building on the IMF's Annual Report on Exchange Arrangements and Exchange Restrictions (AREAER) and capturing the extensive margin of capital controls with annual frequency. This dataset is particularly suited for our study because of three distinguishing features in its granularity. First, it splits capital controls across different financial instruments including bonds, which is at the center of our analysis, as well as on other instruments such as equity, derivatives, money market, collective instruments and real estate. Second, capital controls on each instrument are further categorized based on the residency of the buyer and seller of each financial asset. Third, the dataset also distinguishes capital controls on inflows versus outflows. While we control for broad set of capital controls in our empirical methodology, the key control of interest remains the controls on purchasing bonds locally by non-residents, referred to as $Bonds(PLBN)$ hereafter. That is, our main interest lies on capital controls limiting inflows in the form of nonresidents' ability to buy locally-issued bonds. The dataset in Fernández et al. (2016) provides categorical information on the presence (or absence) of any type of these restrictions by country and year.[9] Table B.1.4 summarizes the 18 underlying policy measures that generate switches in this indicator, distinguishing non administrative instruments such as taxes or reserve requirements from administrative restrictions such as approval, registration, or intermediation requirements. The measures span both tightenings and loosenings and reflect substantial heterogeneity in policy design across countries. This is consistent with recent evidence by Bergant et al. (2026) that the nature of cross-border flow restrictions has historically been quite varied.[10]

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is relevant in our context.

9. Note that our analysis could not be carried with the other two well-known sources for capital controls, namely Chinn et al. (2006) and Quinn et al. (2008), as they do not distinguish across financial assets nor the direction of the capital flow.

10. Note that the reduced number of measures does not allow us to explore heterogeneity of effects across the different types of controls.

We also retrieve information on other macroprudential measures (different from capital controls), that could be simultaneously used to manage credit growth. In particular, we rely on the Integrated Macroprudential Policy (iMaPP) Database (Alam et al., 2019). Distinguishing across different macroprudential measures, the dataset defines categorical monthly variation indicating whether a measure has been loosened (assigned value -1), tightened (1) or kept constant (0). The data comes at monthly frequency, that we aggregate at the quarterly frequency. There are 17 indices to measure the extensive margin of controls and, following Alam et al. (2019), we create iMaPP index as the sum of all 17 indices.

In addition to capital controls, we control for key measures of economic conditions including the real GDP growth rate, the inflation rate, the exchange rate against the US dollar, the IMF financial development index and the EMBI spread. The complete list of data sources is in the Appendix Table B.1.2.

2.2.2 Main variables and summary statistics

We generally employ a firm-level quarterly panel. Table B.1.3 displays summary statistics for firm-level variables in our baseline regression sample, comprising approximately 2,700 firms and resulting from the merge of the different firm-level information with country-level time-series and from the application of controls and fixed effects in the empirical model described in the next section.

The baseline outcome variable of interest is $1(\text{Domestic Bond Iss})_{f,t}$, a dummy with value 1 if a firm f issues a bond domestically in a given quarter t, and with value 0 otherwise.[11] The average likelihood that a firm issues a bond on any given quarter is about 5%. We also report additional information on bond issuance; the average firm issues bonds around 6 times over our sample period, with average volume of more than 200 milion USD and maturity

11. We include firms from the first to the last time we observe a bond issue in SDC. For instance, if we observe a firm in SDC issuing a bond in, say, 2000, and for the last time in 2015, we will include it in our observations within those date range.

above 3 years (see Appendix Table B.1.3).

One of our main variables is firm leverage, defined as total debt over total assets. On average, firms finance one third of their assets through debt, as depicted in Table 2.1. However, the data reflect notable dispersion in firm leverage, with a standard deviation (s.d.) of 16 percentage points (p.p.) and interquartile range (IQR) of 22 p.p.. Our preferred measure for firm profitability is return on assets (ROA), obtained by dividing net income by total assets. The average firm displays positive profitability of around 5%, with significant heterogeneity as accounted for by a s.d. and IQR of roughly 6 p.p.. The correlation between firm leverage and ROA is minus 0.18.

Table 2.1 shows additional summary statistics for the country-level variables. Most importantly, $Bonds(PLBN)_{c,t}$ is a dummy variable with value 1 if country c in quarter t has implemented capital controls on foreign purchase of domestically issued bonds, and with value 0 otherwise. It has to be noted that, consistently with the original data frequency in Fernández et al. (2016), this variable varies at the country-year level (i.e. it is constant across the quarters of a given year). In our sample of Emerging Economies, capital controls on foreigners' purchase of locally issued bonds are in place for approximately two thirds of the time, as signalled by the average of 0.67.[12] Our dataset overall captures 19 switches in capital controls on purchase of locally issued bonds by non residents—that is, episodes in which governments either enforces or removes such measure—across 11 countries (see Appendix Table B.1.3). This is consistent with previous work that has documented stickiness in the use of capital controls (Fernández et al., 2015; Acosta-Henao et al., 2025).

Next, we collapse information on domestic macroprudential policy from Alam et al. (2019) into a country-specific quarterly index, iMaPP. The original data provides a variable with

12. We also use other information on capital controls. In particular, $Bonds(SIAR)_{c,t}$ is a dummy variable for whether a country implements capital controls on sale or issue abroad by residents of foreign issued bonds. We also report several other capital controls dummies, related to the purchase by foreigners of locally issued collective investment, derivatives, equity (either direct investments or not) and money market instruments, and to the extension of other credits (Financial Credits) from abroad or the purchase of real estate assets.

value 0 if a macroprudential tool (e.g. countercyclical capital buffers) has not changed over a month, 1 if it has been tightened, and -1 if it has been loosened. We take the sum over a quarter. In an extension, we also consider an overall macroprudential stance index, which cumulates the iMaPP over time for each country.

2.2.3 Domestic and International Bond Issuance

Our primary focus rests on *domestic* bond issuance by firms, as opposed to international issuance. For concreteness, considering the usual example of a Brazilian firm issuing bonds, we mostly concentrate on issues occurring in Brazilian bond markets, as opposed to bonds issued in international (i.e. non-Brazilian) bond markets.

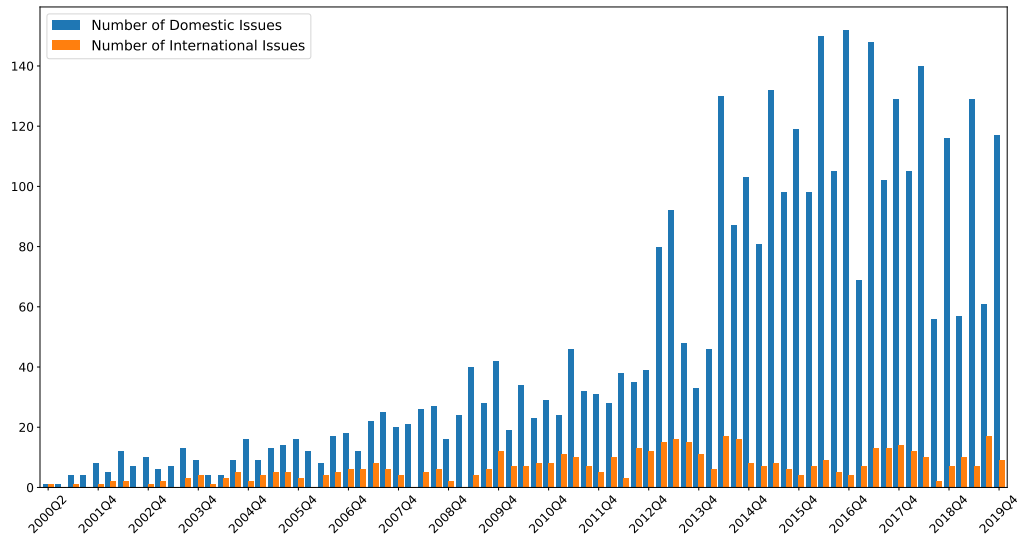
This choice is due to the fact that, since the Global Financial Crisis (GFC) of 2008, firms in emerging market economies (EMEs) have increasingly relied on domestic bond markets to meet their financing needs (Avdjiev et al., 2024; C. C. Bertaut et al., 2021). This structural shift reflects both regulatory developments and evolving market dynamics that have favored local debt issuance, mostly in local currency. Consistent with this trend, our final sample exhibits a substantially higher volume of domestic bond issuances relative to international ones. Figure 2.1 illustrates the prevalence of domestic bond issuance (denoted by blue bars) versus international bond issuance (orange bars), both in terms of the of the number of bonds issued (panel A) and in terms of volume (panel B).

Appendix Table B.1.3 reports some additional information on bond issuance. The average firm in our sample issues bonds around 6 times, and the average issuance equals 227 millions of US dollar.

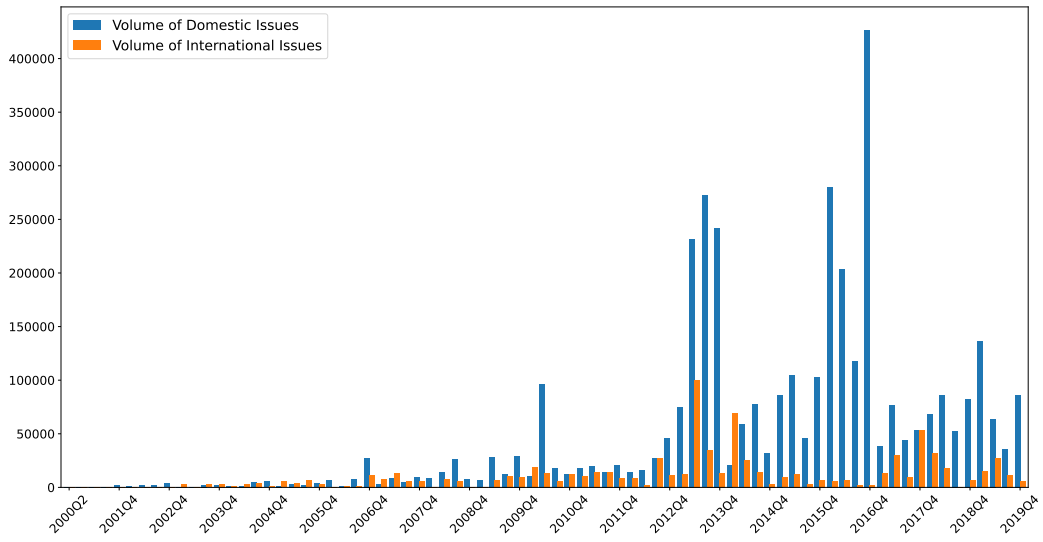
Table 2.1: Summary statistics of capital controls and other economy controls

Observations: 72,332	Mean	Median	Std. Dev.	p25	p75
Dependent Variable					
bois: 1(Domestic Bond Iss)	0.051	0.00	0.22	0.00	0.00
Firm Controls					
Leverage (%)	32.58	31.87	16.56	20.91	43.37
ROA (%)	5.46	5.08	6.36	2.77	8.27
Size ($\equiv$ log(Total Assets))	20.88	20.86	1.69	19.75	22.01
(log) Liquidity	3.11	3.26	0.89	2.66	3.75
Capital Controls on bond inflows					
Bonds (PLBN)	0.67	1.00	0.47	0.00	1.00
Other Capital Controls					
Equity (PLBN)	0.75	1.00	0.44	0.00	1.00
Money Market (PLBN)	0.67	1.00	0.47	0.00	1.00
Bonds (SIAR)	0.79	1.00	0.41	1.00	1.00
Collective Inv. (PLBN)	0.61	1.00	0.49	0.00	1.00
Derivatives (PLBN)	0.76	1.00	0.43	1.00	1.00
Real Estate (PLBN)	0.90	1.00	0.31	1.00	1.00
Financial Credits (Inflows)	0.90	1.00	0.29	1.00	1.00
Direct Investment (Inflows)	0.92	1.00	0.27	1.00	1.00
Macroprudential policy					
iMaPP Index	0.65	0.00	1.48	0.00	1.00
Economy Controls					
Real GDP growth rate	6.01	6.50	3.67	4.13	7.89
CPI Inflation	3.60	2.80	3.52	1.75	4.83
(log) Exchange Rate	2.44	1.89	2.00	1.34	2.11
Overall Financial Development	0.54	0.56	0.11	0.47	0.63
EMBI spread (%)	1.87	1.62	1.43	1.10	2.14

Figure 2.1: Domestic vs International Bond Issuance



(a) Number of Issues



(b) Volume of Issues (in Millions USD)

2.3 Empirical model

2.3.1 Identification of the effects of capital controls on bond issuance

Our baseline model aims at identifying the effects of capital controls on non-financial firms' propensity to issue bonds. We borrow the identification strategy from Becker et al. (2014).[13] In practice, we retain firm-quarter pairs in which total firm-level debt displays a positive growth rate. Hence, we restrict our analysis on firm-quarter pairs in which, by a revealed preference argument, a firm exhibits positive demand for external funding. Hence, estimated adjustments on bond issuance along the extensive margin must be supply driven.

We estimate the following regression model:

$$1\left[Bond_{f,c,t}\right] = \beta_1 CC^{bond}_{c,t-1} + \Gamma X_{f,c,t-1} + \mu_f + \mu_{s,t} + e_{f,t} \tag{2.1}$$

The outcome variable, $1\left[Bond_{f,c,t}\right]$, is a dummy with value 1 if firm f from country c issues a bond in quarter t, and with value 0 otherwise. The key coefficient of interest, β_1, loads a (lagged) dummy variable for whether capital controls on bond inflows are in place in country c, $CC_{c,t-1}$. We focus on capital controls on purchases of bonds issued locally in country c from non-residents, i.e. from investors from country c', $c' \neq c$. Under our baseline hypothesis that capital controls are associated with a reduction in the supply of foreign funding for locally issued bonds, it should be the case that $\beta_1 < 0$.

Capital controls on bond inflows are observed at the annual frequency. We first construct a lag of the annual capital control indicator, so that the value assigned in a year reflects whether bond inflow restrictions were in place during the previous year. This lagged annual series is then mapped to the quarterly firm level panel by assigning the same value to all four quarters within a given calendar year. A lagged value of the capital control variable therefore

13. Becker et al. (2014) study the propensity to issue bonds versus bank debt by listed US firms in reaction to variations in US credit supply conditions. For an applications to Emerging Markets of such approach and in the context of capital controls, see Bacchetta et al. (2023).

is assumed to be known to firms and investors when bond issuance decisions in quarter t are made. This timing reflects the idea that capital controls affect bond issuance with a delay, as firms adjust financing plans in response to the regulatory environment prevailing over the prior year rather than contemporaneous within quarter policy changes.

We augment the model with a rich list of lagged firm-level and country-level controls, denoted by the vector $X_{f,c,t-1}$. In particular, we control for firm profitability and riskiness through ROA and leverage, respectively; moreover, we control for firm liquidity (via the liquid asset ratio) and size (through log total assets). Country-level controls include proxies of business cycle and financial cycle conditions such as GDP growth rate, inflation rate, exchange rates to US Dollar, overall financial development index and variations in the EMBI spread.

We also add other lagged capital controls dummies on other instruments, namely derivatives, equity, money market inflows from non-residents, financial credit and direct investment. Controlling for the enforcement of other capital controls measures is important to avoid omitted variable bias in our estimates. Indeed, capital controls on different classes of transactions may correlate[14] and investors may use the associated securities and financial flows as substitutes or complements to bonds. For analogous reasons, we also control for change in macroprudential stance as measured by lagged iMaPP index described in Section 2.2. Finally, μ_f is a vector of firm fixed effects, whereas $\mu_{s,t}$ denote a vector of sector*time FE. Finally, $e_{f,t}$ is an error term, which we cluster at the firm-level.

We conclude this section by discussing the main threat to our identification, related to the issue of capital controls endogeneity. Indeed, capital controls are not exogenous, but rather driven by current macro-financial local and global developments, including bond issuance by NFCs. However, the empirical model outlined above takes care of such endogeneity to a large extent. First, we control for global (sector-specific) shocks through sector*time fixed

14. See Table B.1.5 in the Appendix.

effects. Second, we exclude reverse causality by using lagged and therefore predetermined dummies for capital controls. Third, since we control for a long list of local macro-financial variables, we exploit residual variation in capital controls after controlling for local business and financial cycles. Last, but not least, the Becker et al. (2014)'s identification strategy narrows down the endogeneity concern by focusing on the choice of issuing bonds vis-à-vis other forms of external finance (e.g. bank loans). Hence, for the potential bias to impact our results significantly, it has to be the case that unobserved macro-financial conditions prompting capital controls tilt firms' financing choice towards bond, as compared to other forms of external financing such as bank loans. In this respect, however, a relatively large literature shows that the global credit cycle influences credit supply by local banks in Emerging Markets as well (see, e.g., Bräuning et al. (2020); Di Giovanni et al. (2022); Morais et al. (2019)).

2.3.2 Heterogeneous effects across firms

We test whether capital controls influence firms' ability to issue bonds differently depending on their profitability (ROA) and leverage. In particular, we categorize firms into quartiles (q) of these two variables and run the following regression model:

$$1\left[Bond_{f,c,t}\right] = \sum_{q\neq 1,\, Z=ROA,Lev} \sum \beta_q^Z \left(CC_{c,t-1}^{bond} * Z_{f,c,t-1}^q\right) + \Gamma X_{f,c,t-1} + \mu_f + \mu_{s,t} + \mu_{c,t} + e_{f,t} \tag{2.2}$$

We are especially interested in the coefficients β_q^{ROA} and β_q^{Lev}, $q = 2, 3, 4$, loading the interaction between the capital controls dummy, $CC_{c,t-1}^{bond}$, and a further dummy for whether a firm is in the q-th quartile of the distribution of either ROA or leverage. Hence, β_q measures the relative impact of capital controls on bond issuance for firms in the q-th quartile

of either leverage or ROA, as opposed to firms in the first quartile, with $q = 2, 3, 4$. The rest of the model is otherwise identical to model 2.1, apart from a few elements. First, we augment our model with country*time fixed effects, $\mu_{c,t}$, which absorb any country-specific and time-varying shocks, controlling for any potential unobserved country-specific factors that influence both the likelihood of capital controls and firm-level bond issuance. Importantly, country*time fixed effects take care of the endogeneity of capital controls with respect to local economic conditions, as they imply that the coefficients of interest are identified via the within country and time variation across firms. Second, we also control for the interaction of other firm characteristics (liquidity and size) with capital controls, subsumed in vector of controls $X_{f,c,t-1}$.

2.3.3 Real effects

To investigate whether capital controls have an ultimate effect on firms' performance, we check whether they impact investment. However, before that, we notice that even under a significant negative effect of capital controls on bond issuance, capital controls may not affect investment to the extent that firms can substitute the forgone bond funding with other sources of external finance, e.g. bank loans. Hence, checking for real effects through a "bond channel" requires a two-step test in which we first verify the effect of capital controls on total liabilities and, next, on investment.

The employed regression model follows. Since a reduction in debt could take time to materialize and to display its influence on investment, we estimate a dynamic model in the spirit of Jordà (2005)'s local projections:

$$\Delta_h y_{f,c,t+h} = \gamma_{1,h} CC^{bond}_{c,t-1} + \Psi_h X_{f,c,t-1} + \mu_{f,h} + \mu_{s,t,h} + e_{f,t,h}, \qquad (2.3)$$
$$h = 0, 1, 2, \cdots, 8$$

We estimate sequentially the models above by OLS. The dependent variable, $\Delta_h y_{f,c,t+h}$, measures the cumulative log-change of the variable of interest (either total liabilities or total investment) between period $t-1$ and $t+h$, where $h = 0, 1, 2, ..., 8$. Hence, through the coefficients $\gamma_{1,h}$, we pin down the response of total liabilities and investment over a 2-year horizon following the use of capital controls. The employed set of controls and fixed effects is identical to that explained for the baseline model 2.1. We eventually augment the model with interactions of the capital control dummy and firm-level indicators of profitability and risk to investigate heterogeneity in real effects.[15]

2.4 Results

2.4.1 Baseline Results: Domestic Bond Issuance

Table 2.2 displays results from the estimation of model 2.1. Column 1 reports estimates from a minimal model, where we just apply macroeconomic controls (including other capital controls measures). In column 2, we add firm and time (year-quarter) fixed effects. Column 3 further augments the model by employing sector*time fixed effects, but excludes time fixed effects. Finally, column 4 shows the most robust estimates, including firm controls, fully aligned with the model described in section equation 2.1. Across all specifications, and despite a notable increase in the adjusted R-squared from 2% to almost 13%, lagged capital controls are systematically associated with a subsequent fall in the likelihood of issuing bonds domestically. The coefficient is also very stable across the different models and, according to the most robust estimate in the last column, is close to -1.7 percentage points (p.p.). This effect is economically sizable, implying a cut by one third with respect to the unconditional

15. In such models, we will also augment the model with country*time fixed effects and with the interaction of firm level controls with capital controls, as explained in the previous subsection when discussing equation 2.2.

average probability of issuing bonds (5.1 p.p.).[16]

Table 2.2: Effect of Capital Controls on Bond Domestic Bond Issuance

bois: 1(Domestic Bond Iss)	(1)	(2)	(3)	(4)
L.Bonds (PLBN)	-0.0096**	-0.0160***	-0.0156***	-0.0169***
	(-2.01)	(-3.16)	(-2.99)	(-3.29)
Other Capital Controls, iMaPP	✓	✓	✓	✓
Economy Controls	✓	✓	✓	✓
Firm Controls	×	×	×	✓
Firm FE	×	✓	✓	✓
Time FE	×	✓	–	–
Sector*Time FE	×	×	✓	✓
Observations	72332	72332	72332	72332
Adj. R-sq	0.0209	0.115	0.125	0.127
Mean bois	0.0510	0.0510	0.0510	0.0510
Std. dev. bois	0.220	0.220	0.220	0.220
Obs. if L.Bonds (PLBN)=1	48113	48113	48113	48113
Number of countries	18	18	18	18

Notes: The dependent variable is a dummy variable equal to 1 if firm f issues a domestic bond in quarter t, and 0 otherwise. L.Bonds (PLBN) is a lagged dummy variable with value 1 if capital controls on purchases by nonresidents of locally-issued bond are imposed in a given country, and with value 0 otherwise. Other Capital Control include (lagged) restrictions on capital inflows through equity, money market, collective investment, derivatives, real estates, financial credits, direct investment and on foreign issue of bonds by residents. The lagged iMaPP index captures country-level domestic macroprudential policy. Economy-level controls include lagged quarterly real GDP growth, CPI inflation, the log of the nominal bilateral exchange rate against the dollar, the overall financial development index, and the lagged change in the EMBI spread. Firm-level controls include lagged values of size (log of total assets), leverage, liquidity, and return on assets (ROA). The symbol "-" denotes cases where a group of controls and/or fixed effects spanned out by the introduction of other controls and/or fixed effects. Standard errors are clustered at the firm level. t-statistics are reported in parentheses. $^{*}p < 0.10$; $^{**}p < 0.05$; $^{***}p < 0.01$.

Having established that capital controls on bond inflows are associated with subsequent economically meaningful declines in domestic bond issuance, we next ask whether other types

16. One potential caveat to these results is that firms could respond to domestic bond inflow controls by substituting toward offshore bond issuance, leaving overall bond financing unchanged. In practice, however, we do not believe that this channel appears quantitatively relevant in our data. Over the sample period, international bond issuance accounts for a substantially smaller share of total corporate bond issuance than domestic issuance, both in number and in volume, see Figures 2.1a and 2.1b. This suggests that offshore issuance does not offset the reduction in domestic bond issuance documented in the baseline results.

of controls are also systematically related to issuance by redirecting firms across markets. To that end, Table 2.3 reports the same regression estimates as the just commented Table 2.2 but zooming into the estimated coefficients for the other policy tools. Irrespectively of the model we use, introducing capital controls on locally issued equity and money market debt flows raises the likelihood of issuing bonds domestically, as signaled by the positive and statistically significant coefficients on $L.Equity(PLBN)$ and $L.MoneyMarket(PLBN)$. These results point to a *substitution effects* between equity and short-term money market financing, on one hand, and (long-term) bond financing, on the other hand. Likewise, introducing capital controls on international bond issuance raises the likelihood to issue bonds locally, as signaled by the positive and statistically significant coefficients on $L.Bonds(SIAR)$. Interestingly, capital controls on financial credits (mostly bank loans) from abroad as well as domestic macroprudential measures reduces the likelihood of issuing domestic bonds, possibly due to the fact that such measures, by targeting domestic credit growth, also desincentivize bond issuance.[17] [18]

2.4.2 Heterogeneous effects

We estimate model 2.2 and report the results in Table 2.4. In column 1, we test the hypothesis that capital controls reduce funding especially for highly leveraged firms. Consistently with this conjecture, the likelihood of issuing bonds falls relatively more for firms with above-median leverage, as opposed to firms with low (first-quartile) leverage. We call this a

17. They may operate also through a signaling channel, by which more government intervention may eventually enforce more controls on bond issuance. We do not report capital controls measures (e.g. on derivatives) displaying a statistically insignificant coefficient.

18. Our focus on the extensive margin of bond issuance is motivated by the nature of the underlying policy instruments. As summarized in Appendix Table B.1.4, many of the bond inflow control measures (Bonds (PLBN)) in our sample take the form of administrative restrictions such as approval requirements, registration rules, or constraints on eligible intermediaries, which primarily affect firms' ability to access bond markets rather than the size of individual issues. Consistent with this institutional feature, we do not find systematic evidence that bond inflow controls operate through the intensive margin of issuance conditional on accessing the market.

Table 2.3: The effects of capital controls on instruments other than bonds inflows on domestic bond issuance.

bois: 1(Domestic Bond Iss)	(1)	(2)	(3)	(4)
L.Bonds (PLBN)	-0.0096**	-0.0160***	-0.0156***	-0.0169***
	(-2.01)	(-3.16)	(-2.99)	(-3.29)
L. Equity (PLBN)	0.0188***	0.0218***	0.0208***	0.0185***
	(4.38)	(3.24)	(2.90)	(2.59)
L. Money Market (PLBN)	0.0087	0.0189***	0.0200***	0.0228***
	(1.44)	(2.71)	(2.80)	(3.21)
L.Bonds (SIAR)	0.0086*	0.0169*	0.0193**	0.0173*
	(1.89)	(1.96)	(2.10)	(1.88)
L.Financial credits	-0.033***	-0.0172***	-0.0197***	-0.0167***
	(-6.90)	(-3.28)	(-3.61)	(-3.16)
L.iMaPP Index	-0.0024***	-0.0018**	-0.0019**	-0.0015*
	(-3.97)	(-2.17)	(-2.30)	(-1.89)
Other Capital Controls	✓	✓	✓	✓
Economy Controls	✓	✓	✓	✓
Firm Controls	×	×	×	✓
Firm FE	×	✓	✓	✓
Time FE	×	✓	–	–
Sector*Time FE	×	×	✓	✓
Observations	72332	72332	72332	72332
Adj. R-sq	0.0209	0.115	0.125	0.127
Mean bois	0.0510	0.0510	0.0510	0.0510
Std. dev. bois	0.220	0.220	0.220	0.220

Notes: The dependent variable is a dummy variable equal to 1 if firm f issues a domestic bond in quarter t, and 0 otherwise. L.Bonds (PLBN) is a lagged dummy variable with value 1 if capital controls on purchases by nonresidents of locally-issued bond are imposed in a given country, and with value 0 otherwise. Other Capital Control include (lagged) restrictions on capital inflows through equity, money market, collective investment, derivatives, real estates, financial credits, direct investment and on foreign issue of bonds by residents. SIAR stands for sold or issued abroad by residents. The lagged iMaPP index captures country-level domestic macroprudential policy. Economy-level controls include lagged quarterly real GDP growth, CPI inflation, the log of the nominal bilateral exchange rate against the dollar, the overall financial development index, and the lagged change in the EMBI spread. Firm-level controls include lagged values of size (log of total assets), leverage, liquidity, and return on assets (ROA). The symbol "-" denotes cases where a group of controls and/or fixed effects spanned out by the introduction of other controls and/or fixed effects. Standard errors are clustered at the firm level. t-statistics are reported in parentheses. $^{*}p < 0.10$; $^{**}p < 0.05$; $^{***}p < 0.01$.

prudential channel of capital inflow controls on firms' bind issuance.

In column 2, we ask whether firms with different degrees of profitability are heterogeneously affected by capital controls. Indeed, very profitable firms, as identified by those in the upper quartile of ROA, suffer a relatively stronger cut in the probability to issue bonds (as opposed to firms in the lower quartile of ROA). This, in turn, we label a *profitability channel* of capital inflow controls.

One subtle aspect of this heterogeneity analysis is that, for some firms, ROA and leverage may correlate substantially, in line with evidence that leverage varies substantially across firms of different size and profitability.[19] In our sample, however, the correlation between ROA and leverage is modest in magnitude, at minus 0.18, indicating substantial independent variation across the two measures. Hence, in order to test whether the two channels operate independently of each other, columns 3 directly carries out a horse-race between the two variables in a model excluding country*time fixed effects, but including economy controls. Lastly, column 4 is the richest specification by including country*time fixed effects.

The resulting estimates confirm both channels are active. This analysis points to significant trade-offs associated with the enforcement of capital controls. On one hand, capital controls reduce debt accumulation by risky firms, in line with a prudential function. On the other hand, capital controls also tend to reduce funding for highly profitable firms. Insofar as these relatively more profitable firms cannot substitute this issuance with alternative sources of finance, this could potentially contribute to a more inefficient allocation of capital across firms that is detrimental for growth. We turn to this next.

2.4.3 Real effects

We conclude our empirical analysis by examining whether capital controls are associated with real effects at the firm level and whether such effects vary systematically across firms. We

19. See, e.g., Dinlersoz et al. (2019).

Table 2.4: Heterogeneous effects of capital controls on bond issuance: firm profitability *vs* leverage.

bois: 1(Domestic bond Iss)	(1)	(2)	(3)	(4)
L.Bonds (PLBN)*Lev Q2	-0.00241		-0.00496	-0.00368
	(-0.44)		(-0.91)	(-0.67)
L.Bonds (PLBN)*Lev Q3	-0.0111*		-0.0107*	-0.0122**
	(-1.86)		(-1.77)	(-2.05)
L.Bonds (PLBN)*Lev Q4	-0.0123*		-0.0116*	-0.0137**
	(-1.89)		(-1.80)	(-2.11)
L.Bonds (PLBN)*ROA Q2		0.00514	0.00378	0.00542
		(0.88)	(0.65)	(0.93)
L.Bonds (PLBN)*ROA Q3		0.00195	-0.00603	0.00221
		(0.32)	(-1.01)	(0.37)
L.Bonds (PLBN)*ROA Q4		-0.0110*	-0.0190***	-0.0107*
		(-1.75)	(-3.05)	(-1.71)
Other Capital Controls, iMaPP	–	–	✓	–
Economy Controls	–	–	✓	–
Firm Controls	✓	✓	✓	✓
Firm FE	✓	✓	✓	✓
Sector*Time FE	✓	✓	✓	✓
Country*Time FE	✓	✓	×	✓
Observations	72233	72233	72332	72233
Adj. R-sq	0.136	0.137	0.127	0.137

Notes: The dependent variable is a dummy variable equal to 1 if firm f issues a domestic bond in quarter t, and 0 otherwise. L.Bonds (PLBN) is a lagged dummy variable with value 1 if capital controls on purchases by nonresidents of locally-issued bond are imposed in a given country, and with value 0 otherwise. Lev Q and ROA Q are quartile indicators for leverage and return on assets, with Q1 the lowest and Q4 the highest. Reported rows are coefficients on L.Bonds (PLBN) interacted with each quartile indicator, the omitted group is Q1. We also interact L.Bonds (PLBN) with other firm controls, size and liquidity, but do not show them here for brevity. Other Capital Control include (lagged) restrictions on capital inflows through equity, money market, collective investment, derivatives, real estates, financial credits, direct investment and on foreign issue of bonds by residents. The lagged iMaPP index captures country-level domestic macroprudential policy. Economy-level controls include lagged quarterly real GDP growth, CPI inflation, the log of the nominal bilateral exchange rate against the dollar, the overall financial development index, and the lagged change in the EMBI spread. Firm-level controls include lagged values of size (log of total assets), leverage, liquidity, and return on assets (ROA). The symbol "-" denotes cases where a group of controls and/or fixed effects spanned out by the introduction of other controls and/or fixed effects. Standard errors are clustered at the firm level. t-statistics are reported in parentheses. $^{*}p < 0.10$; $^{**}p < 0.05$; $^{***}p < 0.01$.

begin by studying their relationship with firms' total liabilities, which captures the balance-sheet channel through which changes in external financing conditions may operate. We then assess how these balance-sheet responses translate into firms' investment decisions

So far, we have shown that capital controls on bond inflows are associated with a sizable reduction in the likelihood to issue bonds locally. However, firms may substitute the forgone bond funding (due to capital controls) with local bank credit or other forms of bank financing. Hence, in order to understand whether capital controls are binding for firms' overall funding capacity, we first check whether they have an ultimate bearing on firms' total liabilities.[20] To this end, Panel A of Table 2.5 shows the results from the estimation of model 2.3. Capital controls reduce total liabilities on impact by 1.2% and by 1.8% over the next quarter. Nonetheless, the effect is relatively short-lived and mean reverts to 0 already after 2 quarters. Panel B shows coefficients for an analogous regression model, though with investment (ratio between CAPEX and the lagged total assets ratio) growth as outcome variable. Consistent with a short-lived impact of the bond channel of capital controls on total firm liabilities, investment goes down on impact, although the effect is marginally statistically insignificant. The reduction in investment peaks 6 quarters when it reaches -0.21% (about 13% of the unconditional average.[21])

In line with the the results for bond issuance described in the previous section, we conclude by asking whether real effects are heterogeneous across firms with different profitability and leverage. In Panel A of Table 2.6, firms with higher leverage undergo a relatively stronger and more persistent cut in total liabilities. For instance, firms in the top quartile of leverage suffer a relative cut in total liabilities (compared to firms in the first quartile) of about 7%

20. Total liabilities, as reported in Worldscope, encompass all short term and long term obligations of the firm, including interest bearing debt and non debt liabilities such as trade credit, provisions, deferred taxes, and pension obligations. Equity instruments and minority interests are excluded. Consequently, our results on total liabilities allow firms to substitute away from bond issuance toward other non equity sources of financing, including bank loans or trade credit, but do not capture substitution toward equity issuance.

21. See Table B.1.6 for summary statistics on investment and total liabilities at all horizons.

Table 2.5: Real effects of capital controls

Δ_h log **Total Liabilities**	h=0	h=1	h=2	h=3	h=4	h=5	h=6	h=7	h=8
L.Bonds (PLBN)	-0.0119*	-0.0174*	-0.00710	-0.0188	0.00649	0.0138	0.0166	0.0245	0.0574**
	(-1.90)	(-1.89)	(-0.63)	(-1.35)	(0.43)	(0.77)	(0.84)	(1.16)	(2.51)
Observations	62834	60225	58195	57258	56879	55083	54046	52787	51910
Δ_h**Investment**	h=0	h=1	h=2	h=3	h=4	h=5	h=6	h=7	h=8
L.Bonds (PLBN)	-0.0010	-0.0007	-0.0016	-0.0018*	-0.0020*	-0.0015	-0.0021*	-0.0005	-0.0006
	(-1.51)	(-0.73)	(-1.54)	(-1.71)	(-1.79)	(-1.31)	(-1.68)	(-0.36)	(-0.46)
Observations	57593	54875	53232	52136	51775	50063	49237	48018	47149
Other Capital Controls, iMaPP	✓	✓	✓	✓	✓	✓	✓	✓	✓
Economy Controls	✓	✓	✓	✓	✓	✓	✓	✓	✓
Firm Controls	✓	✓	✓	✓	✓	✓	✓	✓	✓
Firm FE	✓	✓	✓	✓	✓	✓	✓	✓	✓
Sector*Time FE	✓	✓	✓	✓	✓	✓	✓	✓	✓

Notes: Each column reports horizon h regressions for $h = 1, 2, \cdots, 8$. As a dependent variable, Panel A uses Δ_h log Total Liabilities; Panel B uses Δ_h Investment, where Investment is CAPEX divided by lagged total assets and Δ_h is the change from quarter $t-1$ to $t+h$. L.Bonds (PLBN) is a lagged dummy variable with value 1 if capital controls on purchases by nonresidents of locally-issued bond are imposed in a given country, and with value 0 otherwise. Other Capital Control include (lagged) restrictions on capital inflows through equity, money market, collective investment, derivatives, real estates, financial credits, direct investment and on foreign issue of bonds by residents. The lagged iMaPP index captures country-level domestic macroprudential policy. Economy-level controls include lagged quarterly real GDP growth, CPI inflation, the log of the nominal bilateral exchange rate against the dollar, the overall financial development index, and the lagged change in the EMBI spread. Firm-level controls include lagged values of size (log of total assets), leverage, liquidity, and return on assets (ROA). Standard errors are clustered at the firm level. t-statistics are reported in parentheses. $^{*}p < 0.10$; $^{**}p < 0.05$; $^{***}p < 0.01$.

one year after the enforcement of capital controls and of 10% after two years. Interestingly, in contrast, highly profitable firms manage to substitute the forgone bond funding and do not experience a significant reduction in total liabilities.

Turning now to the heterogeneous effects on investment, results show that, consistently, only relatively leveraged firms undergo a significant reduction in investment. At impact, top leverage-quartile firms reduce investment by -0.14%, as compared to firms in the first quartile. This is a sizable reduction in investment, corresponding to 8.14% of the unconditional mean. Moreover, the adjustment is quite persistent, and peaks at -0.23% after 5 quarters (about 14% of the unconditional mean). In sharp contrast, we do not observe any systematic negative impact on investment by firms that are relatively more profitable.

Taken together, these results suggest that while the average real effects of capital controls are limited, they bind strongly for relatively more leveraged firms, which face persistent reductions in both total liabilities and investment. In contrast, more profitable firms man-

Table 2.6: Heterogeneous real effects across firms: profitability vs leverage

Δ_h log **Total Liabilities**	h=0	h=1	h=2	h=3	h=4	h=5	h=6	h=7	h=8
L.Bonds (PLBN)*Lev Q2	-0.00866	-0.0214**	-0.0253	-0.0319*	-0.0368*	-0.0285	-0.0401*	-0.0246	-0.0471**
	(-1.18)	(-2.05)	(-1.58)	(-1.70)	(-1.68)	(-1.23)	(-1.87)	(-1.14)	(-2.00)
L.Bonds (PLBN)*Lev Q3	-0.0205**	-0.0353***	-0.0443***	-0.0430**	-0.0469**	-0.0490**	-0.0490**	-0.0494**	-0.0607**
	(-2.33)	(-3.10)	(-2.68)	(-2.32)	(-2.19)	(-2.05)	(-2.15)	(-1.99)	(-2.17)
L.Bonds (PLBN)*Lev Q4	-0.0138	-0.0335***	-0.0549***	-0.0661***	-0.0680***	-0.0715***	-0.0768***	-0.0825***	-0.0984***
	(-1.56)	(-2.72)	(-3.37)	(-3.38)	(-2.87)	(-2.69)	(-2.99)	(-2.90)	(-3.12)
L.Bonds (PLBN)*ROA Q2	-0.0013	0.0016	-0.0058	-0.0001	-0.0030	-0.0043	-0.0108	-0.0114	-0.0017
	(-0.23)	(0.17)	(-0.50)	(-0.01)	(-0.20)	(-0.27)	(-0.60)	(-0.59)	(-0.08)
L.Bonds (PLBN)*ROA Q3	0.0031	-0.0034	-0.0015	0.0034	0.0031	-0.0058	-0.0181	-0.0179	-0.0090
	(0.45)	(-0.32)	(-0.11)	(0.20)	(0.19)	(-0.31)	(-0.84)	(-0.79)	(-0.35)
L.Bonds (PLBN)*ROA Q4	0.0181**	0.0092	0.0164	0.0228	0.0146	0.0001	-0.0212	-0.0205	-0.0061
	(2.23)	(0.70)	(0.99)	(1.08)	(0.69)	(0.00)	(-0.84)	(-0.80)	(-0.22)
Observations	62733	60125	58098	57170	56788	54995	53957	52696	51819
Δ_h**Investment**	h=0	h=1	h=2	h=3	h=4	h=5	h=6	h=7	h=8
L.Bonds (PLBN)*Lev Q2	-0.0001	0.0000	-0.0004	-0.0003	-0.0007	-0.0018*	-0.0019*	-0.0018*	-0.0008
	(-0.12)	(0.03)	(-0.46)	(-0.39)	(-0.71)	(-1.66)	(-1.87)	(-1.65)	(-0.76)
L.Bonds (PLBN)*Lev Q3	-0.0011*	-0.0013	-0.0012	-0.0007	-0.0013	-0.0037***	-0.0026**	-0.0024*	-0.0004
	(-1.90)	(-1.41)	(-1.21)	(-0.71)	(-1.24)	(-3.06)	(-2.23)	(-1.84)	(-0.32)
L.Bonds (PLBN)*Lev Q4	-0.0014**	-0.0020**	-0.0008	-0.0009	-0.0007	-0.0023*	-0.0001	0.0009	0.0011
	(-2.12)	(-2.02)	(-0.72)	(-0.78)	(-0.59)	(-1.67)	(-0.04)	(0.56)	(0.74)
L.Bonds (PLBN)*ROA Q2	0.0010**	0.0006	0.0020***	0.0003	0.0010	-0.0004	-0.0006	0.0004	0.0006
	(2.22)	(0.90)	(2.70)	(0.40)	(1.06)	(-0.39)	(-0.58)	(0.38)	(0.62)
L.Bonds (PLBN)*ROA Q3	0.0005	0.0003	0.0003	-0.0015*	-0.0002	-0.0007	-0.0010	-0.0007	-0.0008
	(0.87)	(0.33)	(0.39)	(-1.72)	(-0.25)	(-0.72)	(-0.93)	(-0.64)	(-0.70)
L.Bonds (PLBN)*ROA Q4	0.0007	0.0011	0.0004	-0.0009	0.0010	-0.0017	-0.0011	-0.0018	-0.0013
	(1.16)	(1.22)	(0.43)	(-0.94)	(0.91)	(-1.54)	(-0.96)	(-1.31)	(-0.96)
Observations	57488	54773	53130	52043	51678	49970	49143	47920	47059
Firm Controls	✓	✓	✓	✓	✓	✓	✓	✓	✓
Firm FE	✓	✓	✓	✓	✓	✓	✓	✓	✓
Sector*Time FE	✓	✓	✓	✓	✓	✓	✓	✓	✓
Country*Time FE	✓	✓	✓	✓	✓	✓	✓	✓	✓

Notes: Each column reports horizon h regressions for $h = 1, 2, \cdots, 8$. Panel A uses Δ_h log Total Liabilities; Panel B uses Δ_h Investment, where Investment is CAPEX divided by lagged total assets and Δ_h is the change from quarter $t-1$ to $t+h$. L.Bonds (PLBN) is a lagged dummy variable with value 1 if capital controls on purchases by nonresidents of locally-issued bond are imposed in a given country, and with value 0 otherwise. Lev Q and ROA Q are quartile indicators for leverage and return on assets, with Q1 the lowest and Q4 the highest. Reported rows are coefficients on L.Bonds (PLBN) interacted with each quartile indicator, the omitted group is Q1. Firm-level controls include lagged values of size (log of total assets), leverage, liquidity, and return on assets (ROA). Standard errors are clustered at the firm level. t-statistics are reported in parentheses. $^{*}p < 0.10$; $^{**}p < 0.05$; $^{***}p < 0.01$.

age to substitute the forgone bond financing and hence do not have to cut down on their investment plans. This pattern is consistent with a bond channel that transmits financial frictions into real activity primarily through leveraged firms. In the next section, we explore

this substitution margin more closely by examining which additional sources of financing profitable firms rely on when bond markets are restricted, among other extensions.

2.4.4 Substitution with Alternative Sources of Financing

Capital controls on bond inflows are associated with a contraction in bond issuance and, through this channel, with lower investment among firms with relatively higher leverage (see Table 2.6). By contrast, firms with relatively higher profitability experience a comparable decline in bond issuance but do not exhibit lower investment. This pattern suggests that more profitable firms are able to rely on alternative sources of financing to sustain investment. Consistent with earlier results, this appears to reflect, at least in part, a substitution from bond issuance toward other domestic financing sources, which explains why their total liabilities do not decline significantly. In this section, we explore whether such firms also draw on additional sources of funding beyond those previously documented.

We exploit the role of dividend payouts. Firms with high profitability generate relatively larger profits. Hence, one substitution channel they may exploit is reducing dividends payout, that can be especially attractive during periods characterized by high costs of external financing like those with capital controls in place. We test this conjecture in Table 2.7. We run annual regressions[22] with the dividend payout ratio—i.e., dividends over net income—as dependent variable. In column 1, the negative coefficient on $L.Bonds(PLBN)$ suggest that under capital controls, firms generally reduce the payout ratio; the estimated coefficient is however statistically insignificant at conventional levels. In column 2, we condition the effects on firms' profitability. In line with our hypothesis, firms with relatively higher profitability undergo a significant cut in the payout ratio. Moreover, again in line with our conjecture, the fall in the payout ratio is increasing along firms' profitability, as indicated by the larger

22. Data on dividends at the quarterly frequency display a notable extent of attrition. Therefore we exploit annual data.

coefficient (in absolute terms) for firms in higher quartiles of the distribution of firm ROA.[23] Summing up, cutting dividend payouts is another buffer that more profitable firms in EMEs use in order not to cut down on investment when capital controls curtail their domestic bond issuance.

2.4.5 Alternative Definitions of Profitability & Efficiency

So far, we have explored ROA as a measure of firm profitability. We additionally consider two alternative metrics for robustness. In particular, we exploit returns on equity (ROE) and the average revenue product of capital (ARPK). ROE measures the return on shareholders' own funds, rather than on total assets, and is given by the ratio between net income and equity. ARPK is a measure of firm efficiency (Hsieh et al., 2009; David et al., 2019), computed as total revenues over capital, where capital is given by the net book value of plant, property, and equipment. ARPK directly speaks to those models linking the enforcement of capital controls and other prudential policies to the (mis)allocation of capital across firms (Benigno et al., 2014; Bianchi et al., 2020; Andreasen et al., 2023).[24]

Table B.1.11 estimates the baseline regressions 2.1 and 2.2 for the average and heterogeneous effects of capital controls, though substituting ROA with ROE (columns 3 and 6) and ARPK (columns 2 and 5). Interestingly, the negative unconditional effect of capital controls on bond issuance is robust to such modifications in columns 2 and 3. Next, in columns 6, firms with very high levels (fourth quartile) of ROE experience a relatively stronger cut in bond issuance. Results in columns 5 suggest that firms with relatively higher ARPK do not experience a statistically different ex-post reduction in bond issuance. Hence, while these

23. We also test two additional channels for substitution, namely trade credit by other non-financial firms (proxied using accounts payable) and usage of cash stocks (proxied by current accounts). The related results are shown in Tables B.1.7, B.1.8, B.1.9, and B.1.10 in the Appendix. In general, we do not find statistically significant results.

24. Another direct measure would be firm's total factor productivity. Unfortunately, we cannot compute this measure as the Worldscope does not provide information on firm-level employment.

Table 2.7: Effect on Dividend payout ratio

	(1)	(2)
Dividends/Net income	Average effect	Heterogeneity
L.Bonds (PLBN)	-0.000820	
	(-0.44)	
L.Bonds (PLBN)*ROA Q2		-0.00393**
		(-2.10)
L.Bonds (PLBN)*ROA Q3		-0.00658***
		(-3.23)
L.Bonds (PLBN)*ROA Q4		-0.00957***
		(-3.36)
Other Capital Controls, iMaPP	✓	–
Economy Controls	✓	–
Firm Controls	✓	✓
Firm FE	✓	✓
Sector*Year FE	✓	✓
Country*Year FE	×	✓
Observations	21712	21685
Adj. R-sq	0.711	0.721
Mean Div./Net Inc.	0.0515	0.0515
Std. dev. Div./Net Inc.	0.0709	0.0709

Notes: Regressions are estimated on the firm-year panel at the annual frequency. The dependent variable is the dividend payout ratio, defined as dividends over net income. L.Bonds (PLBN) equals 1 when, in the previous year, purchases by nonresidents of locally issued bonds are restricted, and 0 otherwise. Column 1 reports the average effect. Column 2 conditions on profitability using ROA quartile indicators, with Q1 omitted. Other Capital Control include (lagged) restrictions on capital inflows through equity, money market, collective investment, derivatives, real estates, financial credits, direct investment and on foreign issue of bonds by residents. The lagged iMaPP index captures country-level domestic macroprudential policy. Economy-level controls include lagged quarterly real GDP growth, CPI inflation, the log of the nominal bilateral exchange rate against the dollar, the overall financial development index, and the lagged change in the EMBI spread. Firm-level controls include lagged values of size (log of total assets), leverage, liquidity, return on assets (ROA), and previous year's dividend payout ratio. The symbol "-" denotes cases where a group of controls and/or fixed effects spanned out by the introduction of other controls and/or fixed effects. Standard errors are clustered at the firm level. t-statistics are reported in parentheses. $^{*}p < 0.10$; $^{**}p < 0.05$; $^{***}p < 0.01$.

findings are consistent with capital controls inhibiting profitable firms' bond issuance, they also display a certain degree of sensitivity to employing alternative (model-based) efficiency measures. Overall, these findings corroborate the relative stronger effects of the prudential channel that operates through leverage.

2.4.6 Controlling for the Cumulative Stance of Macroprudential Policies

In this extension we assess robustness of our baseline results when we also control for the *stance* of macroprudential policy. We define it as the sum of the respective policy actions over time and formally quantify it as:

$$\text{Cumulative stance Var}_{t-2} = \sum_{q=0}^{t-2} \text{Var}_q$$

where Var could be any of the chosen 17 policy indices from the macroprudential policy variables taken from iMaPP dataset. $t = 0$ is taken to be the first quarter for which the information on particular macroprudential index is available. Notice that, as our baseline model includes the lagged (as of $t-1$) change in iMAPP, by further adding the cumulative stance up to $t-2$, we effectively control for both the stance and the latest innovation in macroprudential policy. Hence, our model accounts not only for the potential correlation between changes in capital controls and other macroprudential policies, but also for the possibility that capital controls are implemented heterogeneously across countries with differing macroprudential stances. For example, countries maintaining a tighter macroprudential framework may be less susceptible to capital inflow booms and busts, and therefore may have a reduced need to rely on capital controls.

We first consider an aggregate index, summing across all different policies. The results displayed in column 2 of Table 2.8 show that, if anything, the impact of capital controls on bond issuance becomes relatively stronger (i.e., more negative) after controlling for the cumulative macroprudential stance (as compared to the baseline results, reported in column 1 for easing the comparison).

Next, we consider indicators for different subsets of macroprudential policies. First, *Loan Targeted* tools encompass both demand-side and supply-side measures directly affecting

loans.[25] Second, *Demand-side* tools specifically include limits on loan-to-value ratios (LTV) and debt-service-to-income ratios (DSTI). On the *supply side*, we consider loan-specific policies (*Supply Loan*) such as limits on credit growth (LCG), loan-loss provisions (LLP), loan restrictions (LoanR), loan-to-deposit ratios (LTD), and limits on foreign currency (LFC). Broader *Supply General* tools include reserve requirements (RR), liquidity requirements, and limits on foreign exchange positions (LFX). The *Supply Capital* category incorporates leverage limits (LVR), countercyclical capital buffers (CCB), capital conservation buffers (Conservation), and overall capital requirements (Capital). Finally, for an *Individual analysis*, we select the macroprudential tools exhibiting the highest variation within the sample: LTV, DSTI, LoanR, LCG, LLP, Capital, and Tax-related measures. In general, controlling for all such different subsets of indicators does not influence the statistical significance of the capital controls (see columns 3 to 8). Across nearly all the specifications, the impact of capital controls on bond issuance strengthens, if anything.

Table 2.8: Regression results including macroprudential stance of an economy in addition to the baseline specification from before

1(Domestic Bond Iss)	(1) Baseline	(2) Sum of all	(3) Loan Targeted	(4) Demand	(5) Supply Loan	(6) Supply general	(7) Supply Capital	(8) Individual
L.Bonds (PLBN)	-0.0169***	-0.0193***	-0.0226***	-0.0203***	-0.0180***	-0.0154***	-0.0191***	-0.0272***
	(-3.29)	(-3.61)	(-4.01)	(-3.65)	(-3.42)	(-2.94)	(-3.53)	(-4.64)
Other CC, iMaPP	✓	✓	✓	✓	✓	✓	✓	✓
Economy Controls	✓	✓	✓	✓	✓	✓	✓	✓
Firm Controls	✓	✓	✓	✓	✓	✓	✓	✓
Firm FE	✓	✓	✓	✓	✓	✓	✓	✓
Sector*Time FE	✓	✓	✓	✓	✓	✓	✓	✓
Observations	72332	72332	72332	72332	72332	72332	72332	72332
Adj. R-sq	0.127	0.127	0.128	0.127	0.128	0.127	0.128	0.128

t statistics in parentheses, Standard errors clustered at the firm level, * $p < .1$, ** $p < .05$, *** $p < .01$

2.4.7 The Effects of Capital Controls along the Financial Cycle

The effects of capital controls on capital allocation across firms may vary throughout the financial cycle. In this respect, the direction and composition of capital flows depend on both

25. We distinguish demand-side and supply-side tools following the categorization in Alam et al. (2019).

local and global financial conditions,[26] and the literature provides mixed evidence on whether looser financial conditions promote more or less capital inflows toward riskier and/or more efficient firms (Benigno et al., 2015; Di Giovanni et al., 2022; Cingano et al., 2022). Hence, whether the heterogeneous effects of capital controls—across firms with different profitability and leverage—-vary along the financial cycle is ultimately an empirical question, which we tackle in Table 2.9.

Column 1 employs an indicator of the local financial cycle, namely the (log) EMBI spread. We multiply such variable by minus one so that an increase denotes a looser local financial cycle.[27]. Interestingly, to start with, when the local cycle is looser, highly leveraged firms tend to disproportionately issue bonds—as indicated by the positive and statistically significant interaction on the coefficient $LEVQ4 * X$—whereas relatively more profitable firms do not (check the double interactions between ROA quartiles and X). Consistently, capital controls disproportionately cut bond issuance by highly leveraged firms, as visible from the negative and statistically significant triple interaction $LEVQ4 * L.Bonds(PLBN) * X$.

Next, in columns 2 and 3, we exploit two indicators of the global financial cycle. Column 2 exploits the broad US Dollar index, which correlates positively with the strength of the US Dollar and is a key driver of global credit conditions and asset prices (Avdjiev et al., 2019; Bruno et al., 2022; Bruno et al., 2023). Column 3 exploits the US Dollar index against Advanced Economies currencies, a relatively more exogenous index with respect to the Emerging Markets local cycles (as compared to the broad Dollar index). In both cases, we express the variables in log and multiply by minus one. Note that from the Emerging Markets perspective, a weaker dollar (signaled by higher values of the rescaled variables) denotes a looser global financial cycle.

Interestingly, results in column 2 using the broad Dollar index—similarly to those on local

26. See Miranda-Agrippino et al. (2022) for a review of the literature on global financial cycles. For evidence on how local cycles interact with capital inflows, see e.g. Di Giovanni et al. (2022).

27. We report summary statistics for the different index of financial cycle in the Appendix Table B.1.12

Table 2.9: Heterogeneous effects on bond issuance: firm profitability *vs* risk along local and global financial cycles.

Dep. Var. 1(Domestic Bond Iss.)	(1)	(2)	(3)
	Local Cycle	Global Cycle	
	X= (-1*)L.Log EMBI	X =(-1)*log BDI	X= (-1)*log UDI AE
Lev Q2 * L.Bonds (PLBN)	-0.0540	-0.793***	-0.399**
	(-1.22)	(-2.63)	(-2.00)
Lev Q3 * L.Bonds (PLBN)	-0.0306	-1.033***	-0.482**
	(-0.66)	(-3.23)	(-2.09)
Lev Q4 * L.Bonds (PLBN)	-0.111**	-0.849**	-0.509**
	(-2.36)	(-2.37)	(-2.27)
ROA Q2 * L.Bonds (PLBN)	-0.0468	-0.841***	-0.380*
	(-0.87)	(-2.83)	(-1.78)
ROA Q3 * L.Bonds (PLBN)	0.00152	-0.438	-0.0560
	(0.03)	(-1.36)	(-0.25)
ROA Q4 * L.Bonds (PLBN)	-0.0737	-1.096***	-0.469**
	(-1.43)	(-3.04)	(-2.12)
Lev Q2 * X	0.00631	0.0543	0.0306
	(0.82)	(1.11)	(0.82)
Lev Q3 * X	-0.00830	0.105**	0.0499
	(-1.03)	(2.13)	(1.16)
Lev Q4 * X	0.0152*	0.0335	0.0426
	(1.88)	(0.60)	(1.06)
ROA Q2 * X	-0.00450	0.0120	0.0176
	(-0.50)	(0.25)	(0.45)
ROA Q3 * X	-0.0182**	0.00764	-0.0250
	(-2.15)	(0.16)	(-0.62)
ROA Q4 * X	-0.000987	0.0953*	0.0534
	(-0.12)	(1.78)	(1.36)
Lev Q2 * L.Bonds (PLBN) * X	-0.00977	-0.173***	-0.0895**
	(-1.13)	(-2.63)	(-1.98)
Lev Q3 * L.Bonds (PLBN) * X	-0.00437	-0.223***	-0.106**
	(-0.49)	(-3.20)	(-2.03)
Lev Q4 * L.Bonds (PLBN) * X	-0.0185**	-0.183**	-0.112**
	(-2.06)	(-2.34)	(-2.21)
ROA Q2 * L.Bonds (PLBN) * X	-0.0110	-0.184***	-0.0873*
	(-1.05)	(-2.84)	(-1.80)
ROA Q3 * L.Bonds (PLBN) * X	-0.00142	-0.0963	-0.0131
	(-0.14)	(-1.37)	(-0.26)
ROA Q4 * L.Bonds (PLBN) * X	-0.0128	-0.237***	-0.104**
	(-1.31)	(-3.01)	(-2.06)
Firm Controls	✓	✓	✓
Firm FE	✓	✓	✓
Sector*Time FE	✓	✓	✓
Country*Time FE	✓	✓	✓
Observations	72233	60761	72233
Adj. R-sq	0.137	0.142	0.137

Notes: The dependent variable is a dummy variable equal to 1 if firm f issues a domestic bond in quarter t, and 0 otherwise. X is the financial cycle index named at the top of each column: in column 1 X is the negative of log EMBI, in column 2 the negative of log Broad Dollar Index, in column 3 the negative of log Dollar Index against advanced economies. Larger values of X indicate looser financial conditions. Lev Q and ROA Q are quartile indicators for leverage and return on assets, with Q1 the lowest and Q4 the highest; the omitted group is Q1. L.Bonds (PLBN) equals 1 when purchases by nonresidents of locally issued bonds are restricted in the previous quarter, 0 otherwise. Reported rows show coefficients on interactions of quartile indicators with L.Bonds (PLBN), X, and both. Firm-level controls include lagged values of size (log of total assets), leverage, liquidity, and return on assets (ROA). Standard errors are clustered at the firm level. t-statistics are reported in parentheses. $^{*}p < 0.10$; $^{**}p < 0.05$; $^{***}p < 0.01$.

cycles in column 1—show that a looser global financial cycle implies higher bond issuance by highly leveraged firms. However, also highly profitable firms benefit more from a looser financial cycle in terms of higher frequency of bond issuance. Symmetrically, capital controls have a negative and stronger effect on bond issuance by both riskier and more profitable firms. Results are broadly similar in column 3 where we use the Dollar index vis-a-vis Advanced Economies currencies.

Overall, the results in this section confirm that capital controls raise a trade-off between capital allocation and financial stability. Such trade-off is not altered significantly by global financial cycles, whereas it tends to be less acute in periods of increased investors' appetite for local debt instruments (i.e., conditional on loosening the local financial cycle), when capital controls are especially effective on risky firms.

2.5 A Simple Model of Capital Controls and Firm Heterogeneity

This section develops a simple model of capital controls with firm heterogeneity. The model provides a parsimonious framework that rationalizes the two key channels identified in the empirical analysis. On the one hand, capital inflow controls serve a *prudential* role by curbing excessive external borrowing and reducing financial fragility. On the other hand, these policies may entail a *trade-off* with economic efficiency by distorting firms' scale and investment decisions.

The model relies on three key ingredients. First, firms are heterogeneous in their idiosyncratic productivity, which is imperfectly known at the time borrowing decisions are made. Second, optimistic beliefs held by firms and their foreign lenders lead to excessive external borrowing, increasing ex post financial fragility. Third, the government can impose a uniform capital control on external debt to curb excessive borrowing and improve financial stability. However, because it cannot distinguish high- from low-productivity firms, the policy prevents high-productivity firms from operating at their efficient scale, generating an efficiency

cost. These ingredients are complementary to existing theoretical rationales for prudential capital controls, but focus on belief-driven overborrowing and firm-level heterogeneity, in the spirit of narratives emphasizing excessive optimism during capital inflow episodes Carmen M. Reinhart et al. (2009b) and recent formal models of sentiment-driven capital flows Benhima et al. (2022).

2.5.1 Environment

Consider a two-period small open economy (SOE) model. Time is discrete, $t = 1, 2$. There is a unit mass of firms indexed by $i \in [0, 1]$. At $t = 1$ all firms are ex-ante identical. In period 2 each firm draws an idiosyncratic productivity type (θ) that can take on two values: high (H) or low (L). Formally:

$$\theta_i \in \{\theta_H, \theta_L\}, \qquad \theta_H > \theta_L > 0,$$

with probabilities

$$\Pr(\theta_i = \theta_H) = \lambda, \qquad \Pr(\theta_i = \theta_L) = 1 - \lambda, \quad \lambda \in (0, 1).$$

A key deviation from a traditional SOE model is that we assume firms and foreign lenders are over optimistic about the likelihood of ending up as high type. We formalize this by capturing beliefs as:

$$\Pr(\theta_i = \theta_H) = \tilde{\lambda}, \qquad \Pr(\theta_i = \theta_L) = 1 - \tilde{\lambda}, \quad \tilde{\lambda} \in (0, 1).$$

with $\tilde{\lambda} > \lambda$.

Aggregate productivity is realized in period 2 and takes two values: a good state ($\bar{A}$) and

a bad state ($\underline{A}$). Formally:

$$A \in \{\bar{A}, \underline{A}\}, \qquad \bar{A} > \underline{A} > 0.$$

The probability of the each state is

$$\Pr\big(A = \bar{A}\big) = p, \qquad \Pr(A = \underline{A}) = 1 - p.$$

Agents, however, are also optimistic about how severe the bad state is. Formally, lenders and borrowers believe that in the bad state productivity is $\tilde{\underline{A}}$ with $\tilde{\underline{A}} > \underline{A}$, so the bad state is perceived to be milder than it truly is.

Firms borrow from risk neutral foreign lenders at an exogenous gross world rate, $R > 1$. Because of the small open economy assumption, borrowers take this rate as given. Furthermore, because the model will be calibrated in a way that, *ex-ante*, lenders assign a null probability of firms defaulting, there is no risk premium over R and all firms face the same constant rate. To further simplify the set up, there is no production in period 1. All borrowing finances capital for period 2 to be used in production. We turn next to firms' technology and financing restrictions.

2.5.2 Technology and Financing

At $t = 1$, before knowing its type, a firm chooses how much to borrow from foreign lenders, $d \geq 0$. Borrowing is done in order to accumulate capital that is also acquired from abroad at a unitary price: $k = d$. At $t = 2$, for a given aggregate productivity A and realized type θ_i, firm i produces

$$y_i(A, \theta_i) = A\theta_i d^{\alpha}, \qquad 0 < \alpha < 1.$$

The firm must repay its debt at the gross rate R. If revenues are insufficient, the firm defaults and produces zero. As mentioned, because lenders share the same optimistic beliefs as firms, the interest rate does not include a default premium.

Period 2 profit is

$$\pi_i(A, \theta_i; d) = \max\{A\theta_i d^\alpha - Rd,\, 0\}.$$

Default occurs whenever

$$A\theta_i d^\alpha < Rd. \tag{2.4}$$

2.5.3 Capital Inflow Control

The government can impose capital controls on inflows in the form of a tax $\tau \geq 0$ on foreign borrowing in period 1. The tax increases the effective cost of borrowing but does not affect the repayment obligation. Firms pay τd to the government when borrowing at $t = 1$.

2.5.4 Firm's Problem and Overborrowing Decisions

Given beliefs $(\tilde{\lambda}, \underline{\tilde{A}})$ and the capital control tax τ, all firms are ex ante identical and choose the same borrowing level $d \geq 0$ at $t = 1$.

Under these beliefs, expected profit from choosing d is

$$\begin{aligned}\tilde{\Pi}(d; \tau) = p\Big[\tilde{\lambda}\, \bar{A}\theta_H d^\alpha + (1 - \tilde{\lambda})\, \bar{A}\theta_L d^\alpha\Big] \\ + (1 - p)\Big[\tilde{\lambda}\, \underline{\tilde{A}}\theta_H d^\alpha + (1 - \tilde{\lambda})\, \underline{\tilde{A}}\theta_L d^\alpha\Big] - (R + \tau)\, d.\end{aligned}$$

It is convenient to define the perceived productivity term as

$$\Phi(\tilde{\lambda}, \underline{\tilde{A}}) \equiv p\big[\tilde{\lambda}\, \bar{A}\theta_H + (1 - \tilde{\lambda})\, \bar{A}\theta_L\big] + (1 - p)\big[\tilde{\lambda}\, \underline{\tilde{A}}\theta_H + (1 - \tilde{\lambda})\, \underline{\tilde{A}}\theta_L\big],$$

$$\implies \tilde{\Pi}(d;\tau) = \Phi(\tilde{\lambda}, \underline{\tilde{A}})\, d^{\alpha} - (R+\tau)\, d.$$

The firm chooses d to maximize $\tilde{\Pi}(d;\tau)$, which yields the first order condition

$$\alpha\, \Phi(\tilde{\lambda}, \underline{\tilde{A}})\, d^{\alpha-1} = R + \tau.$$

The optimal borrowing level as a function of the inflow tax is therefore

$$d(\tau) = \left[\frac{\alpha\, \Phi(\tilde{\lambda}, \underline{\tilde{A}})}{R+\tau} \right]^{\frac{1}{1-\alpha}}. \tag{2.5}$$

This optimality condition implies some intuitive behaviors by firms. On one hand, $d(\tau)$ will be strictly decreasing in the strength of capital controls τ, and strictly increasing in the amount of optimism captured by the perceived productivity term $\Phi(\tilde{\lambda}, \underline{\tilde{A}})$. The latter object, in turn, rises with optimism about the odds of being the high productivity type ($\tilde{\lambda}$) and how less severe the bad state is ($\underline{\tilde{A}}$).

It follows from the borrowing decision in (2.5) that low-productivity firms will *overborrow*, which can be quantified as the difference between the equilibrium level of debt chosen under uncertainty of their type and the debt level a low-productivity firm would choose under full information of its type.[28]

By contrast, high-productivity firms underborrow relative to the full-information benchmark, as they do not internalize their higher productivity when making borrowing decisions under uncertainty. Crucially, however, these two distortions are not symmetric when it comes to their implications on the macroeconomy. For overborrowing by low-productivity firms gives rise to default in equilibrium, generating disproportionately large economic costs.

28. From (2.5), a low-productivity firm that is only uncertain about aggregate TFP would choose debt level $d^L(\tau) = \left[\frac{\alpha\Gamma}{R+\tau}\right]^{\frac{1}{1-\alpha}}$, where $\Gamma = [\rho\bar{A} + (1-\rho)\underline{A}]\theta_L$. The level of overborrowing ($d(\tau) - d^L(\tau)$) can be shown to be proportional to $\Phi(\tilde{\lambda}, \underline{\tilde{A}}) - \Gamma$ which, assuming for simplicity that $\underline{\tilde{A}} = \underline{A}$, is $p\tilde{\lambda}\bar{A}(\theta_H - \theta_L) + (1-p)\tilde{\lambda}\bar{A}(\theta_H - \theta_L) > 0$.

We turn to these costs next.

2.5.5 Default Region

Ex-post, profits for type $j \in \{H, L\}$ in state A are

$$\pi_j(A; d) = \max\{A\theta_j d^\alpha - Rd,\ 0\}.$$

Low type firms default in the bad state when

$$\underline{A}\theta_L d^\alpha < Rd.$$

The maximum borrowing level that a low type can repay in the bad state is

$$d^{ND} = \left[\frac{\underline{A}\theta_L}{R}\right]^{\frac{1}{1-\alpha}}. \tag{2.6}$$

If $d(\tau) > d^{ND}$, firms that realize as low type default when $A = \underline{A}$. High type firms do not default under the same borrowing level.

Optimism $(\tilde{\lambda}, \tilde{\underline{A}})$ raises the perceived productivity term $\Phi(\tilde{\lambda}, \tilde{\underline{A}})$, and therefore raises $d(0)$. If $d(0) > d^{ND}$, ex ante optimism leads to a default region among low type firms in the bad state.[29]

2.5.6 Government

The government's role is to set the capital control tax. The model is characterized by structural parameters $(\lambda, p, \bar{A}, \underline{A})$ that determine the distribution of firm types and aggregate states. For any choice of the inflow tax τ, the associated borrowing level $d(\tau)$ is the equilib-

29. For default to materialize only in low-productivity firms and not among high-productivity firms it further needs to be the case that parameters θ_L and θ_H are calibrated in a manner that guarantees that $\underline{A}\theta_L d^\alpha < Rd < \underline{A}\theta_H d^\alpha$. We work under such assumption.

rium outcome of firm and investor decisions. Policy affects resource allocation only through its effect on this borrowing choice.

A central issue in formulating the government's problem is, however, the information it possesses about the underlying economic environment. In particular, one may ask whether the government knows the true values of such structural parameters, or whether it shares the same optimistic beliefs as firms and their lenders (or different ones). While the degree of government information will matter for the precise formulation of the policy problem, the key economic forces shaping the optimal use of capital controls are present regardless of the government's informational advantage.

Two considerations are central. First, capital controls play a *prudential role*. By raising the cost of external borrowing, a sufficiently tight control can curb excessive debt accumulation by low-productivity firms and eliminate default in equilibrium. In doing so, capital controls reduce financial fragility and the associated deadweight costs of default. This prudential motive implies that, absent other considerations, there exists a strictly positive level of capital controls that improves welfare relative to laissez-faire.

Second, capital controls entail an *efficiency cost*. Because the government cannot condition policy on firm-level productivity, capital controls apply uniformly across firms. As a result, while they restrict excessive borrowing by low-productivity firms, they also further limit the ability of high-productivity firms to borrow and operate at their efficient scale. Tighter controls therefore distort investment and production decisions for the most productive firms, generating an efficiency loss.

The interaction of these two forces—prudential benefits and efficiency costs—implies a fundamental trade-off in the use of capital controls that arises independently of whether the government holds correct or biased beliefs about the underlying parameters. Such trade-off is formally stated in the following two Propositions.

Proposition 1. ***Prudential Role of Inflow Control***. *If optimism is strong enough that*

$d(0) > d^{ND}$, then there exists a unique $\tau^{ND} > 0$ such that

$$d(\tau^{ND}) = d^{ND}.$$

At τ^{ND}, firms that realize as low type no longer default in the bad aggregate state.

Proof. From (2.5), $d(\tau)$ is continuous and strictly decreasing in τ. As $\tau \to \infty$, $d(\tau) \to 0$. If $d(0) > d^{ND}$ and $d(\infty) < d^{ND}$, the intermediate value theorem implies a unique τ^{ND} such that $d(\tau^{ND}) = d^{ND}$. At this tax, low types are just able to repay in the bad state and no longer default. □

Proposition 2. ***Efficiency Cost of a Uniform Control****. At τ^{ND}, borrowing $d(\tau^{ND})$ is strictly lower than under laissez faire:*

$$d(\tau^{ND}) < d(0).$$

Firms that realize as high type therefore operate below the borrowing level they would choose absent the inflow tax and without default, which generates an efficiency loss.

Proof. From (2.5), $d(\tau)$ is strictly decreasing in τ for all $\tau \geq 0$, so $d(\tau) < d(0)$. High type firms do not default in the bad state even at $d(0)$ when parameters are chosen so that $\underline{A}\theta_H d(0)^\alpha \geq Rd(0)$. Reducing d from $d(0)$ to $d(\tau^{ND})$ lowers their expected output and profits without providing any prudential benefit for them, so aggregate output is lower relative to the laissez faire benchmark. □

To make the policy trade-off explicit, we now consider a benchmark case in which the government is fully informed about the underlying economic environment, including the true productivity distribution and the probability of default-relevant states. Under this assumption, the government chooses the level of capital controls to maximize aggregate

welfare, taking into account both the reduction in default costs and the distortionary effects on firm scale.

Aggregate welfare is defined as expected output net of debt repayments. For a given τ, this object is

$$\begin{aligned}\mathrm{W}(\tau) = p\Big[\lambda\big(\bar{A}\theta_H d(\tau)^\alpha - Rd(\tau)\big) + (1-\lambda)\big(\bar{A}\theta_L d(\tau)^\alpha - Rd(\tau)\big)\Big] \\ + (1-p)\Big[\lambda\big(\underline{A}\theta_H d(\tau)^\alpha - Rd(\tau)\big) + (1-\lambda)\,\pi_L(\underline{A}; d(\tau))\Big],\end{aligned}$$

where low type firms may default in the bad state and therefore generate

$$\pi_L(\underline{A}; d) = \max\{\underline{A}\theta_L d^\alpha - Rd,\ 0\}.$$

Tax revenue equals $\tau d(\tau)$. In this static setting it is a transfer within the domestic economy and does not enter the welfare measure. Including it directly would create a mechanical motive for high taxes that is unrelated to default or production.

The policy problem is

$$\arg\max_{\tau\in[0,1]} W(\tau) = \text{Payoff}(\tau) \tag{2.7}$$

This formulation allows us to characterize the welfare-maximizing level of capital controls formally, as stated in the following Proposition 3.

Proposition 3. ***Welfare-Maximizing Tax****. Let $W(\tau)$ denote the government's welfare objective in* (2.7)*. Under standard parameter restrictions ensuring that $\lim_{\tau\to\infty} W(\tau) < W(0)$, the function $W(\tau)$ is single-peaked. Therefore, there exists a unique welfare-maximizing inflow tax*

$$\tau^\star = \arg\max_{\tau\geq 0} W(\tau).$$

In general,

$$\tau^\star \neq \tau^{ND}.$$

The optimal policy balances the marginal reduction in financial fragility against the marginal increase in misallocation of high-type firms.

Proof. Since $d(\tau)$ is strictly decreasing and smooth in τ, and $W(\tau)$ is continuous, $W(\tau)$ achieves its maximum on any compact interval. For sufficiently large τ, both output and tax revenue fall, implying $W(\tau)$ eventually lies below $W(0)$. This, together with the monotonicity and single-crossing structure induced by $d(\tau)$, delivers a unique maximizer $\tau^\star$. Since eliminating default entirely may require raising τ beyond the point where marginal misallocation costs exceed the marginal reduction in fragility, $\tau^\star$ does not generally coincide with τ^{ND}. □

2.5.7 Numerical illustration and key metrics

This subsection illustrates the mechanisms of the model using a simple numerical example. The goal is not to quantitatively match the data, but illustrate how the model can qualitatively account for some of the main empirical findings in terms of the relationship between inflow controls and borrowing, as well as the main two channels pinned down empirically.

Borrowing and default. With ex ante identical firms, all firms choose the same borrowing level $d(\tau)$ at $t = 1$, given beliefs $(\tilde{\lambda}, \underline{\tilde{A}})$ and the inflow tax τ, according to (2.5).

For firms that realize as low type, the maximum level of debt that can be repaid in the bad aggregate state (d^{ND}) is determined by (2.6). If $d(\tau) > d^{ND}$, low type firms default when $A = \underline{A}$ and produce zero in that state.

Aggregate output. Expected output under the true probabilities (λ, p) is

$$\begin{aligned} Y(\tau) = p\Big[\lambda\, \bar{A}\theta_H d(\tau)^\alpha + (1-\lambda)\, \bar{A}\theta_L d(\tau)^\alpha\Big] \\ + (1-p)\Big[\lambda\, \underline{A}\theta_H d(\tau)^\alpha + (1-\lambda)\, \underline{A}\theta_L d(\tau)^\alpha\, \mathbf{1}\{d(\tau) \le d^{ND}\}\Big]. \end{aligned} \tag{2.8}$$

When $d(\tau) > d^{ND}$, low type firms default in the bad state and output in that state is

produced only by high type firms.

Financial fragility. Financial fragility is defined as the expected loss of output in the bad aggregate state due to defaults by low type firms. This object is

$$\mathcal{F}(\tau) = (1-p)(1-\lambda)\,\underline{A}\theta_L d(\tau)^\alpha \cdot \mathbf{1}\{d(\tau) > d^{ND}\}. \tag{2.9}$$

For low values of τ, optimism pushes borrowing above the safe threshold, so fragility is positive. As τ increases and $d(\tau)$ falls below d^{ND}, fragility disappears.

Profits by firm type. For a given inflow tax τ, let $d(\tau)$ denote the common borrowing choice implied by (2.5). Under the true probabilities (λ, p), expected profits of a firm that realizes as high type are

$$\Pi_H(\tau) = p\big[\bar{A}\theta_H d(\tau)^\alpha - Rd(\tau)\big] + (1-p)\big[\underline{A}\theta_H d(\tau)^\alpha - Rd(\tau)\big], \tag{2.10}$$

while expected profits of a firm that realizes as low type are

$$\Pi_L(\tau) = p\big[\bar{A}\theta_L d(\tau)^\alpha - Rd(\tau)\big] + (1-p)\,\pi_L\big(\underline{A}; d(\tau)\big), \tag{2.11}$$

where

$$\pi_L(\underline{A}; d) = \max\{\underline{A}\theta_L d^\alpha - Rd,\ 0\}$$

captures default in the bad state whenever $d(\tau) > d^{ND}$. Aggregate expected profitability is

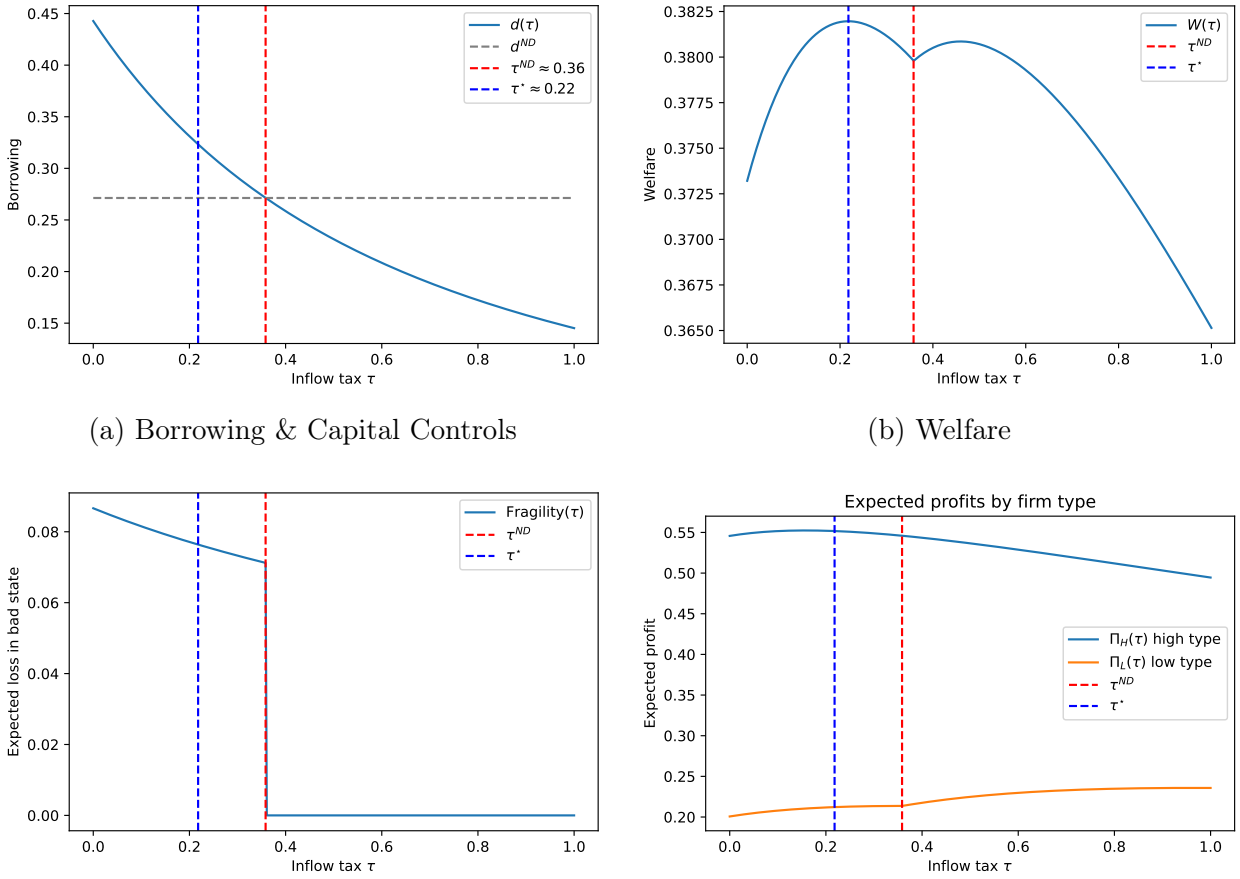
$$\Pi(\tau) = \lambda\,\Pi_H(\tau) + (1-\lambda)\,\Pi_L(\tau). \tag{2.12}$$

As τ increases from zero, borrowing falls. This raises $\Pi_L(\tau)$ by reducing default risk but lowers $\Pi_H(\tau)$ by forcing high type firms to operate at a smaller scale. The welfare maximizing inflow tax therefore balances these opposing forces.

Illustration. To illustrate these mechanisms, we simulate the model under the following parameter values:

$$\alpha = 0.4, \quad R = 1.05, \quad \lambda = 0.5, \quad \theta_H = 1, \quad \theta_L = 0.6, \quad \bar{A} = 2.0, \quad \underline{A} = 0.8, \quad p = 0.5,$$
$$\tilde{\lambda} = 0.8, \quad \tilde{\underline{A}} = 1.5.$$

Figure 2.2 shows the variation in borrowing by each firm-type, welfare, financial fragility and profitability against the capital inflow tax τ, which is allowed to vary over the interval $[0, 1]$.



(a) Borrowing & Capital Controls

(b) Welfare

(c) Financial fragility

(d) Profitability by firm type

Figure 2.2: Numerical illustration of the model. The figure shows how the inflow tax affects borrowing, welfare, financial fragility, and profitability. Vertical dashed lines denote the no-default threshold τ^{ND} (red) and the welfare-maximizing inflow tax $\tau^{\star}$ (blue).

For a given degree of optimism, borrowing $d(\tau)$ is decreasing in the inflow tax, as shown in

panel (a). As τ increases, borrowing falls below the safe threshold d^{ND}, eliminating default by low-productivity firms and driving financial fragility to zero (panel (c)). At the same time, tighter controls compress the scale of high-productivity firms, lowering their expected profits (panel (d)). These opposing forces generate a non-monotonic welfare profile (panel (b)): welfare initially rises as fragility is reduced, but eventually declines as efficiency losses dominate. The welfare-maximizing inflow tax $\tau^\star$ therefore lies below the level that fully eliminates default, balancing prudential gains against efficiency costs.

2.5.8 Model Extension: Dividends as an Internal-Finance Margin

We now extends the baseline model in Section 2.5 to rationalize the empirical evidence that more profitable firms reduce dividend payouts when capital inflow controls tighten. The extension introduces (i) production in both periods and (ii) an end-of-period dividend–retention decision that finances next-period capital when firms have only one-time access to external borrowing.

Timing and additional assumptions

Time is $t = 1, 2$. The economy is as in the baseline model, except for the following modifications.

1. **One-time external borrowing (long-term debt only).** At the start of $t = 1$, firms choose a single level of external borrowing $d \geq 0$ *before* they know their idiosyncratic productivity type $\theta_i \in \{\theta_H, \theta_L\}$. Firms *cannot* borrow again in $t = 2$. This captures an extreme form of short-term financial exclusion and can be motivated by firms' reliance on long-term financing.

2. **Production in both periods.** Aggregate productivity is stochastic in *both* periods.

For $t \in \{1, 2\}$,

$$A_t \in \{\bar{A}, \underline{A}\}, \qquad \Pr\big(A_t = \bar{A}\big) = p, \qquad \Pr(A_t = \underline{A}) = 1 - p,$$

with $\bar{A} > \underline{A} > 0$. (For parsimony, the two draws may be i.i.d.; nothing below hinges on this.) As in the baseline model, private agents are optimistic about the severity of the bad state; in particular, they perceive the bad state to be $\tilde{\underline{A}} > \underline{A}$.[30]

3. **Type revelation at the end of $t = 1$.** After production in period 1, the firm's type θ_i is revealed. Dividend and retention decisions are made with knowledge of θ_i.

4. **Capital depreciates within the period; cash earns zero.** Capital is purchased at unit cost and fully depreciates at the end of each period. Any unused borrowed funds are carried as cash from the start of $t = 1$ to the end of $t = 1$ and earn zero net interest.

5. **Debt service schedule.** The firm pays interest at the end of $t = 1$ and repays principal plus interest at the end of $t = 2$. Let $R > 1$ denote the gross per-period world rate. We represent the within-horizon debt service as:

$$\text{payment at end of } t = 1 : \ (R - 1)\, d, \qquad \text{payment at end of } t = 2 : \ R\, d.$$

This is a simple-interest representation over the two periods. It keeps the model transparent and preserves the baseline interpretation of R.

6. **Inflow control.** As in the baseline model, the government imposes a proportional inflow control $\tau \geq 0$ on external debt. In this extension, we treat it as an additional per-unit borrowing cost paid at the end of period 1 (together with interest), equal to

30. If desired, one can allow optimism to differ by period. For simplicity we use the same $\tilde{\underline{A}}$ across periods.

τd. Since it is a transfer within the domestic economy, it does not enter firm payoffs directly beyond its effect on the firm's resources.[31]

Technology and profits

A firm with type $\theta \in \{\theta_H, \theta_L\}$ that uses capital k_t in period t produces

$$y_t(A_t, \theta; k_t) = A_t \, \theta \, k_t^{\alpha}, \qquad 0 < \alpha < 1, \qquad t = 1, 2. \tag{2.13}$$

At the start of $t = 1$, the firm chooses k_1 subject to $k_1 \leq d$. Define cash carried from the start of $t = 1$ to the end of $t = 1$ as

$$m \equiv d - k_1 \geq 0. \tag{2.14}$$

End-of-period-1 dividend and retention decision

At the end of $t = 1$, after (A_1, θ) are realized and after paying the period-1 debt service (interest plus the inflow control), internal resources available for dividends and for financing period-2 capital are

$$\mathcal{R}_1(A_1, \theta; \tau) \equiv A_1 \theta k_1^{\alpha} + m - (R-1)d - \tau d = A_1 \theta k_1^{\alpha} + (d - k_1) - (R - 1 + \tau)d. \tag{2.15}$$

Since firms cannot borrow in $t = 2$, period-2 capital must be financed internally:

$$k_2(A_1, \theta; \tau) + Div_1(A_1, \theta; \tau) = \mathcal{R}_1(A_1, \theta; \tau), \qquad k_2 \geq 0, \quad Div_1 \geq 0. \tag{2.16}$$

31. Alternative equivalent formulations include an up-front tax at origination or a wedge in the effective interest rate. The end-of-period-1 payment representation is convenient for the dividend mechanism below.

Period-2 dividends and default

Given k_2 and the realization of A_2, end-of-period-2 dividends are

$$Div_2(A_2, \theta; \tau) = \max\Big\{A_2\theta\, k_2^{\alpha} - Rd,\ 0\Big\}. \tag{2.17}$$

Default occurs whenever $A_2\theta k_2^{\alpha} < Rd$. As in the baseline model, we focus on parameter regions where default is relevant for low types in the bad state but not for high types.

Payout friction

To ensure an interior dividend–retention choice and to capture the empirical stickiness of dividends, we introduce a standard reduced-form payout friction: deviating from a benchmark payout $\bar{Div}$ is costly. We follow Lintner (1956) and Jermann et al. (2012) when introducing a convex adjustment cost on equity payouts to capture dividend smoothing. At the end of $t = 1$, the firm evaluates dividends according to:

$$Div_1 - \frac{\varphi}{2}\big(Div_1 - \bar{Div}\big)^2, \qquad \varphi > 0. \tag{2.18}$$

Firm objective

At the start of $t = 1$, before θ is known, the firm chooses (d, k_1) to maximize expected discounted dividends under private beliefs (optimism about $\tilde{\lambda}$ and $\underline{\tilde{A}}$), taking into account that (Div_1, k_2) are chosen at the end of $t = 1$ once (A_1, θ) are realized:

$$\max_{d\geq 0,\ 0\leq k_1\leq d}\ \mathbb{E}_{\text{beliefs}}\left[\max_{\substack{Div_1\in[0,\mathcal{R}_1]\\ k_2=\mathcal{R}_1-Div_1}}\ \Big\{Div_1 - \frac{\varphi}{2}(Div_1 - \bar{Div})^2 + \beta\,\mathbb{E}\big[Div_2(A_2, \theta; \tau)\mid A_1, \theta\big]\Big\}\right], \tag{2.19}$$

where $\mathcal{R}_1 \equiv \mathcal{R}_1(A_1, \theta; \tau)$ is given by (2.15).

The key new mechanism is embedded in (2.16): when τ increases, external finance becomes more costly, reducing internal resources at the end of $t = 1$ and forcing firms to re-optimize the split between immediate payouts and retained earnings that finance k_2.

Dividend response to capital inflow controls

We now characterize the dividend substitution margin implied by the extension. The result is stated for the end-of-period-1 dividend choice, conditional on (d, k_1), which is sufficient to rationalize the empirical pattern that profitable firms cut dividends when inflow controls tighten. In equilibrium, tighter controls also reduce the optimal borrowing $d(\tau)$, strengthening the effect through $\mathcal{R}_1$.

Let $\mu \equiv \mathbb{E}[A_2]$ denote expected period-2 productivity (under beliefs or under true probabilities; the sign results below do not depend on which is used). Consider a region where the firm does not default in period 2 for the type under consideration (in particular for $\theta = \theta_H$), so that (2.17) is strictly positive and the max operator does not bind.

Proposition 4. ***Dividend Cuts under Tighter Inflow Controls****. Fix (d, k_1) and consider the end-of-period-1 choice of (Div_1, k_2) for a firm that realizes (A_1, θ) at the end of $t = 1$, under the no-default region in period 2. Suppose the optimum is interior: $Div_1 \in (0, \mathcal{R}_1)$ and $k_2 \in (0, \mathcal{R}_1)$.*

1. ***Dividends increase in internal resources.*** *Div_1 is strictly increasing in $\mathcal{R}_1$.*

2. ***Tighter inflow controls reduce dividends.*** *Since $\partial \mathcal{R}_1 / \partial \tau = -d < 0$ from (2.15), it follows that*
$$\frac{\partial Div_1(A_1, \theta; \tau)}{\partial \tau} < 0.$$

3. ***More profitable firms cut dividends more (interior case).*** *For $\theta_H > \theta_L$, the*

absolute sensitivity of dividends to τ is weakly larger for high types:

$$\left|\frac{\partial Div_1(A_1,\theta_H;\tau)}{\partial\tau}\right| \geq \left|\frac{\partial Div_1(A_1,\theta_L;\tau)}{\partial\tau}\right|,$$

with strict inequality whenever both types are interior.

Proof. At the end of $t=1$, given (A_1,θ) and predetermined (d,k_1), the firm chooses Div_1 (equivalently $k_2=\mathcal{R}_1-Div_1$) to maximize

$$Div_1-\frac{\varphi}{2}(Div_1-\bar{Div})^2+\beta\,\mathbb{E}\big[A_2\theta(\mathcal{R}_1-Div_1)^{\alpha}-Rd\mid A_1,\theta\big],$$

where we used that dividends in $t=2$ are strictly positive under the no-default region, so $Div_2=A_2\theta k_2^{\alpha}-Rd$. Letting $\mu\equiv\mathbb{E}[A_2\mid A_1,\theta]$ and dropping the constant term $-\beta Rd$, the problem reduces to

$$\max_{Div_1\in(0,\mathcal{R}_1)}\ \Big\{Div_1-\frac{\varphi}{2}(Div_1-\bar{Div})^2+\beta\,\mu\,\theta(\mathcal{R}_1-Div_1)^{\alpha}\Big\}.$$

The first-order condition for an interior optimum is

$$1-\varphi(Div_1-\bar{Div})-\beta\,\mu\,\theta\,\alpha(\mathcal{R}_1-Div_1)^{\alpha-1}=0. \tag{2.20}$$

Define the left-hand side of (2.20) as $F(Div_1;\mathcal{R}_1,\theta)$. Differentiating,

$$\frac{\partial F}{\partial Div_1}=-\varphi-\beta\,\mu\,\theta\,\alpha(\alpha-1)(\mathcal{R}_1-Div_1)^{\alpha-2}<0,$$

since $0<\alpha<1$ implies $\alpha-1<0$. Thus the interior solution is unique and differentiable by the implicit function theorem.

Next,

$$\frac{\partial F}{\partial\mathcal{R}_1}=-\beta\,\mu\,\theta\,\alpha(\alpha-1)(\mathcal{R}_1-Div_1)^{\alpha-2}>0,$$

again because $\alpha - 1 < 0$. Therefore

$$\frac{\partial Div_1}{\partial \mathcal{R}_1} = -\frac{\partial F/\partial \mathcal{R}_1}{\partial F/\partial Div_1} > 0,$$

proving part (1). Using (2.15), $\partial \mathcal{R}_1/\partial \tau = -d < 0$, so by the chain rule

$$\frac{\partial Div_1}{\partial \tau} = \frac{\partial Div_1}{\partial \mathcal{R}_1} \cdot \frac{\partial \mathcal{R}_1}{\partial \tau} < 0,$$

which proves part (2).

Finally, differentiating F with respect to θ yields

$$\frac{\partial F}{\partial \theta} = -\beta\,\mu\,\alpha(\mathcal{R}_1 - Div_1)^{\alpha-1} < 0,$$

so

$$\frac{\partial Div_1}{\partial \theta} = -\frac{\partial F/\partial \theta}{\partial F/\partial Div_1} < 0.$$

Thus, higher-θ firms optimally retain more (lower Div_1) because the marginal return to internal investment k_2 is larger. Since $\partial \mathcal{R}_1/\partial \tau$ does not depend on θ (it equals $-d$), while $\partial Div_1/\partial \mathcal{R}_1$ is increasing in θ for interior solutions under $0 < \alpha < 1$,[32] it follows that the absolute dividend response to τ is (weakly) larger for high types, with strict inequality when both types are interior. □

Mapping to the dividend evidence. Proposition 4 establishes a dividend substitution margin: when inflow controls tighten (higher τ), firms optimally reduce end-of-period-1 dividend payouts to retain earnings and finance period-2 capital internally. Since the marginal value of retained earnings is higher for more profitable (high-θ) firms, dividend cuts are

32. This follows from differentiating $\partial Div_1/\partial \mathcal{R}_1$ with respect to θ using (2.20) and the implicit function theorem. Intuitively, the higher marginal product of k_2 for high types makes retained earnings more valuable, so dividend adjustments absorb more of a resource shock.

strongest for these firms, consistent with the empirical finding that profitable firms cushion real effects by relying more heavily on internal finance when bond inflows are restricted.

2.5.9 Mapping from Model to Empirical Results: Discussion

The model is intentionally stylized but designed to isolate the key mechanisms needed to interpret the empirical findings. It provides a unified framework linking capital inflow controls, firm-level borrowing decisions, financial fragility, and real outcomes under firm heterogeneity.

The model delivers four implications that map directly to the evidence. First, ex ante identical firms choose a common level of external borrowing, and under optimistic beliefs higher borrowing is privately attractive because it allows firms to scale up investment and production. This feature mirrors the empirical finding that capital inflows are associated with increased corporate borrowing, particularly through bond markets.

Second, optimism combined with imperfect information leads to excessive borrowing relative to true risks. When adverse aggregate conditions materialize, firms that realize as low productivity default, generating financial fragility and output losses. This mechanism is consistent with the empirical evidence that capital inflows disproportionately raise leverage and fragility among weaker firms.

Third, a uniform capital inflow control reduces financial fragility by lowering equilibrium borrowing and eliminating default among low-productivity firms. Because these firms are the ones for which excessive borrowing leads to default in adverse states, the prudential gains of the policy are concentrated precisely where financial vulnerabilities are most severe. At the same time, because policy cannot be targeted at the firm level, the same control also restricts borrowing by high-productivity firms that would not default even in the absence of regulation. These firms are therefore forced to operate below their efficient scale, leading to lower investment and profitability. As a result, the use of capital inflow controls generates a trade-off between reducing fragility among weaker firms and distorting real outcomes

for stronger firms—a trade-off that closely mirrors the heterogeneous firm-level responses documented in the data.

Fourth, a simple extension to the model that endogenizes firms' payout decisions by incorporating an internal finance margin through dividends and retained earnings. This allows the model to account for the empirical finding that more profitable firms respond to tighter bond inflow controls by reducing dividend payouts, allowing them to sustain investment despite reduced access to external finance.

Overall, the model clarifies why capital inflow controls can simultaneously reduce financial fragility and generate real effects, and why these effects are heterogeneous across firms. By linking optimism-driven borrowing, default risk, and uniform policy intervention, the model provides a disciplined interpretation of the empirical patterns and the central policy trade-off faced by regulators when managing capital inflows.

2.6 Conclusion

This paper examines the impact of capital controls on firms' domestic bond issuance in emerging markets. In doing so, it addresses critical questions about the trade-off between financial stability and efficiency that the use of these policy tools entails. Specifically, we explore whether capital controls reduce bond issuance, how their effects vary across firms with different risk profiles, and whether they ultimately constrain overall financing and investment. Our results reveal that capital controls significantly decrease the probability of domestic bond issuance, with effects concentrated among more leveraged firms, who face persistent reductions in liabilities and investment. By contrast, more profitable firms manage to substitute away from bond financing, cushioning the real effects.

To interpret these empirical patterns, we develop a simple model of capital inflow controls under firm heterogeneity. In the model, firms borrow externally under optimistic beliefs before productivity is realized, leading to excessive leverage and default risk among weaker

firms in adverse states. A uniform capital inflow control reduces this financial fragility by curbing borrowing, but at the cost of constraining the scale of more productive firms that would not default even in the absence of regulation. The model thus formalizes a trade-off between financial stability and productive efficiency and provides a unified framework that rationalizes the heterogeneous firm-level responses documented in the data. An extension of the model highlights dividends as an internal finance margin through which profitable firms adjust to tighter inflow controls. By cutting payouts and retaining earnings, these firms can partially offset reduced access to bond markets and limit real investment declines, consistent with the empirical evidence.

These findings underscore the heterogeneous firm-level impacts of capital controls and highlight the importance of considering both their prudential benefits and their potential costs when evaluating capital flow management policies. This trade-off, which emerges naturally in the model, emphasizes that the effectiveness of capital controls depends critically on firms' ability to substitute toward alternative financing channels. From a policy perspective, it is crucial that productive firms retain access to alternative sources of funding when bond markets are restricted. Ensuring that such firms can substitute into other financing channels is key to mitigating the growth costs of capital controls and preserving their effectiveness as prudential tools.

Our study opens up several avenues for future research. One potential direction is to empirically explore the interaction between the types of capital controls we analyze and other policy tools, such as macroprudential instruments and foreign exchange interventions. While theoretical discussions of these interactions have been developed in the literature (see, e.g., Basu et al., 2020, Adrian et al., 2021), there is still limited empirical evidence on their combined effects, making this a fruitful area for further investigation. A second direction is to extend the theoretical framework developed in this paper into a fully stochastic and quantitative setting, allowing the model to more closely match observed firm-level dynamics

and policy variation over the financial cycle. Such extensions would help sharpen normative guidance on the optimal design and timing of capital inflow controls, further informing policymakers' efforts to balance financial stability and growth in emerging markets.

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APPENDIX A

APPENDIX FOR CHAPTER 1

A.1 Data Appendix

Table A.1.1: Observations in the sample split by countries (Panel A) and sectors (Panel B)

Panel A. By Country

Country	First period	Last period	Count
China	2002q1	2019q4	32,532
South Korea	2001q2	2019q4	12,812
Malaysia	2001q2	2019q4	8,070
Brazil	2001q2	2019q4	7,391
Thailand	2001q4	2019q4	6,295
Indonesia	2002q1	2019q4	4,740
Mexico	2001q2	2019q4	3,190
Chile	2001q2	2019q4	2,027
Philippines	2002q1	2019q4	1,678
Russia	2003q1	2019q4	1,239
India	2003q4	2019q4	1,025
Peru	2002q1	2019q4	730
Argentina	2010q2	2019q4	683
Poland	2005q3	2019q4	634
Türkiye	2002q1	2019q2	574
Colombia	2009q1	2019q4	413
Vietnam	2010q1	2019q4	258
South Africa	2003q1	2015q3	62
Total			84,353

Panel B. By Sector

Sector	Count
Manufacturing	36,209
Transportation	15,988
Construction	12,185
Services	6,648
Wholesale Trade	4,095
Retail Trade	4,105
Energy	3,852
Agriculture	1271
Total	84,353

Notes: The table reports the number of firm–quarter observations in the main regression sample by country (Panel A) and by broad sector (Panel B). "First period" and "Last period" indicate the time span of coverage in each country. Sectoral classifications follow Worldscope two-digit industry groups. Total observations correspond to the set of firm–quarters used in the baseline regressions with full fixed effects.

Persistence of borrowing constraint type Table A.1.3 reports the transition probabilities of firms' borrowing constraint type from quarter $t-1$ to t. The classification is based on the type of the most recent bond issue, as described in Section 1.2. The diagonal entries indicate that constraint types are highly persistent: roughly 97% of earnings-based

Table A.1.2: Keyword dictionaries for tranche classification (SDC fields)

Collateral-based (examples)	**Earnings-based (examples)**
"mortgage", "collateral", "airport", "auto", "asset backed", "capital", 'construction", "equipment", "lease", "estate"	"senior notes", "debenture", "income", "cash", "unsecured", those that didn't specify collateral terms

Notes: Implemented on `SECURITY`, `ASSETTYPE`, `DESCRIPTION` on SDC Platinum; case-insensitive match. There were some that didn't fit into any bucket. Those were labeled miscellaneous and removed from the sample in this paper. Examples include terms such as "government securities", "catastrophe", "student", "health care", "insurance", "family". Some issues carry group guarantees (parent or subsidiary). In the baseline, guaranteed issues are included under earnings-based because repayment relies on consolidated operating earnings rather than specific pledged assets.

firms and 94% of collateral-based firms remain in the same category in the following quarter. Transitions between the two constrained types are rare (1–4%), and switches into or out of the constrained group occur in only about 3–4% of firm–quarters. This persistence supports interpreting the lagged flow variable as a stable proxy for a firm's prevailing borrowing relationship rather than as a short-term fluctuation.

Table A.1.3: Transition probabilities (from $t-1$ to t)

	None	Earnings	Collateral
None	0.96	0.03	0.01
Earnings	0.02	0.97	0.01
Collateral	0.03	0.04	0.94

Notes: The table shows transition probabilities between borrowing constraint types from quarter $t-1$ to t. "None" denotes firm–quarters with no outstanding bond issue; "Earnings" and "Collateral" denote firms whose most recent bond issue was earnings-based or collateral-based, respectively. Values represent the fraction of firms in each initial state at $t-1$ that transition to each state at t. Diagonal entries reflect persistence in the firm's borrowing type, while off-diagonal entries capture reclassifications due to new issuance or maturities.

A.1.1 Variable Definitions and Data Sources

Table A.1.4: Variable Definitions and Data Sources

Variable	**Definition**	**Source**
Investment	Capital expenditures divided by lagged total assets, expressed in percentage points.	Worldscope Fundamentals Quarterly (FQ)
$\mathbf{1}\{Flow_{i,t-1} = k\}$	Indicator for the type of the most recent bond issuance, $k \in \{\text{Earnings based}, \text{Collateral based}\}$. Used to classify the firm's active borrowing constraint at $t-1$.	Derived from LSEG SDC Platinum (security level bond data)
$s^C_{i,t-1}$	Lagged decayed share of collateral based borrowing in past flows: $s^C_{i,t} = (1-\delta)s^C_{i,t-1} + \text{Flow}^C_{i,t-1}$, with $\delta = 0.15$. Used as a continuous measure of exposure to collateral based debt.	Author's calculation based on SDC
$\Delta s^{\$}_t$	Standardized quarterly change in the advanced economy U.S. dollar index: $\Delta s^{\$}_t = [\log(UDI_t) - \log(UDI_{t-1})]/\sigma_{\Delta s}$, where UDI is the nominal dollar index against major advanced economy currencies.	FRED (Federal Reserve Economic Data)
$\Delta s^B_{c,t}$	Standardized quarterly change in the bilateral LC/USD exchange rate at the country time level, used in robustness checks.	IMF International Financial Statistics (IFS)
Size	Log of total assets in USD.	Worldscope FQ
Leverage (%)	Total debt as a share of total assets: (Short Term Debt + Long Term Debt)/Total Assets × 100	Worldscope FQ

Continued on next page

Table A.1.4: Variable Definitions and Data Sources, continued

Variable	**Definition**	**Source**
Profitability (ROA, pp)	Return on assets: [(Net Income + Interest Expense × (1 − Tax Rate))/Average Total Assets] × 100	Worldscope Fundamentals Annual (FA)
Liquidity	Ratio of cash and equivalents to current assets.	Worldscope FQ
Tangibility	Ratio of net property, plant, and equipment (PPE) to total assets.	Worldscope FQ
Export intensity	Foreign sales divided by total sales.	Worldscope FA
EBITDA / Assets	Earnings before interest, taxes, depreciation, and amortization, scaled by total assets.	Worldscope FQ
Debt/EBITDA	Total debt divided by EBITDA, proxying for interest coverage and leverage capacity.	Worldscope FQ
Real GDP growth (%)	Quarterly percentage change in real GDP.	IMF World Economic Outlook (WEO)
Inflation (CPI, %)	Year over year percentage change in consumer prices.	IMF WEO
Short term policy rate	Quarterly average of the central bank policy rate or equivalent short term money market rate.	IMF IFS
Exchange rate (LC/USD)	Log of the nominal local currency per USD exchange rate.	IMF IFS
Excess Bond Premium (EBP)	Change in the U.S. excess bond premium, capturing non default components of corporate credit spreads.	Gilchrist et al. (2012) dataset / FRED

Continued on next page

Table A.1.4: Variable Definitions and Data Sources, continued

Variable	**Definition**	**Source**
VIX	Quarterly change in the Chicago Board Options Exchange Volatility Index, proxy for global risk aversion.	FRED / CBOE
Constraint classification indices	Share of collateral based and earnings based debt issuance at the firm, sector, and country level, used to characterize the prevalence of borrowing regimes.	Author's calculation based on SDC Platinum

A.1.2 Classification of Borrowing Exposure

The analysis uses three related measures of borrowing exposure: (i) a *flow-based* measure that captures the contractual basis of new bond issuance in each firm–quarter, (ii) a *stock-based* measure that summarizes the composition of outstanding debt, and (iii) a *lifetime* measure that aggregates issuance histories over the sample period. All measures are constructed from security-level data in LSEG's *SDC Platinum* database and should be interpreted as classifications within the public bond market. Bank loans and other private liabilities are not observed, so these variables capture only the composition of publicly issued debt.

Firm–Quarter Classification Based on Issuance Flows

The flow-based measure identifies the contractual type of new borrowing in each firm–quarter. For firm i and quarter t, let f_{it}^{E} and f_{it}^{C} denote the total proceeds of earnings-based and collateral-based issues, respectively. Define the firm–quarter borrowing-type indicator B_{it}^{F} as

$$B_{it}^{F} = \begin{cases} 1 & \text{if } f_{it}^{E} > 0 \text{ and } f_{it}^{C} = 0, \\ 2 & \text{if } f_{it}^{C} > 0 \text{ and } f_{it}^{E} = 0, \\ 0 & \text{if } f_{it}^{E} = f_{it}^{C} = 0, \\ 3 & \text{if } f_{it}^{E} > 0 \text{ and } f_{it}^{C} > 0. \end{cases}$$

Most firm–quarters involve issuance of a single type of bond, so mixed cases ($B_{it}^{F} = 3$) are rare. In the main regressions, the lagged indicator $B_{i,t-1}^{F}$ is used to ensure that borrowing type is predetermined relative to contemporaneous shocks. The descriptive statistics in Figure 1.1 report the aggregate shares of firm–quarters classified as earnings- or collateral-based, excluding mixed cases.

As a robustness variant used in Section 1.7, a continuous analogue of this measure accu-

mulates past issuance flows with geometric decay:

$$D_{it}^{C} = \rho D_{i,t-1}^{C} + f_{i,t-1}^{C}, \qquad D_{it}^{E} = \rho D_{i,t-1}^{E} + f_{i,t-1}^{E}, \qquad \rho = 0.85,$$

and defines the corresponding exposure share

$$s_{it}^{C} = \frac{D_{it}^{C}}{D_{it}^{C} + D_{it}^{E}}.$$

This continuous exposure measure follows the same logic as the stock construction described below and is used to test robustness to alternative persistence assumptions.

Firm–Quarter Exposure Based on Outstanding Debt

The stock-based measure summarizes the composition of firms' outstanding liabilities, rolling forward past issuance according to contractual maturities. For each firm i and quarter t,

$$D_{it}^{j} = \rho^{j} D_{i,t-1}^{j} + f_{it}^{j}, \qquad j \in \{E, C\},$$

where f_{it}^{j} denotes new issuance proceeds of type j, and $\rho^{j} = \exp\big(-\ln 2 / H^{j}\big)$ is the quarterly survival rate implied by the average maturity H^{j} (in quarters) of bonds of that type. The parameters H^{E} and H^{C} are estimated from all observed tranches and applied uniformly across firms. This construction provides a smooth approximation of outstanding debt without requiring bond-specific amortization schedules.

At the start of each quarter $(t-1)$, a firm is classified as *earnings-based* if only earnings-based bonds are outstanding ($D_{i,t-1}^{E} > 0, D_{i,t-1}^{C} = 0$), *collateral-based* if only asset-backed bonds are outstanding ($D_{i,t-1}^{C} > 0, D_{i,t-1}^{E} = 0$), and *mixed* otherwise. Figure 1.2 reports the resulting shares of earnings- and collateral-based firm–quarters among constrained observations, excluding mixed cases.

Firm-Level Classification Based on Lifetime Issuance

To characterize long-run borrowing orientation, I aggregate issuance data over the entire sample. For each firm i, let N_i^E, N_i^C denote the number of earnings- and collateral-based issues, and A_i^E, A_i^C their total face values. Define issuance shares:

$$s_{i,N}^C = \frac{N_i^C}{N_i^E + N_i^C}, \qquad s_{i,A}^C = \frac{A_i^C}{A_i^E + A_i^C}.$$

A firm is classified as *mostly earnings-based* if the collateral share is below 0.4, *mostly collateral-based* if it exceeds 0.6, and *mixed* otherwise. Each firm counts once in the firm-count plots; in amount-weighted plots, firms are weighted by total lifetime issuance $A_i^E + A_i^C$. Figures 1.3a–1.3b report the resulting distribution of firm types by country and sector, while Figures A.1.1a–A.1.1b show the same distributions weighted by issuance amounts.

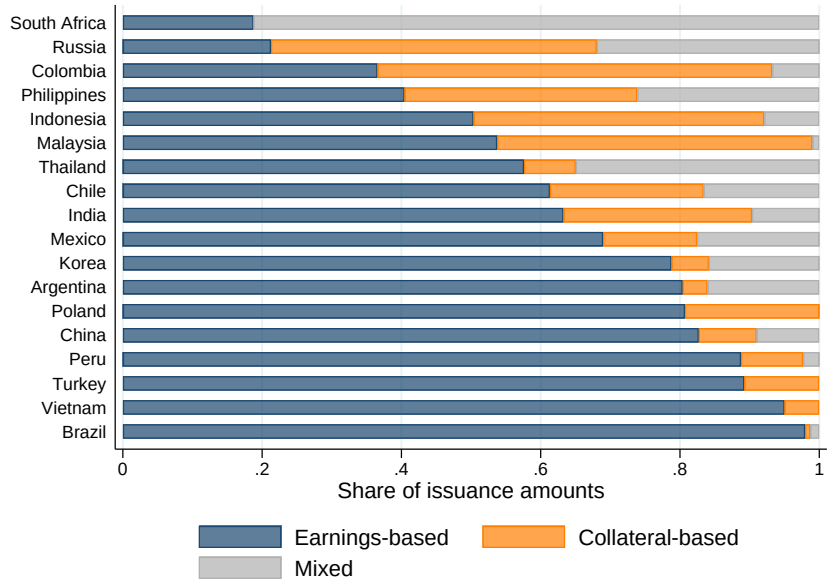
Cross-country variation in lifetime issuance shares reflects differences in secured-transactions and insolvency frameworks (Section 1.3), while sectoral variation reflects technological heterogeneity in asset tangibility and cash-flow stability.

A.1.3 What currency do these constrained firms borrow in?

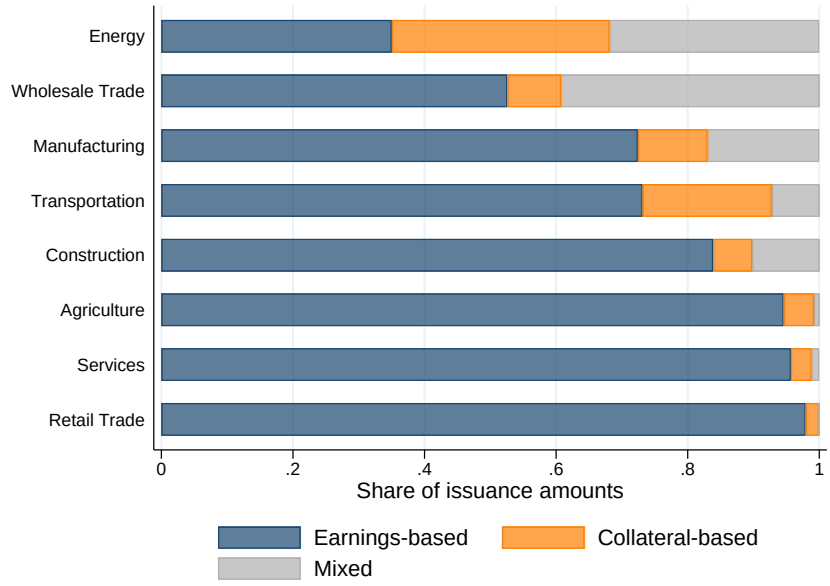
Figure A.1.2 compares the currency composition of bond issuance across firm types. The vast majority of borrowing by both earnings-based and collateral-based firms is denominated in local currency, reflecting the deepening of domestic bond markets across emerging economies over the sample period. On average, about ninety percent of constrained firms' issuance occurs in local currency, with the remainder largely in U.S. dollars. This similarity across firm types implies that differences in their responses to dollar movements are not driven by systematic differences in currency denomination. Instead, the key dimension of heterogeneity lies in the *basis of borrowing*—whether debt is secured by collateral or backed by earnings.

Figure A.1.1: Share of earnings-based and collateral-based issuance amounts

(a) Share of earnings-based and collateral-based issuance amounts by country.

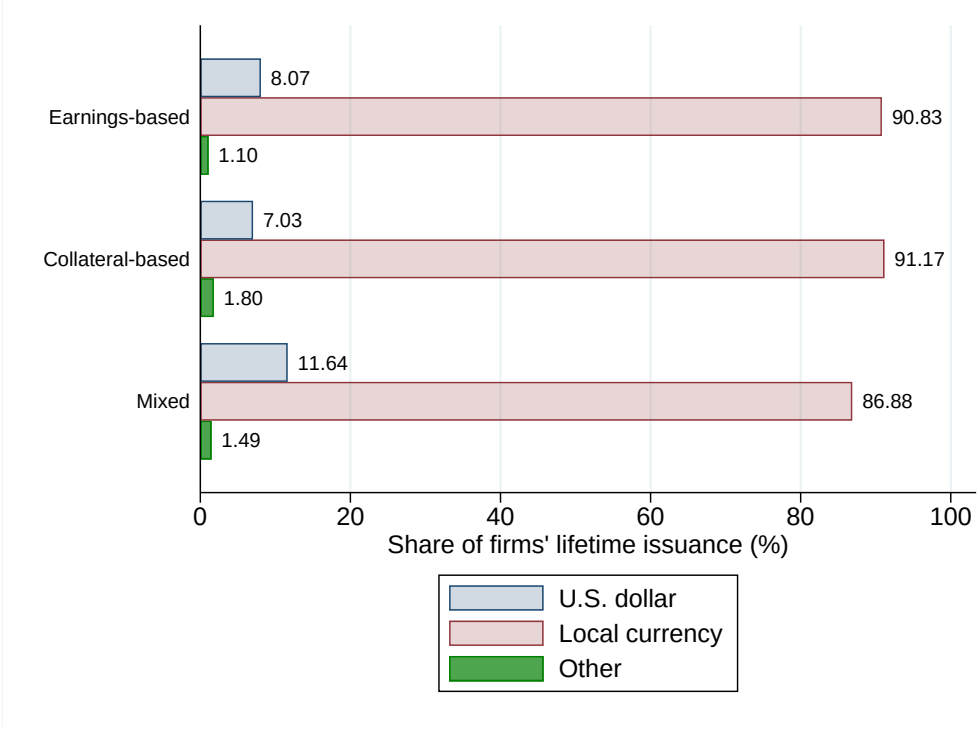


(b) Share of earnings-based and collateral-based issuance amounts by sector.



Notes: The figures report the composition of debt type by country and sector Panel A shows the distribution across countries and Panel B across sectors.

Figure A.1.2: Borrowing currency by firm type.

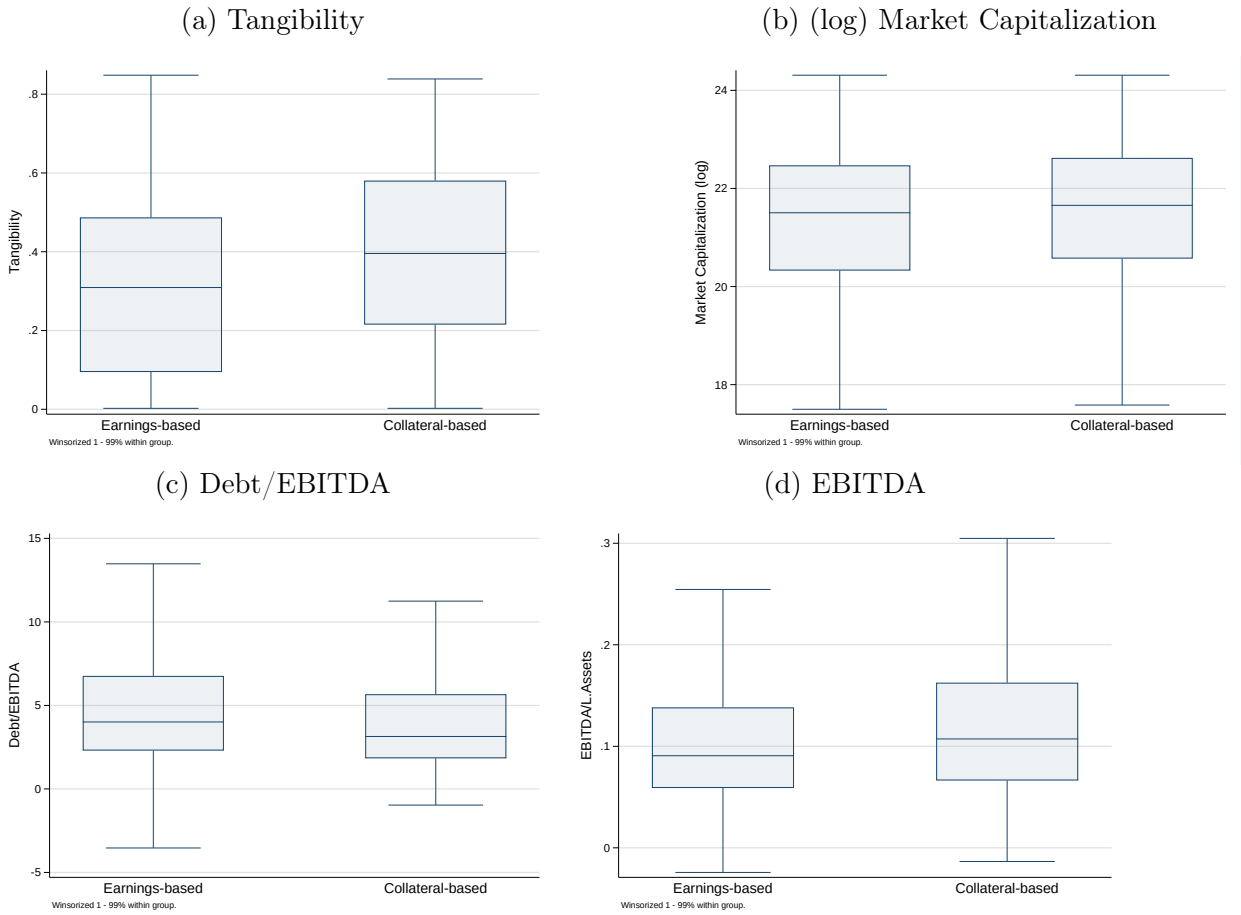


Notes: The figure reports the share of U.S.-dollar, local-currency, and other-currency bond issuance for firms classified as earnings-based, collateral-based, or mixed. Shares are computed from firm-level lifetime issuance counts as described in Appendix A.1.2. All firm types borrow predominantly in local currency—around 90% of total issuance—indicating that the observed heterogeneity in investment responses cannot be attributed to differences in the currency of borrowing.

A.1.4 Firm characteristics by current borrowing constraint

Table A.1.5 and Figure A.1.3 summarizes firm characteristics by the type of borrowing constraint implied by outstanding debt. Firms with collateral-based debt are more asset-intensive and exhibit higher tangibility, consistent with their ability to pledge physical collateral. Earnings-based borrowers are somewhat larger in market capitalization and display higher profitability, consistent with credit relationships based on operating cash flows. Leverage levels are comparable across groups, while liquidity is modestly higher for unconstrained firms with no outstanding bonds. These patterns confirm that the classification based on outstanding debt captures meaningful differences in financial structure rather than mechanical differences in size or sector composition.

Figure A.1.3: Firm characteristics by borrowing constraint.



Notes: Box plots compare firm characteristics across borrowing-constraint types—earnings-based and collateral-based—based on the composition of *outstanding debt* at $t-1$. Variables include tangibility, log market capitalization, debt/EBITDA, and EBITDA, all winsorized at the 1st–99th percentiles. Flow variables are scaled by lagged total assets and stock variables by contemporaneous total assets. Boxes show interquartile ranges (25th–75th percentiles), horizontal lines denote medians, and whiskers represent the 10th and 90th percentiles.

A.1.5 Institutional Setting

Event Study Around Secured-Lending Reforms To further examine the dynamic relationship between institutional reforms and borrowing composition, I conduct an event study around changes in the *Strength of Legal Rights Index* (SLRI) from the World Bank's *Doing Business* database. For each country, I identify the first year in which the SLRI increases by at least one point and construct an event-time window from five years before to

	p25	Median	p75	Mean	Std. Dev.	Count
None						
Size (log Assets)	19.11	20.06	21.03	20.10	1.45	44062
Market capitalization (log)	18.66	19.93	20.96	19.82	1.65	42494
Profitability (ROA, pp)	2.39	4.89	8.22	5.21	6.67	44062
Leverage (Debt/Assets)	0.18	0.30	0.42	0.31	0.17	44062
Liquidity (Cash/Current Assets)	0.07	0.16	0.27	0.18	0.14	44062
Tangibility (Net PPE/Assets)	0.16	0.33	0.52	0.35	0.22	44003
Investment (CAPEX/L.Assets, pp)	0.20	0.83	2.08	1.56	2.16	44062
Export intensity (Foreign Sales/Total Sales)	0.00	0.00	0.21	0.15	0.25	27500
EBITDA/L.Assets	0.06	0.10	0.15	0.10	0.09	32686
Debt/EBITDA	1.04	2.64	5.14	3.10	10.37	33085
Earnings-based						
Size (log Assets)	20.60	21.53	22.56	21.56	1.51	25787
Market capitalization (log)	19.96	21.07	22.06	20.95	1.62	25207
Profitability (ROA, pp)	2.36	4.51	7.45	4.87	5.53	25787
Leverage (Debt/Assets)	0.26	0.35	0.45	0.36	0.14	25787
Liquidity (Cash/Current Assets)	0.05	0.11	0.19	0.14	0.35	25787
Tangibility (Net PPE/Assets)	0.12	0.32	0.51	0.33	0.23	25729
Investment (CAPEX/L.Assets, pp)	0.21	0.76	1.71	1.26	1.66	25787
Export intensity (Foreign Sales/Total Sales)	0.00	0.02	0.28	0.18	0.27	22515
EBITDA/L.Assets	0.06	0.09	0.14	0.10	0.07	20896
Debt/EBITDA	1.91	3.46	6.03	4.01	10.51	20904
Collateral-based						
Size (log Assets)	20.27	21.27	22.33	21.28	1.52	12219
Market capitalization (log)	19.77	20.88	21.89	20.75	1.68	11869
Profitability (ROA, pp)	2.61	5.02	8.21	5.44	6.07	12219
Leverage (Debt/Assets)	0.25	0.34	0.45	0.35	0.14	12219
Liquidity (Cash/Current Assets)	0.04	0.10	0.19	0.13	0.12	12219
Tangibility (Net PPE/Assets)	0.21	0.39	0.55	0.39	0.22	12205
Investment (CAPEX/L.Assets, pp)	0.33	0.97	1.99	1.47	1.80	12219
Export intensity (Foreign Sales/Total Sales)	0.00	0.05	0.35	0.21	0.28	9747
EBITDA/L.Assets	0.07	0.11	0.16	0.12	0.08	9843
Debt/EBITDA	1.71	2.98	5.17	3.28	9.89	9856

Table A.1.5: Firm characteristics by borrowing constraint.

Notes: The table reports summary statistics for firm characteristics by the type of borrowing constraint associated with *outstanding debt* in quarter $t-1$, within the main regression sample. Variables are defined as in Figure A.1.3 and winsorized at the 1st–99th percentiles. Collateral-based firms exhibit higher asset tangibility, while earnings-based firms are larger and more profitable, consistent with the notion that collateral-based lending relies on physical assets and earnings-based lending relies on cash-flow capacity. All variables are expressed as percentages or in log form where indicated.

five years after that reform. I then estimate

$$\text{EBShare}_{c,t} = \sum_{\tau=-5}^{5} \beta_\tau \, 1\{t - t_c^* = \tau\} + \alpha_c + \gamma_{t_c^*} + \varepsilon_{c,t}, \tag{A.1.1}$$

where $\text{EBShare}_{c,t}$ denotes the share of earnings-based borrowing among constrained firms in country c and year t, α_c are country fixed effects, and $\gamma_{t_c^*}$ are cohort (reform-year) fixed effects. Coefficients are reported relative to the event year ($\tau = 0$), which is normalized to zero. Standard errors are clustered by country.

Figure A.1.4 plots the estimated event-time coefficients with 95% confidence intervals. The share of earnings-based borrowing remains stable in the years preceding the reform, showing no pre-trend, and rises significantly in the three to five years following an improvement in creditor-rights institutions. This pattern indicates that legal modernization—particularly reforms that strengthen secured-transactions and insolvency frameworks—is associated with a gradual shift from collateral-based to earnings-based lending relationships.

Table A.1.6: Insolvency regimes and prevalence of reorganization procedures across sample economies (in force during 2001–2019)

Country	**Legal framework and key law (year)**	**Reorganization feature**
Argentina	*Ley de Concursos y Quiebras* (1995, amended 2002)	Preventive reorganization (*concurso preventivo*) allowed
Brazil	Law 11.101/2005 (*Recuperação Judicial*)	Chapter 11 type judicial recovery process since 2005
Chile	Law 20.720/2014 (*Ley de Reorganización y Liquidación*)	Court supervised corporate reorganization
China	*Enterprise Bankruptcy Law* (2007)	Reorganization introduced; enforcement uneven

Continued on next page

Table A.1.6: Insolvency regimes and prevalence of reorganization procedures across sample economies (continued)

Country	Legal framework and key law (year)	Reorganization feature
Colombia	Law 1116/2006 (*Business Recovery and Reorganization*)	Judicial reorganization permitted
India	*Insolvency and Bankruptcy Code* (2016)	Unified insolvency code; reorganization procedure available
Indonesia	Bankruptcy Law No. 37/2004	Suspension of debt payment obligations (*PKPU*) possible
Korea	*Debtor Rehabilitation and Bankruptcy Act* (2006)	Chapter 11 style rehabilitation procedure
Malaysia	*Companies Act* (amended 2016)	Judicial management and voluntary arrangements allowed
Mexico	*Ley de Concursos Mercantiles* (2000)	Reorganization before liquidation permitted
Peru	Law 27809/2002 (*General Insolvency System*)	Out of court and administrative restructuring allowed
Philippines	*Financial Rehabilitation and Insolvency Act* (2010)	Court supervised rehabilitation procedure
South Africa	*Companies Act* (2008)	Business rescue provisions enabling reorganization
Thailand	*Bankruptcy Act* (amended 1998)	Corporate debt reorganization under court oversight

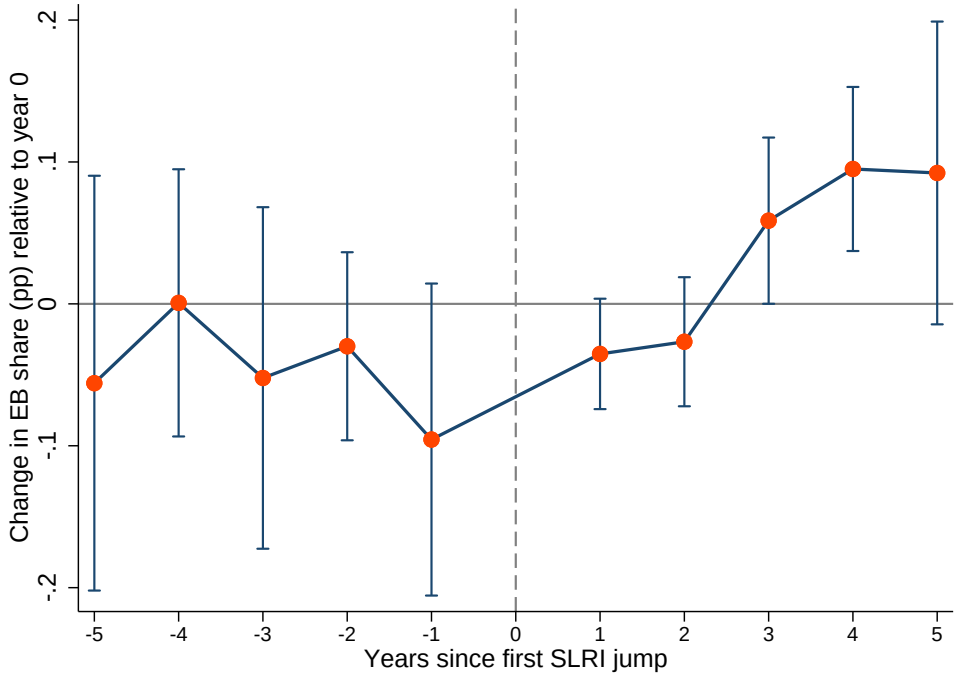
Continued on next page

Table A.1.6: Insolvency regimes and prevalence of reorganization procedures across sample economies (continued)

Country	Legal framework and key law (year)	Reorganization feature
Turkey	*Execution and Bankruptcy Law* (amended 2018)	*Konkordato* reorganization strengthened after 2018
Russia	Federal Law No. 127 FZ (2002)	Rehabilitation and external management procedures allowed
Poland	*Bankruptcy and Reorganization Law* (2003) to *Restructuring Law* (2016)	Reorganization under court oversight
Vietnam	*Law on Bankruptcy* (2014)	Reorganization procedure for viable firms under court supervision
	Predominant regime: Reorganization	Brazil, Mexico, Chile, South Africa
	Predominant regime: Liquidation	China, India, Indonesia, Turkey
	Predominant regime: Hybrid	Korea, Malaysia, Thailand, Vietnam

Notes: The table summarizes insolvency and restructuring frameworks governing corporate debt resolution across the 18 emerging market economies in the sample. "Reorganization feature" indicates whether court or administratively supervised restructuring is available to preserve the going concern value of firms. Legal sources include World Bank *Doing Business: Resolving Insolvency* (2019), IMF Technical Notes, OECD insolvency reports, and national legislation.

Figure A.1.4: Event-time effects of SLRI reforms on earnings-based borrowing share.



Notes: The figure plots event-time coefficients from Equation (A.1.1), estimated over a ±5-year window around the first one-point increase in a country's *Strength of Legal Rights Index* (SLRI). The regression includes country and cohort (reform-year) fixed effects; standard errors are clustered by country. Coefficients are expressed relative to the reform year ($\tau = 0$), shown by the vertical dashed line. Caps denote 95% confidence intervals. The post-reform rise in the earnings-based share suggests that stronger creditor-rights institutions facilitate the expansion of cash-flow-based lending.

A.2 Robustness Results

A.2.1 Investment response

This appendix reports the full regression tables corresponding to the robustness exercises discussed in Section 1.7. Each specification preserves the same fixed effects (firm, country×time, and sector×time) and firm-level controls as the baseline regression in Equation (1.1). Standard errors are clustered two ways, by firm and by quarter. The results confirm that the heterogeneous investment response to dollar appreciations is robust to alternative definitions of financing constraints and to different measures of global risk premia.

Alternative decay rates for financing composition. Table A.2.1 re-estimates the baseline specification using a continuous measure of the firm's exposure to collateral-based borrowing, constructed as a decayed share of past flows with quarterly persistence parameter $\delta \in \{0.10, 0.15, 0.20, 0.25\}$. Across all decay rates, the estimated interaction between the dollar appreciation and the lagged collateral-based share remains negative and statistically significant, indicating that the relative sensitivity of investment for collateral- versus earnings-based borrowers is not sensitive to the assumed persistence of financing relationships.

Alternative measures of global risk-premium shocks. Table A.2.2 reports results obtained when replacing the dollar index with two alternative global financial shocks: (i) the quarterly change in the *VIX*, capturing global risk aversion, and (ii) the change in the *Excess Bond Premium* (EBP), following Gilchrist et al. (2012), which isolates movements in corporate spreads unrelated to expected defaults. Both variables are standardized to have mean zero and unit variance over the sample. In both cases, collateral-constrained firms exhibit significantly stronger investment contractions when global risk premia rise, consistent with the interpretation of the dollar index as a proxy for global financial tightening.

Taken together, these robustness checks confirm that the paper's main findings are not driven by specific modeling choices, measurement of the financing constraint, or the particular global shock used to capture risk-premium fluctuations.

Table A.2.1: Investment response based on continuous measure of collateral based debt

	(1)	(2)	(3)	(4)
$(\Delta s_t^{\$} \times s_{i,t}^{C})$	-0.027***	-0.026**	-0.024**	-0.024**
	(0.010)	(0.010)	(0.010)	(0.010)
Obs.	74099	74099	74099	74099
Within (R.squared)	0.080	0.080	0.080	0.080

Notes: The table reports robustness of the investment regression to alternative decay parameters δ used in constructing the continuous collateral-based share. For each firm–quarter, the decayed share of collateralized borrowing is defined recursively as $s_{i,t}^{C} = (1-\delta)s_{i,t-1}^{C} + \text{Flow}_{i,t-1}^{C}$, where $\text{Flow}_{i,t-1}^{C}$ is an indicator for collateral-based issuance in $t-1$. Each column corresponds to a different quarterly decay rate $\delta \in \{0.10, 0.15, 0.20, 0.25\}$. The dependent variable is investment, measured as capital expenditures divided by lagged total assets (percentage points). The interaction term $\Delta s_t^{\$} \times s_{i,t-1}^{C}$ captures how the response of investment to a one–standard–deviation dollar appreciation varies with the firm's exposure to collateral-based debt. All specifications include firm fixed effects, country×time and sector×time effects, and the same firm-level controls as in Table 1.3. Standard errors are two–way clustered by firm and quarter. $^{*}p < 0.10$; $^{**}p < 0.05$; $^{***}p < 0.01$.

Table A.2.2: Investment response based on alternative measures of risk premium shock

	(1)	(2)
Δ VIX $\times 1\{\text{Flow}_{i,t-1} = C\}$	-0.316***	
	(0.094)	
Δ EBP $\times 1\{\text{Flow}_{i,t-1} = C\}$		-0.218**
		(0.097)
Obs.	6,655	6,655
Within R.squared	0.046	0.048
Adjusted R-squared	0.530	0.531

Notes: The table reports robustness of the investment regression to alternative global risk-premium shocks. Columns (1) and (2) replace the trade-weighted dollar index with the change in the VIX and the change in the excess bond premium (EBP), respectively. Both variables are standardized to have mean zero and unit standard deviation over the sample. The dependent variable is investment, measured as capital expenditures divided by lagged total assets (percentage points). Reported coefficients correspond to the interaction between the standardized shock and the firm's borrowing constraint type, based on the most recent bond issuance at $t-1$. A negative coefficient indicates that collateral-constrained firms reduce investment more strongly when global risk premia rise. All regressions include firm, country×time, and sector×time fixed effects and the same firm-level controls as in Table 1.3. Standard errors are two–way clustered by firm and quarter. $^{*}p < 0.10$; $^{**}p < 0.05$; $^{***}p < 0.01$.

A.2.2 Placebo: Earnings Channel Within Collateral-Based Firms

As a robustness check, I test whether the positive export-earnings channel documented in Section 1.6.3 is present among collateral-based firms. If export exposure simply captures higher profitability or demand elasticity rather than a true earnings-constraint mechanism, similar patterns should appear within collateral-based borrowers. Appendix Table A.2.3 shows that this is not the case: among collateral-based firms, investment responses to dollar shocks do not vary systematically with pre-crisis export exposure.

Table A.2.3: Earnings channel within collateral-based borrowers

Inv_{it}	(1)	(2)	(3)	(4)	(5)	(6)
$\Delta s_t^{\$} \times \text{Exp}_i^*$	-0.020	-0.024				
	(0.015)	(0.016)				
$\Delta \log(\text{Revenue})$		0.063**		0.061**	0.059**	
		(0.027)		(0.026)	(0.028)	
$\Delta s_t^B \times \text{Exp}_i^*$			0.013	0.011	0.005	
			(0.015)	(0.017)	(0.019)	
ZX						0.014
						(0.017)
N	8537	8247	8537	8247	7250	6220
Adj. R-sq	0.578	0.585	0.578	0.585	0.608	0.034

Notes: The table reports OLS and IV estimates from regressions of average investment over t–$t+2$ on exchange-rate movements interacted with firms' pre-2008 export exposure. The dependent variable is the three-quarter average of investment (capital expenditures divided by lagged assets). The sample is restricted to collateral-based firms based on the stock of outstanding bond debt. The global shock, $\Delta s_t^{\$}$, measures the appreciation of the U.S. dollar against advanced-economy currencies; Δs_{ct}^B is the standardized change in log(LC/USD) within each country. Export exposure is each firm's average pre-2008 export share, winsorized at the 1st–99th percentiles and standardized within the collateral-based sample. Controls include lagged size, leverage, ROA, and liquidity. All regressions include firm, country×time, and sector×time fixed effects. Standard errors are two-way clustered by firm and quarter. $^{*}p < 0.10$; $^{**}p < 0.05$; $^{***}p < 0.01$.

A.3 Model of Borrowing Constraints and Dollar Shocks

Environment and Timing

A small open economy contains a continuum of firms $i \in [0, 1]$. Each firm finances capital K_{it} using one–period debt B_{it}. The world interest rate r_t is exogenous, but firms pay a firm–specific external finance premium μ_{it} that rises with constraint tightness. Time is discrete, and in each period t:

1. The global dollar price s_t (the nominal dollar index) is realized.
2. Firms observe (K_{it}, s_t, θ_i), where $\theta_i \in [0, 1]$ denotes export intensity.
3. Each firm chooses a financing regime $r_{it} \in \{C, E\}$ (Collateral or Earnings).
4. It chooses debt B_{it} and investment I_{it}, taking the regime constraint as given.
5. Production occurs, debt is repaid, and capital evolves via $K_{i,t+1} = K_{it} + I_{it}$.

Technology and Revenues

Output is linear in capital:

$$Y_{it} = A_t K_{it}.$$

Under dominant-currency pricing, an exporter with intensity θ_i earns local-currency revenue

$$R_{it}(s_t) = (\chi_0 + \chi_1 \theta_i s_t) A_t K_{it},$$

where $\chi_0 > 0$ captures domestic sales and $\chi_1 > 0$ captures the sensitivity of export revenues to dollar appreciation. Investment costs are quadratic:

$$\frac{\varphi}{2} I_{it}^2, \qquad \varphi > 0.$$

Borrowing Constraints and Premiums

Firms differ in the basis of repayment.

Collateral–based (CB) constraint. Borrowing is secured against pledgeable assets:

$$B_{it} \leq \phi_C q(s_t) K_{it}, \qquad \phi_C \in (0,1), \quad q'(s_t) < 0. \tag{A.3.1}$$

A dollar appreciation ($\uparrow s_t$) reduces the local-currency value of collateral and tightens (A.3.1).

Earnings–based (EB) constraint. Borrowing is instead secured by operating cash flow:

$$B_{it} \leq \phi_E R_{it}(s_t) = \phi_E(\chi_0 + \chi_1 \theta_i s_t) A_t K_{it}, \qquad \phi_E > 0. \tag{A.3.2}$$

A dollar appreciation raises revenues in local currency for exporters ($\theta_i > 0$), relaxing (A.3.2).

External Finance Premium. For regime $r \in \{C, E\}$, define tightness $\tau_{it}^r = B_{it}/\bar{B}_{it}^r$ and let $\mu_{it}^r = \Psi(\tau_{it}^r)$, where $\Psi'(\cdot) > 0$, $\Psi''(\cdot) \geq 0$, $\Psi(0) = 0$. Thus a tighter constraint (larger τ_{it}^r) raises the borrowing premium.

Firm Problem

Given (K_{it}, s_t, θ_i), the firm chooses (I_{it}, B_{it}, r_{it}) to maximize expected discounted profits:

$$\max_{\{K_{i,t+1}, B_{it}, r_{it}\}} \sum_{t=0}^{\infty} \beta^t \left[R_{it}(s_t) - (r_t + \mu_{it}^{r_{it}}) B_{it} - \frac{\varphi}{2} I_{it}^2 - \kappa_{r_{it}} \right],$$

subject to the constraint $B_{it} \leq \bar{B}_{it}^{r_{it}}(s_t)$.

Investment Condition. For an interior solution,

$$\varphi I_{it} = \mathbb{E}_t[A_{t+1}(\chi_0 + \chi_1 \theta_i s_{t+1})] - (r_t + \mu_{it}^{r_{it}}), \tag{A.3.3}$$

so that $\partial I_{it}/\partial \mu_{it}^r < 0$.

Debt Choice. Within a regime, the firm equates the marginal cost of tighter constraints to the return on debt. A tightening of $\bar{B}_{it}^r$ increases τ_{it}^r and hence μ_{it}^r.

Regime Choice. At the start of t, firms select the regime that minimizes the total user cost:

$$r_{it} = \arg \min_{r \in \{C,E\}} \{(r_t + \mu_{it}^r) B_{it} + \kappa_r\}. \tag{A.3.4}$$

With small i.i.d. idiosyncratic taste shocks, this choice yields a multinomial logit structure as in the empirical multinomial specification.

Comparative Statics

[Constraint Sensitivities] For a small dollar appreciation $\Delta s > 0$,

$$\frac{\partial \bar{B}_{it}^C}{\partial s} < 0, \qquad \frac{\partial \bar{B}_{it}^E}{\partial s} = \phi_E \chi_1 \theta_i A_t K_{it} > 0 \text{ if } \theta_i > 0.$$

Proposition 5 (Premium and Investment Response)**.** *When the borrowing constraint binds,*

$$\frac{\partial \mu_{it}^C}{\partial s} > 0, \quad \frac{\partial I_{it}^C}{\partial s} < 0; \qquad \frac{\partial \mu_{it}^E}{\partial s} \begin{cases} < 0 & \text{if } \theta_i > 0, \\ = 0 & \text{if } \theta_i = 0, \end{cases} \quad \frac{\partial I_{it}^E}{\partial s} \begin{cases} > 0 & \text{if } \theta_i > 0, \\ = 0 & \text{if } \theta_i = 0. \end{cases}$$

Proposition 6 (Endogenous Reallocation)**.** *Let $\mathcal{V}_{it}^r = -[(r_t + \mu_{it}^r) B_{it} + \kappa_r]$ denote regime value. Define the exporter threshold $\theta^\star(s_t)$ such that $\mathcal{V}_{it}^E(\theta^\star, s_t) = \mathcal{V}_{it}^C(s_t)$. Then $\partial \theta^\star / \partial s <$*

0*: dollar appreciations make the earnings-based regime relatively more attractive, shifting issuance toward EB contracts.*

Empirical Mapping

Linearizing investment around a steady state gives

$$\Delta I_{it} = \beta_C(\Delta s_t \times CB_{i,t-1}) + \beta_E(\Delta s_t \times EB_{i,t-1}) + \beta_X(\Delta s_t \times EB_{i,t-1} \times \theta_i) + \text{controls} + \varepsilon_{it},$$

where

$$\beta_C < 0, \qquad \beta_E \approx 0, \qquad \beta_X > 0.$$

These predictions correspond to the heterogeneous investment slopes in Table 3 and the earnings-buffer results in Table 5. The regime-choice condition (A.3.4) implies the reallocation pattern estimated in the multinomial logit (Table 6, Figure 7).

Interpretation

The model nests two canonical mechanisms in the literature: (i) the collateral-based financial accelerator of Kiyotaki et al. (1997) and Bernanke et al. (1999); and (ii) the earnings-based borrowing constraint of Drechsel (2023) and Lian et al. (2021). Under dominant-currency pricing (Gopinath et al., 2020), exporters' revenues rise in domestic currency when the dollar appreciates, creating a measurable heterogeneity in borrowing tightness across constraint types. The model provides microfoundations for the empirical coefficients estimated in the paper.

APPENDIX B

APPENDIX FOR CHAPTER 2

B.1 Appendix

Table B.1.1: List of countries along with timeline in our final sample

Country	Timeline
Argentina	2000Q2 - 2019Q4
Brazil	2000Q2 - 2019Q4
Chile	2001Q2 - 2019Q4
China	2001Q3 - 2019Q4
Colombia	2003Q2 - 2019Q4
Hungary	2001Q3 - 2019Q4
India	2013Q2 - 2019Q4
Indonesia	2007Q1 - 2019Q4
Kazakhstan	2015Q3 - 2018Q4
Malaysia	2000Q2 - 2019Q4
Mexico	1998Q2 - 2019Q4
Peru	2002Q1 - 2019Q4
Philippines	2001Q2 - 2019Q4
Poland	2005Q1 - 2019Q4
Russian Fed	2002Q1 - 2019Q4
Thailand	1999Q3 - 2019Q1
Turkey	2004Q4 - 2019Q4
Vietnam	2006Q2 - 2019Q4

Table B.1.2: Variable Definitions

Variable	**Definition**	**Source**
1(Domestic bond issuance)	Dummy equal to 1 if the firm issues a domestic bond in a given quarter.	SDC Platinum New Issues

Continued on next page

Table B.1.2: Variable Definitions, continued

Variable	Definition	Source
Leverage (%)	Total debt as a percentage of total assets, defined as (Short Term Debt + Long Term Debt)/Total Assets × 100	Worldscope Fundamentals Quarterly (FQ)
ROA	Return on assets: ((Net Income + Interest Expense × (1 − Tax Rate))/Average Total Assets) × 100	Worldscope Fundamentals Annual
Size	Log of total assets measured in USD.	Worldscope FQ
Liquidity	Log of the ratio of cash and equivalents to current assets.	Worldscope FQ
Bonds (PLBN)	Controls on nonresident bond purchases. Equals 1 if control is imposed, 0 otherwise.	Fernandez et al. (2016)
Equity (PLBN)	Controls on nonresident equity purchases. Equals 1 if control is imposed.	Fernandez et al. (2016)
Money Market (PLBN)	Controls on nonresident purchases of money market instruments.	Fernandez et al. (2016)
Bonds (SIAR)	Controls on residents issuing bonds abroad.	Fernandez et al. (2016)
Collective Inv. (PLBN)	Controls on nonresident collective investment purchases.	Fernandez et al. (2016)
Derivatives (PLBN)	Controls on nonresident derivatives purchases.	Fernandez et al. (2016)
Real Estate (PLBN)	Controls on nonresident real estate purchases.	Fernandez et al. (2016)

Continued on next page

Table B.1.2: Variable Definitions, continued

Variable	**Definition**	**Source**
Financial Credits (Inflows)	Inflow restrictions on financial credit.	Fernandez et al. (2016)
Direct Investment (Inflows)	Inflow restrictions on FDI.	Fernandez et al. (2016)
iMaPP Index	Composite index of 17 macroprudential policy indices by country. Higher values equal more restrictions.	Alam et al. (2019)
Real GDP growth	Quarterly real GDP growth rate.	IMF WEO
Inflation (CPI)	Year over year change in consumer prices.	IMF WEO
Exchange Rate	Log of nominal USD exchange rate.	IMF IFS
Overall Financial Development	Composite index of financial institutions and markets.	IMF Financial Development Index database
EMBI spread	Quarterly Emerging Markets Bond Index spread. Regressions use the change in this spread as a control.	J.P. Morgan

Table B.1.3: Descriptive statistics of new bond issues in our final sample

Observations: 72,332	Mean	Median	Std. Dev.	p25	p75
Issues					
# bonds per firm	6.21	5.00	5.20	2.00	9.00
# bonds per country	205	59	448.87	4.75	107
Principal amount (Millions USD)	227.74	114.77	485.36	58.19	235.12
Maturity (years)	3.60	3.00	3.29	1.00	5.00
Bonds (PLBN)					
Total switches[1](from 0 to 1 or 1 to 0)					19
Countries that switch					11
Average switches per country (excluding zero switches)					1.73
Average switches per country (including zero switches)					1.06
# of switches from 0 to 1 (tightening)					10
# of switches from 1 to 0 (loosening)					9

Table B.1.4: Description of Bonds (PLBN) measures from IMF AREARER

Country	Years	Direction	Instrument type	Short description
Argentina	2005 (0)→2006 (1)	Tightening	Non admin	30% unremunerated reserve requirement on capital inflows
Argentina	2016 (1)→2017 (0)	Loosening	Admin	Removal of minimum holding period and liberalization of FX access for nonresidents
Brazil	2001→2002	Loosening	Admin	Nonresidents allowed to purchase bonds through dedicated investment funds
Brazil	2008→2009	Tightening	Non admin	2% IOF tax on nonresident investments in equity and fixed income securities
Brazil	2012→2013	Loosening	Non admin	Reduction of IOF tax on fixed income instruments to zero
Colombia	2010→2011	Loosening	Admin	Mandatory use of local administrators for foreign portfolio investments
Malaysia	2000→2001	Tightening	Admin	Approval requirement for nonresident issuance and withholding tax on interest
Malaysia	2003→2004	Loosening	Non admin	Tax exemption on interest income from ringgit denominated securities
Mexico	2013→2014	Tightening	Admin	Bond purchases restricted to securities firms and credit institutions
Philippines	2003→2004	Tightening		
Philippines	2005→2006	Loosening		
Poland	2010→2011	Loosening		
Poland	2018→2019	Tightening	Unclear	Regulations governing participation securities apply
Russia	2007→2008	Loosening	Non admin	No foreign exchange restrictions on nonresident securities purchases
Russia	2009→2010	Tightening	Non admin	Issuer level limitations on nonresident bond purchases
Russia	2011→2012	Loosening	Non admin	No restrictions on nonresident bond transactions
Thailand	2003→2004	Tightening	Non admin	Cap on large short term debt investments by nonresidents
Turkey	2013→2014	Tightening	Admin	Nonresidents permitted to purchase securities through authorized intermediaries
Vietnam	2010→2011	Tightening	Admin	Mandatory local currency trading accounts for securities transactions

Notes: The table reports policy changes affecting bond inflows based on AREAER (The Annual Report on Exchange Arrangements and Exchange Restrictions) descriptions. Direction refers to switches in the bond inflow control indicator for Bonds (PLBN). Tightening refers to a change in capital control from 0 to 1 and loosening refers to the change from 1 to 0. Years mention the years in which the control switches. Instrument type reflects the classification made by us based on the descriptions in the AREAER. Blank entries indicate missing information in the underlying AREAER narrative.

1. We define a capital control switch as a year-over-year change in the binary indicator capturing the presence of a specific capital flow restriction. Given the dummy nature of these variables, a switch reflects either a tightening of capital controls (a transition from 0 to 1) or a loosening (a transition from 1 to 0) relative to the previous year.

Table B.1.5: Correlations between capital controls measures

	Bonds	Bonds (SIAR)	Collective Inv.	Derivatives	Equity	Money Market	Real Estate	FCI	DII
Bonds (PLBN)	1.00								
Bonds (SIAR)	0.52	1.00							
Collective Inv. (PLBN)	0.70	0.38	1.00						
Derivatives (PLBN)	0.48	0.34	0.43	1.00					
Equity (PLBN)	0.52	0.07	0.46	0.59	1.00				
Money Market (PLBN)	0.89	0.51	0.74	0.50	0.59	1.00			
Real Estate (PLBN)	0.33	0.40	0.27	0.37	0.24	0.31	1.00		
Financial credits (Inflows)	0.36	0.33	0.31	0.44	0.18	0.25	0.45	1.00	0.09
Direct investment (Inflows)	0.23	0.22	0.32	0.18	0.20	0.22	0.44	0.09	1.00

Notes: Pairwise Pearson correlations among binary capital control indicators, computed at the country quarter level on the sample used in the regressions. PLBN indicates restrictions on purchases by nonresidents of locally issued instruments. SIAR indicates restrictions on foreign issues of bonds by residents. FCI is financial credit inflows. DII is direct investment inflows. Other labels refer to the corresponding inflow categories. Only the lower triangle and the diagonal are shown.

Table B.1.6: Summary statistics of real variables at all horizons.

	Mean	Median	Std. Dev.	p25	p75	N
(log) Total Liabilities (h=0)	22.809	22.344	2.586	21.131	23.856	62834
(log) Total Liabilities (h=1)	22.853	22.383	2.566	21.188	23.880	60267
(log) Total Liabilities (h=2)	22.898	22.436	2.546	21.254	23.918	58237
(log) Total Liabilities (h=3)	22.920	22.454	2.541	21.272	23.927	57303
(log) Total Liabilities (h=4)	22.939	22.489	2.527	21.315	23.953	56921
(log) Total Liabilities (h=5)	22.961	22.503	2.518	21.336	23.963	55134
(log) Total Liabilities (h=6)	22.972	22.533	2.503	21.361	23.959	54092
(log) Total Liabilities (h=7)	22.991	22.552	2.492	21.398	23.969	52850
(log) Total Liabilities (h=8)	23.006	22.579	2.476	21.423	23.981	51960
Investment (h=0)	0.018	0.011	0.023	0.003	0.025	59087
Investment (h=1)	0.019	0.012	0.022	0.004	0.025	56197
Investment (h=2)	0.018	0.012	0.021	0.004	0.025	54845
Investment (h=3)	0.018	0.011	0.021	0.004	0.024	54056
Investment (h=4)	0.017	0.011	0.020	0.004	0.023	53931
Investment (h=5)	0.017	0.011	0.020	0.004	0.023	52349
Investment (h=6)	0.016	0.011	0.020	0.003	0.022	51584
Investment (h=7)	0.016	0.010	0.019	0.003	0.022	50514
Investment (h=8)	0.016	0.010	0.019	0.003	0.022	49735

Notes: This table shows the summary statistics for the levels of real variables: (log) Total Liabilities and Investment ($\equiv$ CAPEX/(lagged) Total Assets) at horizons, $h = 0, 1 \cdots, 8$. Missing quarterly observations are filled by linear interpolation within firm to align variables across horizons. The interpolated series have distributions that are essentially the same as in the raw data.

B.1.1 Exploring substitution channels

Table B.1.7: Current Accounts and Capital Controls on Bond PLBN

Δ_h log(Current Accounts)	h=0	h=1	h=2	h=3	h=4	h=5	h=6	h=7	h=8
L.Bonds (PLBN)	-0.0132**	-0.00864	-0.00861	-0.0111	0.0141	0.00849	0.0331**	0.0421**	0.0686***
	(-2.34)	(-1.08)	(-0.80)	(-0.94)	(1.06)	(0.55)	(2.00)	(2.30)	(3.50)
Other Capital Controls, iMaPP	✓	✓	✓	✓	✓	✓	✓	✓	✓
Economy Controls	✓	✓	✓	✓	✓	✓	✓	✓	✓
Firm Controls	✓	✓	✓	✓	✓	✓	✓	✓	✓
Firm FE	✓	✓	✓	✓	✓	✓	✓	✓	✓
Sector*Time FE	✓	✓	✓	✓	✓	✓	✓	✓	✓
Observations	62801	60192	58152	57224	56842	55048	53997	52748	51866

Notes: Each column reports horizon h regressions for $h = 1, 2, \cdots, 8$. Dependent variables are Δ_h (log) Current Accounts and Δ_h is the change from quarter $t-1$ to $t+h$. L.Bonds (PLBN) is a lagged dummy variable with value 1 if capital controls on purchases by nonresidents of locally-issued bond are imposed in a given country, and with value 0 otherwise. Other Capital Control include (lagged) restrictions on capital inflows through equity, money market, collective investment, derivatives, real estates, financial credits, direct investment and on foreign issue of bonds by residents. The lagged iMaPP index captures country-level domestic macroprudential policy. Economy-level controls include lagged quarterly real GDP growth, CPI inflation, the log of the nominal bilateral exchange rate against the dollar, the overall financial development index, and the lagged change in the EMBI spread. Firm-level controls include lagged values of size (log of total assets), leverage, liquidity, and return on assets (ROA). Standard errors are clustered at the firm level. t-statistics are reported in parentheses. $^{*}p < 0.10$; $^{**}p < 0.05$; $^{***}p < 0.01$.

Table B.1.8: Heterogeneity with Current Accounts and Capital Controls on Bond PLBN

Δ_h(log) Current Assets	h=0	h=1	h=2	h=3	h=4	h=5	h=6	h=7	h=8
L.Bonds (PLBN)*Lev Q2	0.00153	-0.0147	-0.0290*	-0.0244	-0.0268	-0.00593	-0.0114	0.00522	-0.00948
	(0.21)	(-1.35)	(-1.76)	(-1.31)	(-1.18)	(-0.24)	(-0.50)	(0.23)	(-0.38)
L.Bonds (PLBN)*Lev Q3	-0.0225**	-0.0383***	-0.0582***	-0.0574***	-0.0666***	-0.0647***	-0.0698***	-0.0594**	-0.0717***
	(-2.58)	(-3.00)	(-3.28)	(-3.03)	(-3.04)	(-2.68)	(-2.96)	(-2.38)	(-2.65)
L.Bonds (PLBN)*Lev Q4	-0.0215**	-0.0383***	-0.0734***	-0.0856***	-0.0943***	-0.0882***	-0.104***	-0.0940***	-0.115***
	(-2.36)	(-2.74)	(-4.05)	(-4.34)	(-3.97)	(-3.27)	(-3.85)	(-3.20)	(-3.47)
L.Bonds (PLBN)*ROA Q2	-0.00315	-0.0106	-0.00109	-0.00423	-0.0129	-0.00911	-0.0125	0.000635	0.00487
	(-0.49)	(-1.12)	(-0.09)	(-0.29)	(-0.83)	(-0.54)	(-0.69)	(0.03)	(0.22)
L.Bonds (PLBN)*ROA Q3	0.000939	-0.00395	0.00291	0.00262	0.00608	0.00450	0.00523	0.0238	0.0305
	(0.12)	(-0.35)	(0.21)	(0.15)	(0.36)	(0.24)	(0.26)	(1.10)	(1.28)
L.Bonds (PLBN)*ROA Q4	0.00773	-0.000880	0.0174	0.0190	0.00230	0.00541	0.000203	-0.000482	0.00866
	(0.86)	(-0.07)	(1.11)	(1.03)	(0.12)	(0.25)	(0.01)	(-0.02)	(0.32)
Firm Controls	✓	✓	✓	✓	✓	✓	✓	✓	✓
Firm FE	✓	✓	✓	✓	✓	✓	✓	✓	✓
Sector*Time FE	✓	✓	✓	✓	✓	✓	✓	✓	✓
Country*Time FE	✓	✓	✓	✓	✓	✓	✓	✓	✓
Observations	62700	60092	58055	57135	56750	54959	53907	52657	51774

Notes: Each column reports horizon h regressions for $h = 1, 2, \cdots, 8$. Dependent variables are Δ_h (log) Current Accounts and Δ_h is the change from quarter $t-1$ to $t+h$. L.Bonds (PLBN) is a lagged dummy variable with value 1 if capital controls on purchases by nonresidents of locally-issued bond are imposed in a given country, and with value 0 otherwise. Lev Q and ROA Q are quartile indicators for leverage and return on assets, with Q1 the lowest and Q4 the highest. Reported rows are coefficients on L.Bonds (PLBN) interacted with each quartile indicator, the omitted group is Q1. Firm-level controls include lagged values of size (log of total assets), leverage, liquidity, and return on assets (ROA). Standard errors are clustered at the firm level. t-statistics are reported in parentheses. $^{*}p < 0.10$; $^{**}p < 0.05$; $^{***}p < 0.01$.

Table B.1.9: Accounts Payable and Capital Controls on Bond PLBN

Δ_h log(Accounts Payable)	(1) h=0	h=1	h=2	h=3	h=4	h=5	h=6	h=7	h=8
L.Bonds (PLBN)	0.0228	0.00826	-0.0103	-0.0499	-0.0426	-0.0701*	-0.0571	-0.0282	-0.0538
	(0.90)	(0.33)	(-0.39)	(-1.65)	(-1.32)	(-1.79)	(-1.39)	(-0.66)	(-1.14)
Other Capital Controls, iMaPP	✓	✓	✓	✓	✓	✓	✓	✓	✓
Economy Controls	✓	✓	✓	✓	✓	✓	✓	✓	✓
Firm Controls	✓	✓	✓	✓	✓	✓	✓	✓	✓
Firm FE	✓	✓	✓	✓	✓	✓	✓	✓	✓
Sector*Time FE	✓	✓	✓	✓	✓	✓	✓	✓	✓
Observations	46389	43049	41768	40949	40216	38674	37982	36938	35969

t statistics in parentheses
Standard errors clustered at the firm level
* $p < .1$, ** $p < .05$, *** $p < .01$

Notes: Each column reports horizon h regressions for $h = 1, 2, \cdots, 8$. Dependent variables are Δ_h (log) Accounts Payable and Δ_h is the change from quarter $t-1$ to $t+h$. L.Bonds (PLBN) is a lagged dummy variable with value 1 if capital controls on purchases by nonresidents of locally-issued bond are imposed in a given country, and with value 0 otherwise. Other Capital Control include (lagged) restrictions on capital inflows through equity, money market, collective investment, derivatives, real estates, financial credits, direct investment and on foreign issue of bonds by residents. The lagged iMaPP index captures country-level domestic macroprudential policy. Economy-level controls include lagged quarterly real GDP growth, CPI inflation, the log of the nominal bilateral exchange rate against the dollar, the overall financial development index, and the lagged change in the EMBI spread. Firm-level controls include lagged values of size (log of total assets), leverage, liquidity, and return on assets (ROA). Standard errors are clustered at the firm level. t-statistics are reported in parentheses. $^{*}p < 0.10$; $^{**}p < 0.05$; $^{***}p < 0.01$.

Table B.1.10: Heterogeneity with Accounts Payable and Capital Controls on Bond PLBN

Δ_h log(Accounts Payable)	h=0	h=1	h=2	h=3	h=4	h=5	h=6	h=7	h=8
L.Bonds (PLBN)*Lev Q2	0.00490	0.0107	0.0430	0.0171	0.0490	0.0142	0.0492	0.0279	0.00358
	(0.28)	(0.38)	(1.37)	(0.58)	(1.35)	(0.33)	(1.15)	(0.60)	(0.07)
L.Bonds (PLBN)*Lev Q3	0.0123	0.0233	0.0493	0.0258	0.0119	-0.00915	0.0296	-0.0480	-0.0187
	(0.52)	(0.71)	(1.38)	(0.80)	(0.29)	(-0.19)	(0.61)	(-0.86)	(-0.30)
L.Bonds (PLBN)*Lev Q4	0.00424	-0.00789	0.0102	-0.00812	-0.00657	-0.0165	-0.0185	-0.0649	-0.0742
	(0.19)	(-0.26)	(0.27)	(-0.22)	(-0.14)	(-0.27)	(-0.27)	(-0.89)	(-0.87)
L.Bonds (PLBN)*ROA Q2	-0.0445***	-0.0795***	-0.0217	-0.0918***	-0.0356	-0.0261	0.0109	0.0202	0.0205
	(-3.05)	(-3.21)	(-0.80)	(-3.13)	(-1.06)	(-0.67)	(0.26)	(0.49)	(0.45)
L.Bonds (PLBN)*ROA Q3	-0.0174	-0.0233	0.00825	-0.0528*	-0.0186	0.00895	-0.00950	-0.0134	-0.0249
	(-1.11)	(-0.95)	(0.28)	(-1.71)	(-0.51)	(0.23)	(-0.23)	(-0.31)	(-0.50)
L.Bonds (PLBN)*ROA Q4	0.0143	-0.0174	0.0224	-0.0131	-0.0300	-0.00527	-0.00435	0.0257	0.0126
	(0.82)	(-0.69)	(0.76)	(-0.44)	(-0.87)	(-0.14)	(-0.11)	(0.59)	(0.25)
Firm FE	✓	✓	✓	✓	✓	✓	✓	✓	✓
Sector*Time FE	✓	✓	✓	✓	✓	✓	✓	✓	✓
Country*Time FE	✓	✓	✓	✓	✓	✓	✓	✓	✓
Observations	46284	42944	41673	40857	40123	38584	37897	36852	35886

Notes: Each column reports horizon h regressions for $h = 1, 2, \cdots, 8$. Dependent variables are Δ_h (log) Accounts Payable and Δ_h is the change from quarter $t-1$ to $t+h$. L.Bonds (PLBN) is a lagged dummy variable with value 1 if capital controls on purchases by nonresidents of locally-issued bond are imposed in a given country, and with value 0 otherwise. Lev Q and ROA Q are quartile indicators for leverage and return on assets, with Q1 the lowest and Q4 the highest. Reported rows are coefficients on L.Bonds (PLBN) interacted with each quartile indicator, the omitted group is Q1. Firm-level controls include lagged values of size (log of total assets), leverage, liquidity, and return on assets (ROA). Standard errors are clustered at the firm level. t-statistics are reported in parentheses. $^{*}p < 0.10$; $^{**}p < 0.05$; $^{***}p < 0.01$.

Table B.1.11: Baseline and heterogeneity results with alternative measures of productivity

bois: 1(Domestic bond Iss)	(1) Baseline (ROA)	(2) ARPK	(3) ROE	(4) Baseline (ROA)	(5) ARPK	(6) ROE
L.Bonds (PLBN)	-0.0169***	-0.0170***	-0.0180***			
	(-3.29)	(-3.31)	(-3.46)			
L.Bonds (PLBN)*Lev Q2				-0.00368	-0.00252	-0.00331
				(-0.67)	(-0.46)	(-0.60)
L.Bonds (PLBN)*Lev Q3				-0.0122**	-0.0111*	-0.0122**
				(-2.05)	(-1.88)	(-2.02)
L.Bonds (PLBN)*Lev Q4				-0.0137**	-0.0136**	-0.0144**
				(-2.11)	(-2.11)	(-2.10)
L.Bonds (PLBN)***Efficiency*** Q2				0.00542	-0.00515	0.00411
				(0.93)	(-0.79)	(0.71)
L.Bonds (PLBN)***Efficiency*** Q3				0.00221	-0.00450	-0.00496
				(0.37)	(-0.62)	(-0.83)
L.Bonds (PLBN)***Efficiency*** Q4				-0.0107*	-0.00255	-0.0139**
				(-1.71)	(-0.32)	(-2.20)
Other Capital Controls, iMaPP	✓	✓	✓	–	–	–
Economy Controls	✓	✓	✓	–	–	–
Firm Controls	✓	✓	✓	✓	✓	✓
Firm FE	✓	✓	✓	✓	✓	✓
Sector*Time FE	✓	✓	✓	✓	✓	✓
Country*Time FE	×	×	×	✓	✓	✓
Observations	72332	71985	71240	72233	71886	71141
Adj. R-sq	0.127	0.127	0.127	0.137	0.137	0.137

Notes: The dependent variable is a dummy that equals one if the firm issues a domestic currency bond in the quarter. L.Bonds (PLBN) is a lagged dummy variable with value 1 if capital controls on purchases by nonresidents of locally-issued bond are imposed in a given country, and with value 0 otherwise. ARPK is average revenue product of capital, ROE is return on equity. Quartile indicators Q2 to Q4 are defined by the measure named in the column header, Q1 is omitted. Columns 1 to 3 report baseline regression specification with different efficiency measures in controls, columns 4 to 6 report interactions with leverage and efficiency quartiles. The sets of controls shown by check marks are included as indicated. Firm-level controls include lagged values of size (log of total assets) and liquidity. The symbol "-" denotes cases where a group of controls and/or fixed effects spanned out by the introduction of other controls and/or fixed effects. Standard errors are clustered at the firm level. t-statistics are reported in parentheses. $^{*}p < 0.10$; $^{**}p < 0.05$; $^{***}p < 0.01$.

Table B.1.12: Summary Statistics for Indexes of the Local and Global Financial Cycles

X	Obs	Mean	Std. Dev.	Median	p25	p75
(-1)*L.Log EMBI	72,332	-5.04	0.61	-5.09	-5.37	-4.70
(-1)*log BDI	60,847	-4.60	0.10	-4.58	-4.71	-4.53
(-1)*log UDI AE	72,332	-4.42	0.11	-4.41	-4.50	-4.32