Dollar Movements, Borrowing Constraints, and Firm Investment*

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Abstract

How do firms in emerging markets respond to global financial tightening? This paper shows that their responses depend on how they borrow. When the U.S. dollar strengthens, indicating financial tightening, firms that borrow against collateral face tighter credit because the local-currency value of their assets falls. Firms that borrow against earnings are less affected, since their borrowing capacity depends on operating cash flows rather than asset valuations. Using bond issuance data from LSEG's SDC Platinum, I classify each issue by whether repayment relies on assets or on earnings, and link these classifications to firm–quarter financial statements from Worldscope for publicly listed non-financial firms in eighteen emerging market economies between 2001 and 2019. Three facts emerge. First, when the dollar rises, investment declines among collateral-based borrowers but remains stable for earnings-based borrowers. Second, within the earnings-based group, the decline in investment is smaller for firms with higher export intensity. Third, new borrowing shifts toward earnings-based contracts as the dollar strengthens, showing a change in financing composition. The aggregate effect of global financial tightening therefore depends on the composition of borrowing types and the distribution of export intensity.

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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 co-move 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 re-

duces 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 heterogeneity 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 2 defines the borrowing regimes and shows how these are constructed using bond issuance data. Section 3 describes the institutional setting in the countries employed in the analysis. Section 4 describes the construction of panel data. Section 5 discusses the transmission mechanism of dollar appreciations followed by empirically testing these in Section 6. Section 7 discusses robustness and extensions, Section 8 discusses policy implications and Section 9 concludes.

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*.

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 specific 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.

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. 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.2 provides full keyword lists used for debt classification.

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.

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

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, $\sigma_{it} = \frac{D_{i,t-1}^{C}}{D_{i,t-1}^{E} + D_{i,t-1}^{C}}$

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.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_{it}^E and f_{it}^C denote the proceeds of earnings-based and collateral-based issues. Define the indicators $1(f_{it}^E > 0)$ and $1(f_{it}^C > 0)$, 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 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.

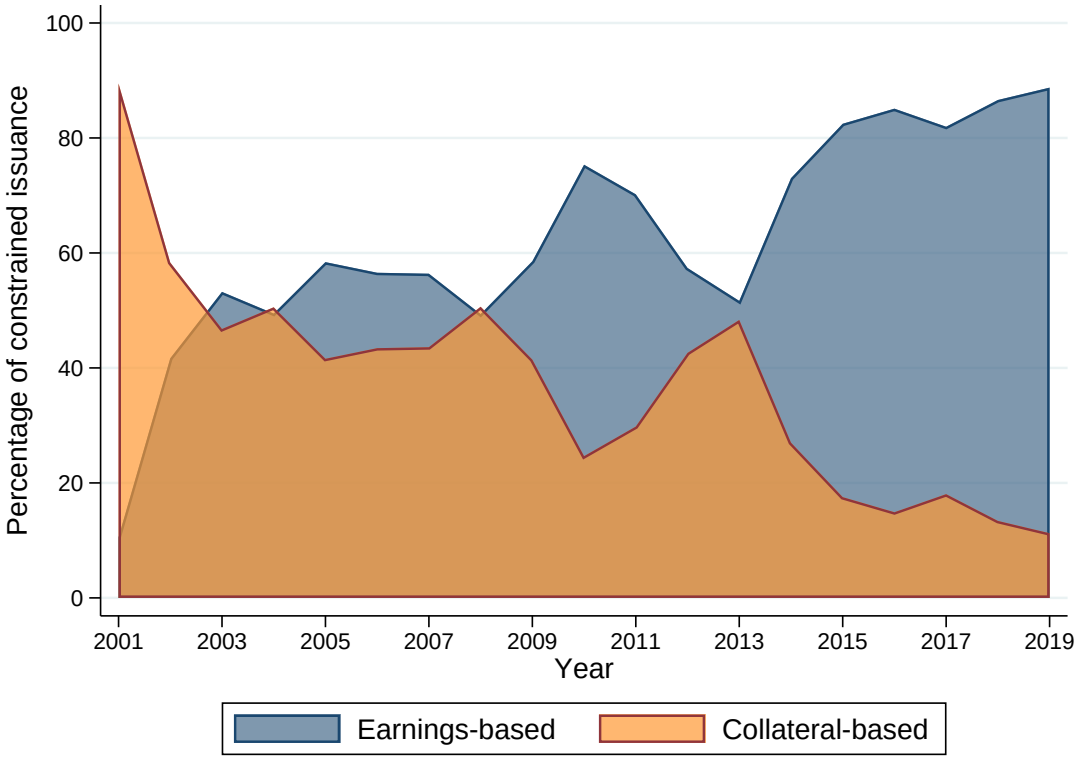
Outstanding debt stocks. Figure 2 reports the same shares computed from outstanding debt rather than new issuance. For each firm i and quarter t, outstanding earnings– and collateral–based debt $(D_{i,t-1}^E, D_{i,t-1}^C)$ are constructed from issuance flows and contractual maturities as described in Section 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.3).

Cross-sectional composition. Figures 3a–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

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

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

Figure 1: Share of earnings-based and collateral-based issuance (flows) over time.



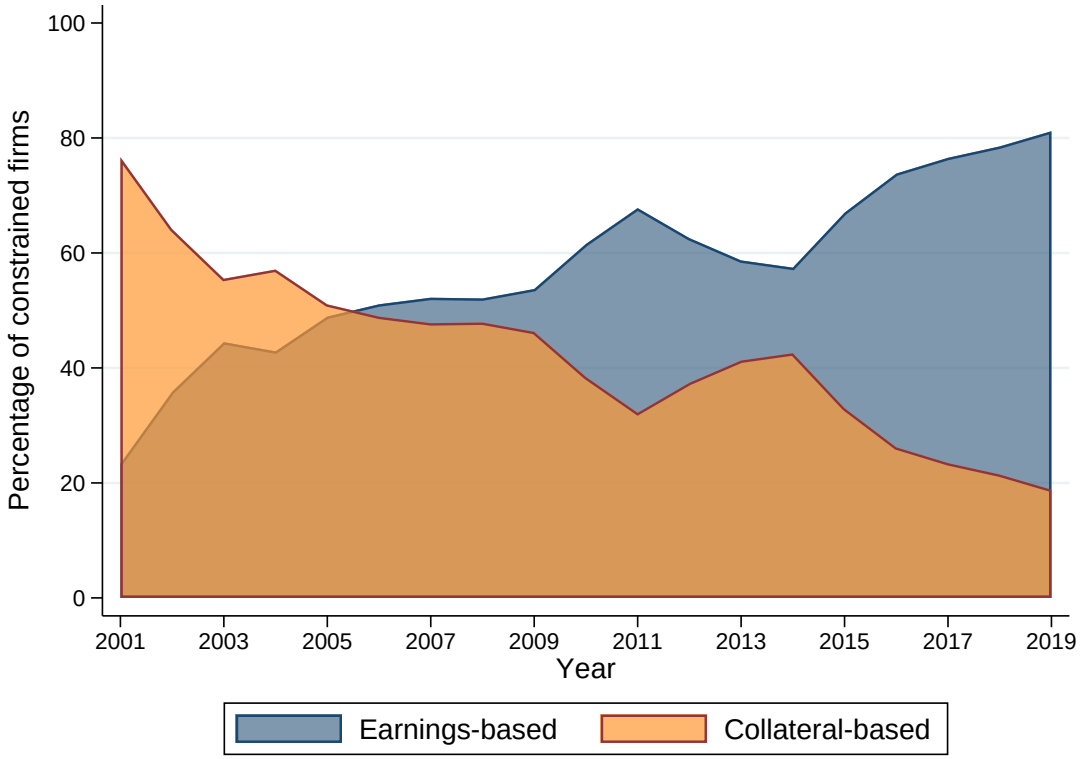
Notes: The figure shows the share of constrained firm–quarters classified by the contractual basis of new bond issuance. A firm–quarter is labeled earnings-based if it issued only earnings-based bonds in that quarter, and collateral-based if it issued only asset-backed bonds. Shares are computed from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

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,

Figure 2: Share of earnings-based and collateral-based debt (stock) over time.



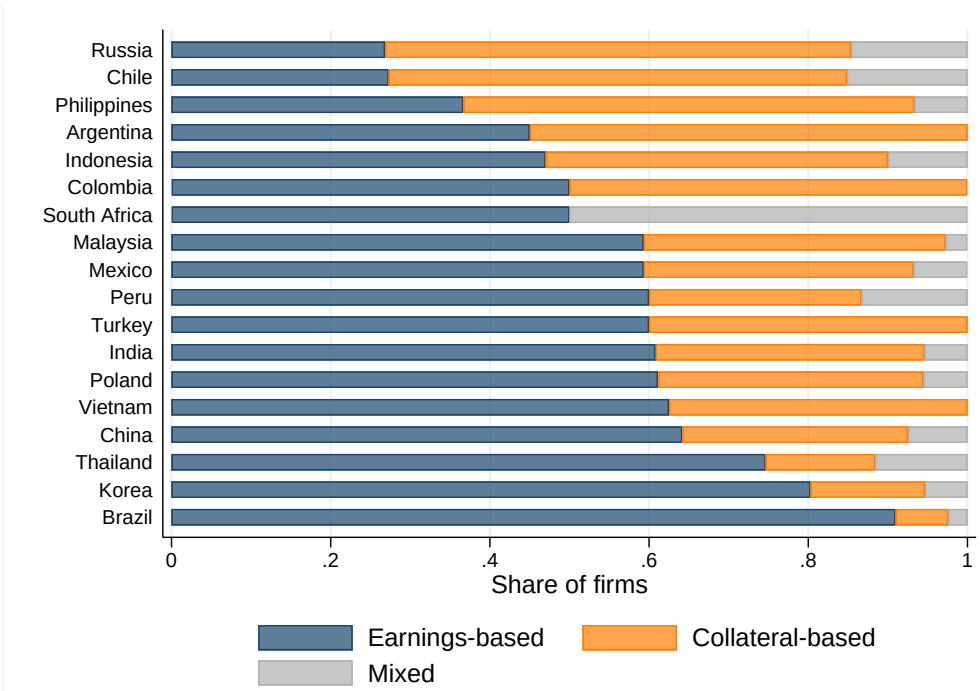
Notes: The figure reports the share of constrained firm–quarters classified by the contractual basis of their outstanding debt. A firm–quarter is labeled earnings–based if only earnings–based bonds are outstanding at $t-1$, and collateral–based if only asset-backed bonds are outstanding. Observations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

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.

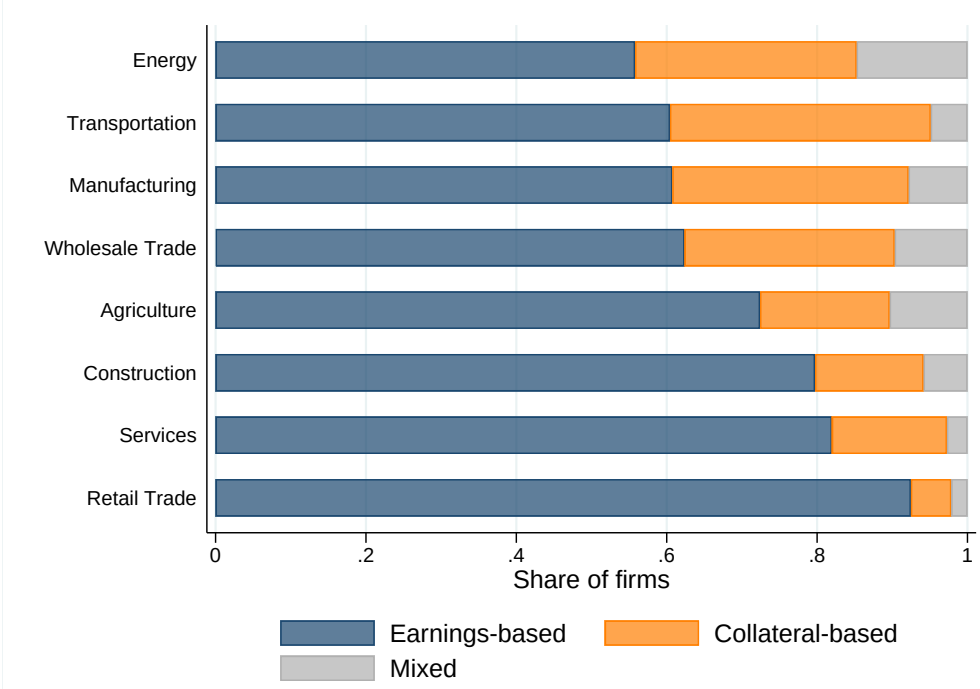
3 Institutional Setting

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

(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). Firms are classified using their lifetime issuance composition. For each firm, the lifetime share of collateral-based versus earnings-based debt is computed by number of issues. Firms with collateral shares below 40 percent are labeled mostly earnings-based, those above 60 percent mostly collateral-based, and intermediate cases as mixed. See Appendix A.2 for details.

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).

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.6 provides detailed country summaries.

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 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 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 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.

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.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.

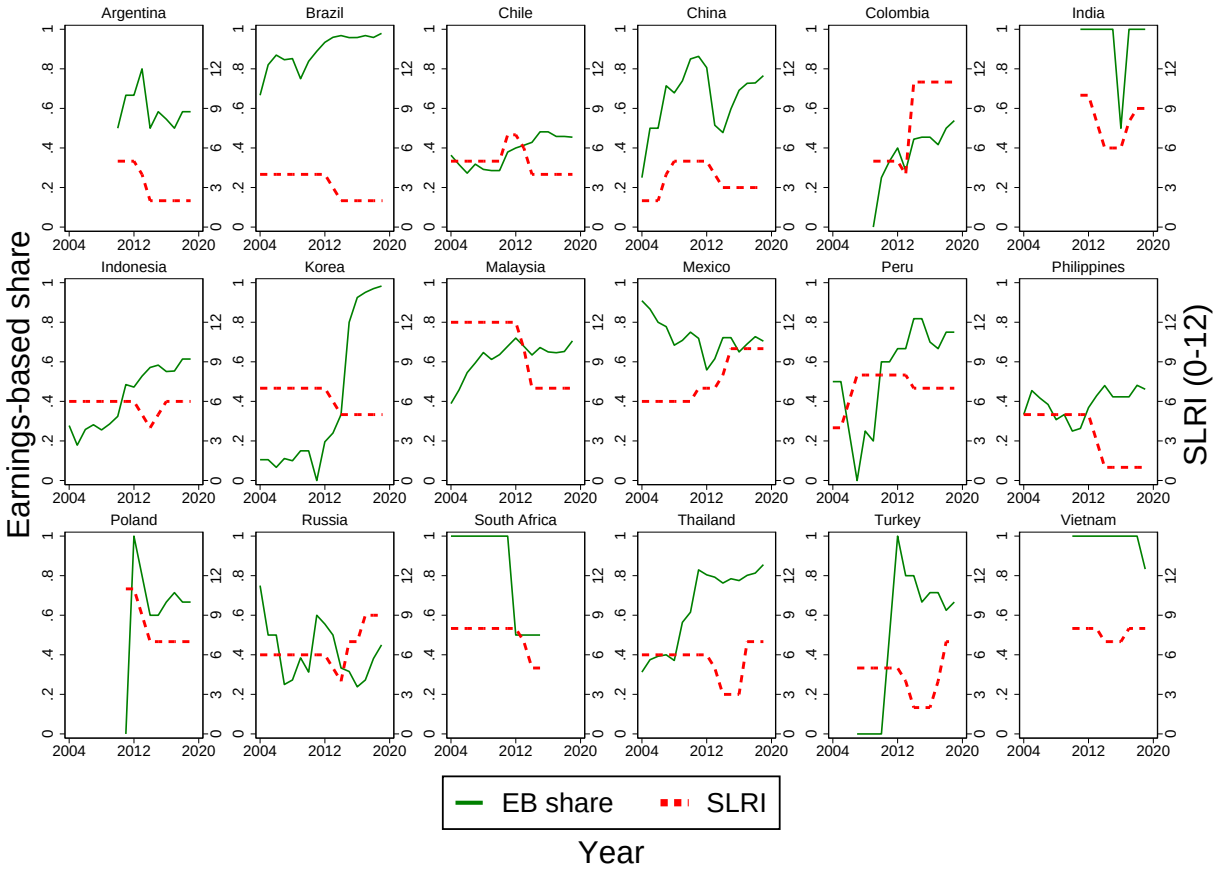
Table 1: Creditor Rights and Legal Frameworks in EMEs

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

Figure 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.

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.

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.

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 reports coverage by country and sector.[5]

[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.

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

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:

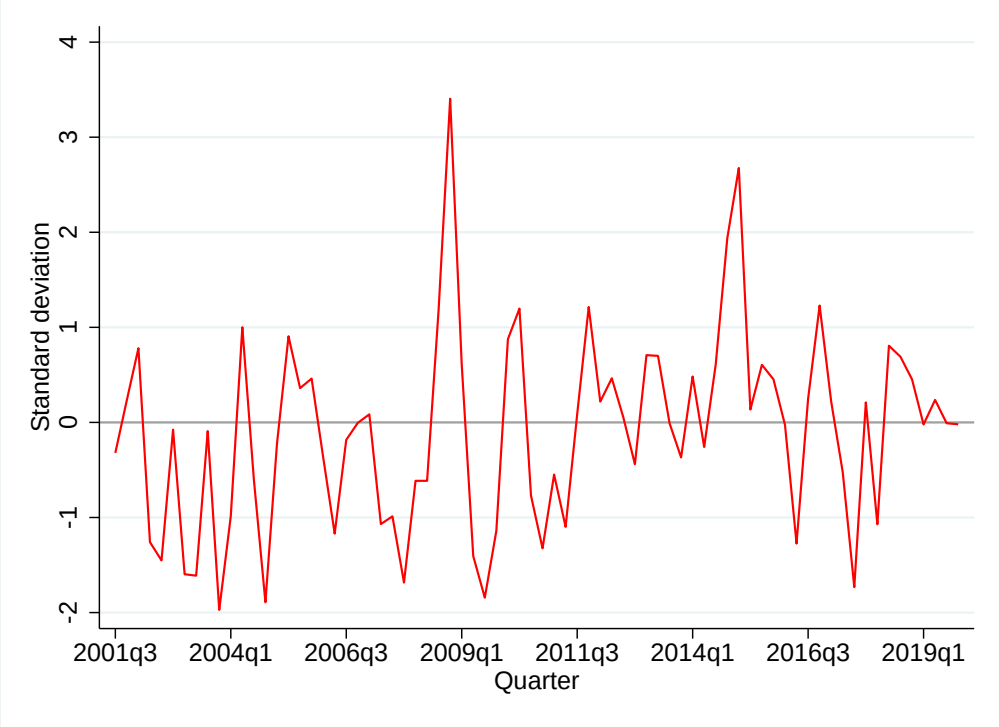
$$\Delta s_t^{\$} = \log(\text{UDI}_t) - \log(\text{UDI}_{t-1}),$$

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 5 shows the standardized series.

Empirically, the index closely tracks bilateral LC/USD changes across EMEs, as shown in Figure 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 7).

Figure 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.

4.3 Firm Characteristics by Constraint Type

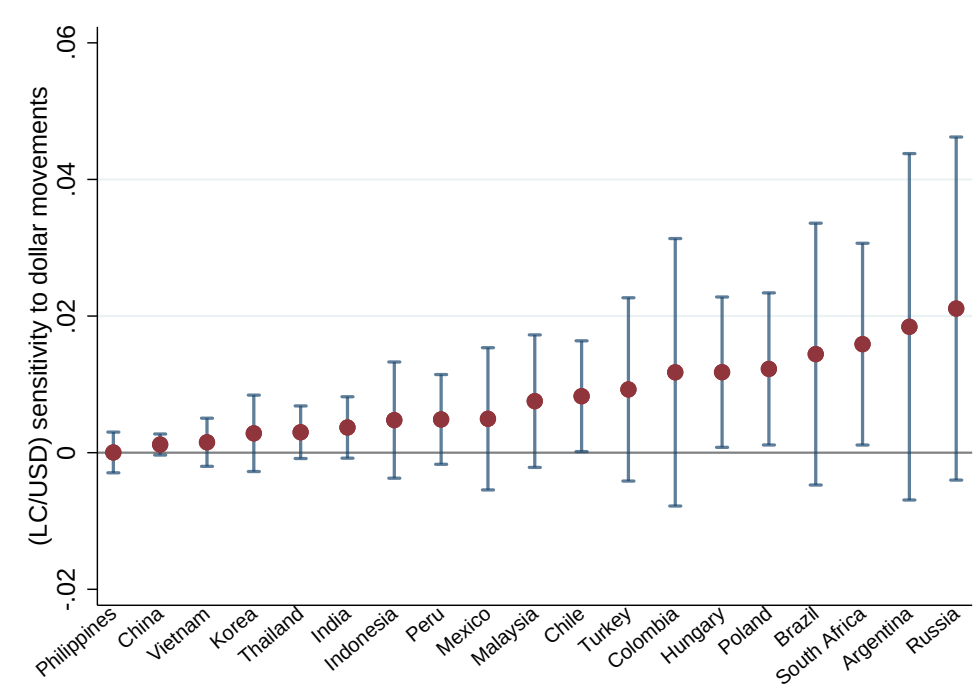
Table 2 compares firm characteristics across the two borrowing-constraint types for firms in the regression sample. As in standard in the corporate finance literature, flow variables are normalized by lagged assets and stock variables are normalized by contemporaneous assets. Variables are winsorized 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

[6] Figure 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).

[7] Refer Table A.4 for detailed variable definitions.

Figure 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.

higher debt relative to earnings measured by EBITDA (Earnings Before Interest, Taxes, Depreciation, and Amortization). Collateral-based firms, in turn, 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.

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 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

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

Table 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

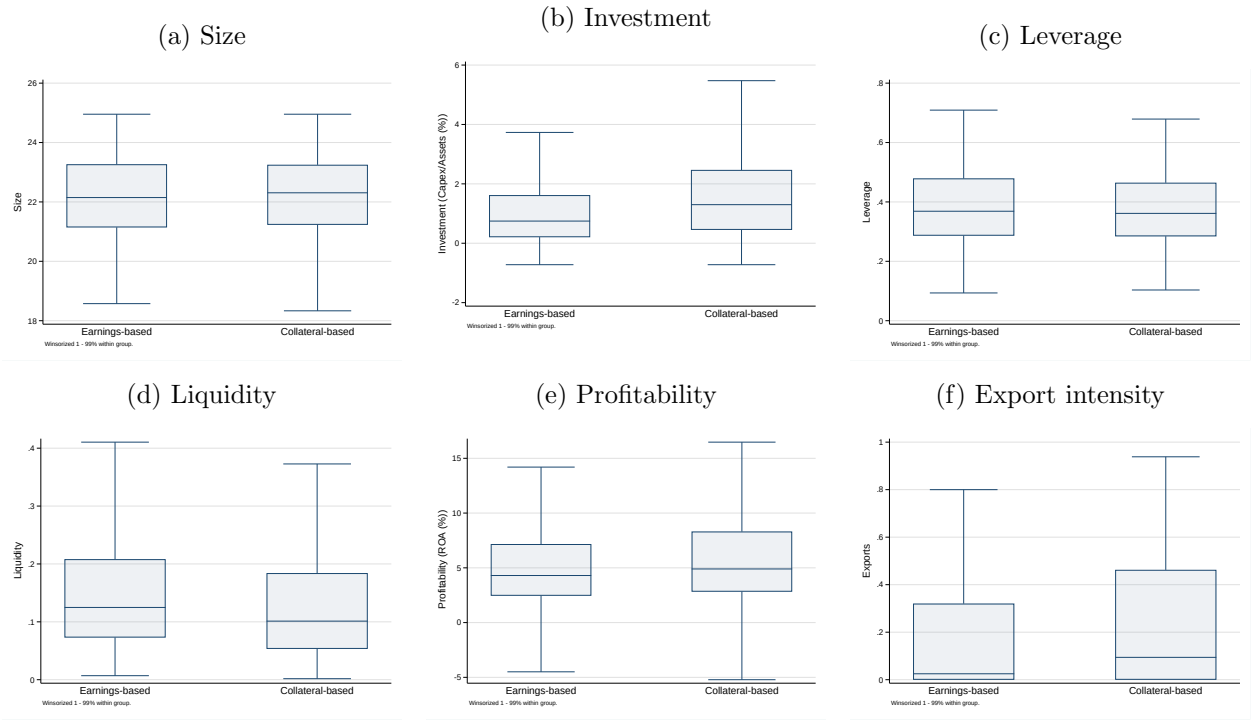
Notes: The table reports firm-level averages of key financial characteristics by borrowing-constraint type—earnings-based (EB) and collateral-based (CB)—and Welch t-tests for differences in means. "Diff" is EB − CB. Each variable is first averaged over a firm's sample period and winsorized at the 1st–99th 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.

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

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.

Figure 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 2 are plotted in Appendix Figure A.3.

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 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.

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 6.1 estimates the heterogeneous impact of dollar appreciations on firm investment across constraint types, establishing the baseline real effect. Section 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 6.3 tests the earnings buffer mechanism by examining whether export revenues mitigate the contraction for earnings-based borrowers when the dollar strengthens. Section 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 4. 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.

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:

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

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 coincides 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

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

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 3 reports estimates of Equation (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.

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) 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 B.1). These findings confirm that the differential response of investment across borrowing types is robust to how the persistence of financing relationships is modeled.

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

Y_{it} : Investment$_{it} \equiv$ CAPEX$_{it}$/Assets$_{it-1}$(%)	$Flow_{i,t-1} \in \{N, EB, CB\}$ (1)	(2)	(3)	$Flow_{i,t-1} \in \{E, C\}$ (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). 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. $^{*}p < 0.10$; $^{**}p < 0.05$; $^{***}p < 0.01$.

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.

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:

$$\text{Net Worth}_{it} = \alpha_i + \gamma_t + \beta_1 \, \Delta s_t^{\$} + \beta_2 \, (\Delta s_t^{\$} \times \text{CB}_{i,t-1}) + \theta' X_{i,t-1} + \varepsilon_{it}, \tag{2}$$

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 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:

$$\log(\text{PPE}_{it}) = \alpha_i + \gamma_{c(i),t} + \gamma_{s(i),t} + \beta_1 \, \Delta s_t^{\$} + \beta_2 \, (\Delta s_t^{\$} \times \text{CB}_{i,t-1}) + \phi \, \log(\text{PPE}_{i,t-1}) + \theta' X_{i,t-1} + \varepsilon_{it}. \tag{3}$$

The estimates are reported in Columns (3) and (4) in Table 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 6.1 operate through valuation effects on firms' balance sheets rather than differences in real profitability or demand.

Table 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. $^{*}p < 0.10$; $^{**}p < 0.05$; $^{***}p < 0.01$.

6.3 Earnings channel within earnings-based borrowers

Section 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 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:

$$\bar{\text{Inv}}_{it} = \beta_1\big(\mathbf{E}_t \times \text{Exp}_i^\star\big) + \Gamma' X_{i,t-1} + \mu_i + \mu_{ct} + \mu_{st} + \varepsilon_{it}, \qquad \mathbf{E}_t \in \{\Delta s_t^{\$}, \Delta s_{ct}^{B}\}, \tag{4}$$

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 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_{ct}^{B}. 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 $\Delta s_{ct}^{B} \times \text{Exp}_i^*$ 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 $ZX_{it} = \Delta s_{ct}^{B} \times \text{Exp}_i^*$, which captures the sensitivity of firm i's earnings to local currency movements. Although the exchange-rate shock Δs_{ct}^{B} is determined at the country level, firms' pre-existing export exposure $\text{ExportExposure}_i^{\star}$ 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 B.3) is small and statistically insignificant, consistent with their borrowing capacity being tied to collateral values rather than cash-flow performance.

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.

Table 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 $Z_{cst} = \Delta s_{ct}^B \times \overline{\text{ExportExposure}}_{cs}^{\star}$. $^{*}p < 0.10$; $^{**}p < 0.05$; $^{***}p < 0.01$.

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:

$$\Pr(\text{Flow}_{it} = k) = \frac{\exp\Big(\gamma_k \, \Delta s_t^{\$} \cdot \sigma_{i,t-1} + \beta_k' X_{i,t-1} + \tau_{s(i)} + \tau_t + \alpha_k\Big)}{\sum_{\ell \in \{N,E,C\}} \exp\Big(\gamma_\ell \, \Delta s_t^{\$} \cdot \sigma_{i,t-1} + \beta_\ell' X_{i,t-1} + \tau_{s(i)} + \tau_t + \alpha_\ell\Big)}, \quad k \in \{N, E, C\}, \tag{5}$$

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 6 reports the multinomial logit coefficients, and Figure 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%.

Table 6: Multinomial logit: flow choice among firms with outstanding debt at $t-1$.

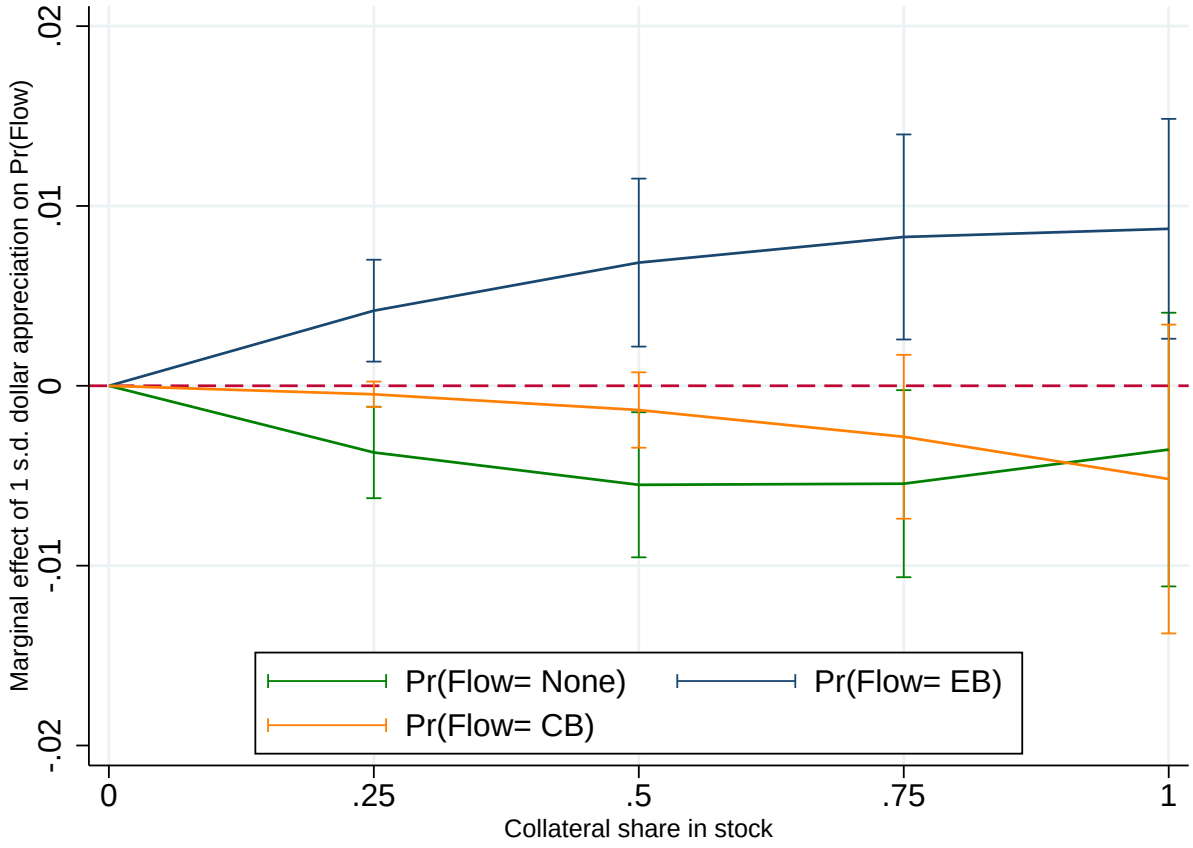
	(1) $k = E$	(2) $k = C$
$\Delta s_t^{\$} \times \sigma_{i,t-1}$	0.142**	-0.097
	(0.065)	(0.093)
$\sigma_{i,t-1}$	-0.980***	1.720***
	(0.075)	(0.097)
L.Size	0.440***	0.443***
	(0.031)	(0.038)
L.Leverage	1.691***	1.317**
	(0.638)	(0.580)
L.Profitability	0.021***	0.021***
	(0.006)	(0.007)
L.Liquidity	0.608	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 ($\sigma_{i,t-1} = D^C_{i,t-1}/(D^E_{i,t-1} + D^C_{i,t-1})$). 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. $^{*}p < 0.10$; $^{**}p < 0.05$; $^{***}p < 0.01$.

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 composition 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.

Figure 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 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.

Firms shift toward contracts underpinned by ongoing cash flows rather than tangible assets, allowing credit to reallocate rather than collapse during periods of dollar 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, tangible 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 rev-

enues 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.

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 B.

Alternative decay rates

The continuous decayed-share specification weights past borrowing flows by a quarterly persistence parameter δ. Table B.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 persistence 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) 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 B.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.

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

[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).

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 borrowing 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.

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.

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Appendix – For Online Publication

A Data Appendix

Table A.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.

Table A.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.

Persistence of borrowing constraint type Table A.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 2. The diagonal entries indicate that constraint types are highly persistent: roughly 97% of earnings-based 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.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 Variable Definitions and Data Sources

Table A.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
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
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.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.

A.2.1 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 report the aggregate shares of firm–quarters classified as earnings- or collateral-based, excluding mixed cases.

As a robustness variant used in Section 7, a continuous analogue of this measure accumulates 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.

A.2.2 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 2 reports the resulting shares of earnings- and collateral-based firm–quarters among constrained observations, excluding mixed cases.

A.2.3 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 3a–3b report the resulting distribution of firm types by country and sector, while Figures A.1a–A.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 3), while sectoral variation reflects technological heterogeneity in asset tangibility and cash-flow stability.

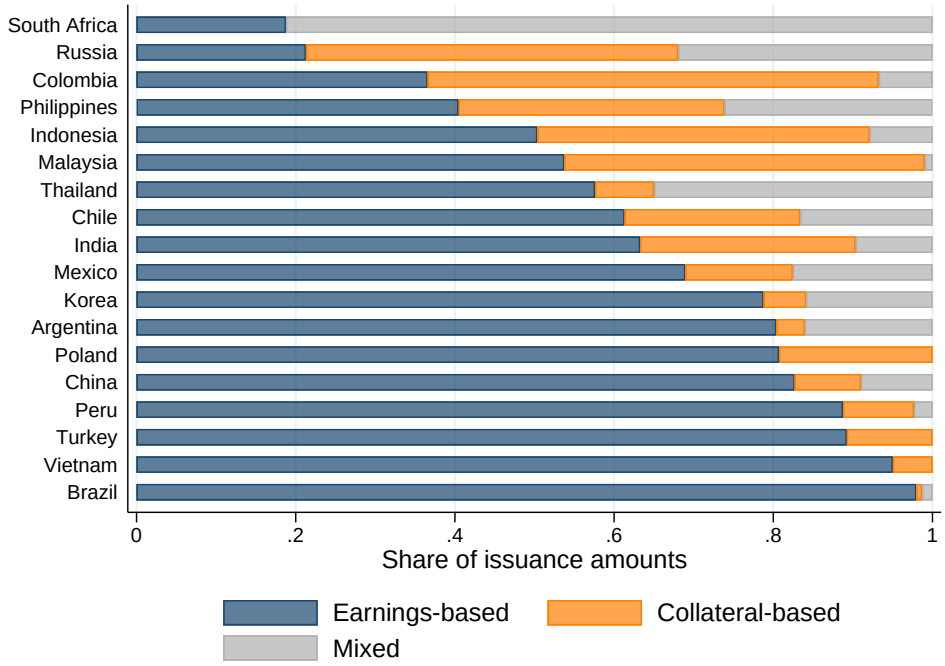
A.3 What currency do these constrained firms borrow in?

Figure A.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.

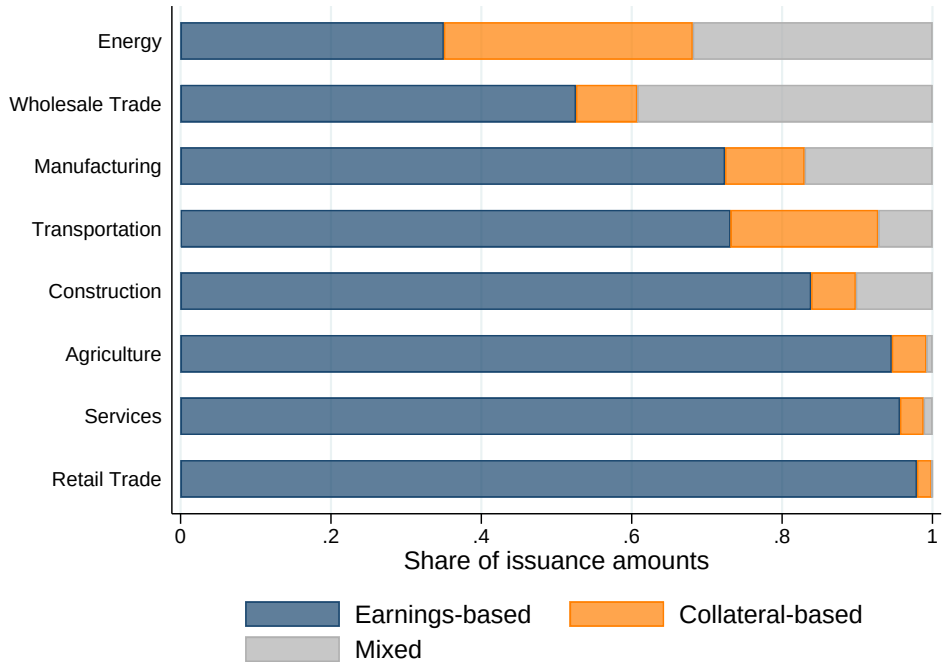
A.4 Firm characteristics by current borrowing constraint

Table A.5 and Figure A.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.

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

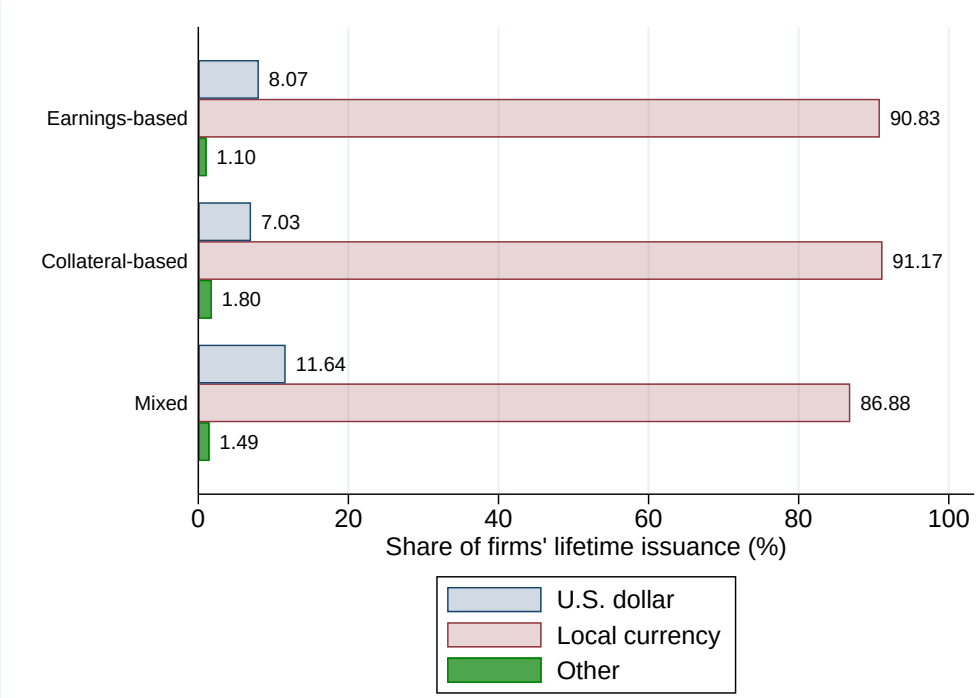


(b) Share of earnings-based and collateral-based issuance amounts by sector.



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. For each firm, I compute the lifetime share of collateral-based versus earnings-based debt in amount of debt issued. Issuance amount shares with collateral shares below 40 percent are classified as earnings-based, those above 60 percent as collateral-based, and intermediate cases as mixed. Shares therefore represent the proportion of total issuance amounts—rather than firms—accounted for by each borrowing type. Cross-country differences reflect variation in secured-transactions and insolvency frameworks (see Section 3), while sectoral differences capture technological heterogeneity in the tangibility of assets and the stability of operating cash flows.

Figure A.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.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.

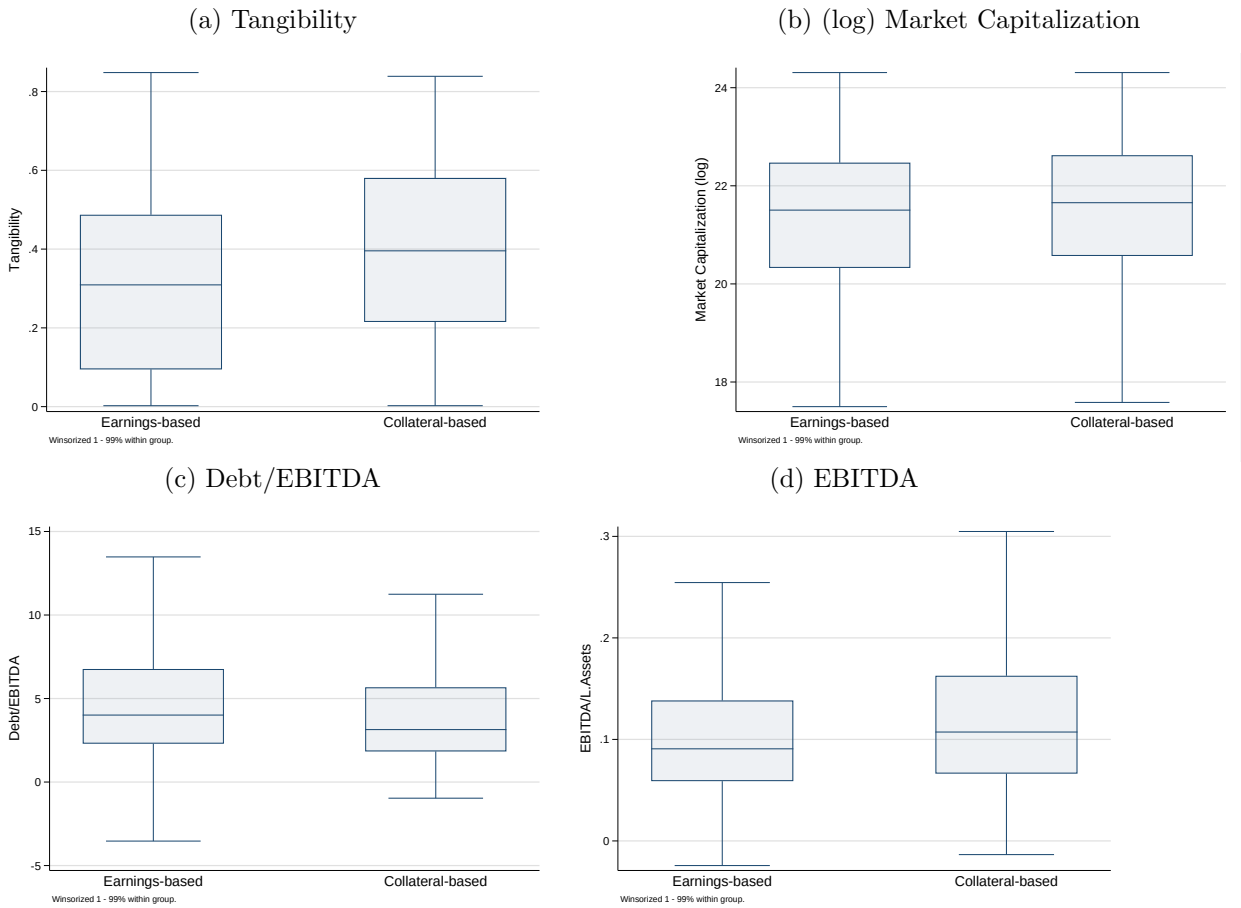
A.5 Institutional Setting

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 five years after that reform. I then estimate

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

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.

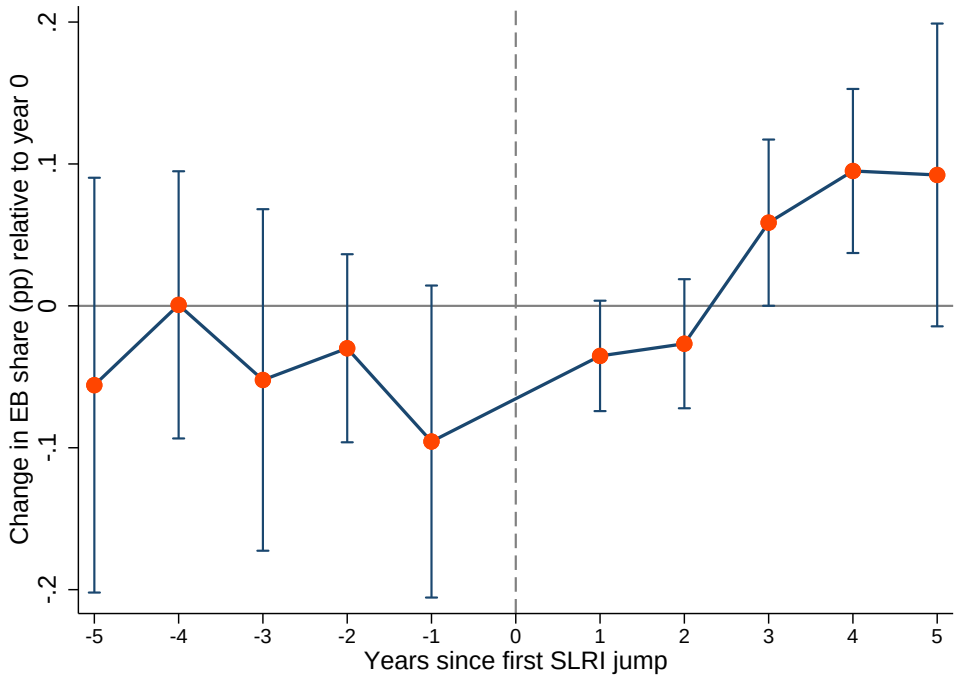
Figure A.3: Firm characteristics by borrowing constraint.



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.

Figure A.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.

Figure A.4: Event-time effects of SLRI reforms on earnings-based borrowing share.



Notes: The figure plots event-time coefficients from Equation (A.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.

	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.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.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.

Table A.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
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
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) → *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.

B Robustness Results

B.1 Investment response

This appendix reports the full regression tables corresponding to the robustness exercises discussed in Section 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). 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 B.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 B.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 B.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 3. Standard errors are two–way clustered by firm and quarter. $^{*}p < 0.10$; $^{**}p < 0.05$; $^{***}p < 0.01$.

Table B.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 3. Standard errors are two–way clustered by firm and quarter. $^{*}p < 0.10$; $^{**}p < 0.05$; $^{***}p < 0.01$.

B.2 Placebo: Earnings Channel Within Collateral-Based Firms

As a robustness check, I test whether the positive export-earnings channel documented in Section 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 B.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 B.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. $^*p < 0.10$; $^{**}p < 0.05$; $^{***}p < 0.01$.

C 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:

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

A dollar appreciation ($\uparrow s_t$) reduces the local-currency value of collateral and tightens (C.1).

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

$$B_{it} \leq \phi_E R_{it}(s_t) = \phi_E(\chi_0 + \chi_1 \theta_i s_t) A_t K_{it}, \qquad \phi_E > 0. \tag{C.2}$$

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

$$\varphi I_{it} = \mathbb{E}_t[A_{t+1}(\chi_0 + \chi_1 \theta_i s_{t+1})] - (r_t + \mu_{it}^{r_{it}}), \tag{C.3}$$

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:

$$r_{it} = \arg \min_{r \in \{C,E\}} \{(r_t + \mu_{it}^r) B_{it} + \kappa_r\}. \tag{C.4}$$

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 1 (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 2 (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 (C.4) implies the reallocation pattern esti-

mated 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.