# His Pain Is Your Gain: Inter-Firm Linkages and Exchange Rate Exposure *

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**Abstract**

How do exchange rate shocks spread in the corporate sector? I study this question using novel multicountry firm-level data on foreign debt and production networks. I show that foreign debt borrowers experience heightened distress from the depreciation of the local currency; however, perhaps surprisingly, they do not propagate such distress to competitors or along the supply chain. Instead, domestic rivals and suppliers exploit the financial vulnerability of their connected foreign debt borrowers and gain enhanced strategic advantages in competition or supplier–customer relationships, resulting in lower credit risk and higher stock prices and future profitability. Overall, the paper highlights the importance of strategic interactions in mitigating risk contagion.

JEL Classification: F31, F34, G32, G33, L11, L14
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> "*The buildup of external debt has in many cases outpaced exports ... Countries that have not addressed vulnerabilities during this favorable period will be at a higher risk of capital flow reversals and higher borrowing costs should global financial conditions suddenly tighten.*"
>
> — IMF Global Financial Stability Report, October 2019

# 1 Introduction

The remarkable appreciation of the U.S. dollar against most major currencies over the past year has policy-makers from many countries worried about fallout on external debt positions of the corporate sector. However, micro evidence on how such exchange rate shocks affect the corporate sector via foreign debt and inter-firm linkages is still scant. On the one hand, due to adverse exchange rate shocks, foreign debt borrowers might become financially distressed. Such heightened distress can propagate to domestic sectors through interconnections between firms and industries. On the other hand, negative cash flow shocks might weaken foreign debt borrowers, thereby preventing them from competing with domestic rivals or replacing domestic suppliers. Thus, domestic firms might benefit from an enhanced competitive advantage or bargaining power.

Due to the difficulties associated with disentangling the different effects at play and the limited availability of granular-level data on currency debt composition and production networks, no empirical studies directly examine the spillover effects from foreign debt borrowers to firms without foreign currency exposure, or the mechanism through which foreign debt propagates external shocks domestically. This paper fills this gap by constructing a comprehensive multicountry sample of *firm-level* foreign debt exposure and competitor/supplier–customer relationships from 2006 to 2020. The sample comprises 14,076 foreign debt borrowers and 9,771 purely domestic firms (i.e., firms with no foreign debt, assets, or revenue) connected through 34,356 supplier–customer relationships and 53,819 competitor pairs across 64 countries.

This rich dataset provides a unique opportunity to empirically examine the propagation of exchange rate shocks within networks of firms. In addition, the exogeneity of currency movements with respect to individual firms' behaviors offers a clean laboratory setting through which to study the links between strategic competition and financial distress. Rather than identifying a contagion effect from foreign debt borrowers to other domestic firms through interconnections between firms during depreciation periods, this paper provides novel evidence that domestic rivals and suppliers benefit from their ties to distressed foreign debt borrowers and quantifies how financial flexibility and strategic interactions can help mitigate the negative spillover effects of adverse external shocks.

I start by showing that exchange rate shocks amplify the vulnerability of firms that borrow in foreign currencies. I estimate a panel regression with interactions between exchange rate movements and the foreign debt ratios of foreign debt borrowers. My results show that firms with higher

foreign debt ratios experience sharper declines in stock prices and more significant increases in default probability following local currency depreciation. On average, a firm with a one-standard-deviation higher foreign debt ratio sees its stock price decrease by 19.5 additional basis points (bps) or its default probability increase by an additional 0.03 standard deviations during a depreciation month. I confirm these results using high-frequency measures of the U.S. Federal Reserve Board's (FRB) monetary policy shocks.

After verifying the heightened distress of foreign debt borrowers in depreciation episodes, I evaluate whether and how foreign debt borrowers transmit such distress to other domestic firms via inter-firm linkages. To isolate the propagation effect in production networks from the direct impact of exchange rate shocks, I focus on purely domestic firms, that is, firms with no foreign debt, assets, or revenue. By construction, purely domestic firms are the least likely to be directly affected by exchange rate shocks, which is confirmed in the placebo tests. Thus, exchange rate shocks affect purely domestic firms only through indirect foreign exposure via production networks.

To identify the varying levels of *indirect* exchange rate exposure of purely domestic firms, I combine the domestic firm dataset with an extensive firm-level database of closest competitors and supplier–customer relationships, based on self-disclosed information by firms or collected from firms' annual reports and other data sources. I define a domestic firm's *focal firms* as connected foreign debt borrowers in the inter-firm linkages. For instance, a domestic supplier's focal firms are customers with foreign debt, while a domestic rival's focal firms are competitors with foreign debt. Then, for each domestic firm, I construct a weighted average of its focal firms' foreign debt and revenue at the end of each year, using the focal firm assets and sales as weights or equal weighting.

Therefore, by construction, if associated customers (competitors) hold more foreign debt, a domestic supplier (rival) is more indirectly exposed to foreign debt through its customers (competitors), even if it has no foreign debt per se. Adverse exchange rate shocks directly affect customers with foreign debt and may propagate to domestic suppliers through the supply chain. My empirical design assumes that domestic firms' optimal choices of suppliers, customers, and competitors are not correlated with focal firms' foreign debt ratios. Hence, the construction above provides a plausibly exogenous measure that can identify differences in indirect exchange rate exposure across firms. To capture the spillover effects of exchange rate shocks via inter-firm linkages, I exploit the heterogeneity in domestic firms' indirect foreign debt exposure and estimate a panel regression with interactions between exchange rate movements and indirect foreign debt ratios.

The results show that there is no horizontal or vertical contagion of financial distress from foreign debt borrowers to purely domestic firms. In contrast, domestic rivals and suppliers appear to benefit from indirect foreign debt exposure during local currency depreciation. The baseline results imply that a one-standard-deviation increase in the sales-weighted exposure of an average domestic rival (supplier) to the foreign debt of its competitors (customers) will lead to an increase in its stock price of 10.7 (9.2) more bps, and an additional 0.009 (0.007) standard deviation decrease in its default probability in response to a one-standard-deviation depreciation in local currency.

These estimates are statistically significant, economically large, and robust to different weighting schemes, alternative exchange rate shocks, and alternative corporate distress measures.

The positive spillover effect observed in the firm-month regressions is not a short-term phenomenon or a result of measurement error or investor bias; rather, it reflects an improvement in future firm fundamentals. Using a similar specification in a firm-year panel regression, I show that an average domestic rival (supplier) earns \$9.5 (\$5.9) million more in operating profits and an additional \$1.3 (\$2.4) million in EBITDA the following year in response to a one-standard-deviation depreciation in local currency, if that domestic rival (supplier) experiences a one-standard-deviation increase in indirect exposure to foreign debt through its competitors (customers). Therefore, when exchange rate shocks weaken their foreign-borrowing competitors and customers, domestic firms not only experience a contemporaneous increase in their distance to default and stock returns but also a subsequent rise in their operating profitability and profit margin.

To uncover the sources of this increase in profitability, I examine the three main components of corporate profits: sales, cost of goods sold ($COGS$), and selling, general, and administrative expenses ($SGA$). My results show that the driver behind domestic rivals' improved profitability is sales growth with little additional change on the cost side. Specifically, when local currency depreciates, an increase of one standard deviation in indirect foreign debt exposure from competitors leads to an additional \$9.06 million in firm sales for an average domestic rival. That is, domestic rivals strengthen their competitive advantages, expand their production capacity, and capture more market share when their foreign-borrowing competitors face tighter financial constraints.

With respect to domestic suppliers, I make two interesting findings. First, there is no revenue shrinkage when adverse exchange rate shocks affect downstream customers. Second, the rise in domestic suppliers' profitability is due to lower operating expenses. When the local currency depreciates, a one-standard-deviation increase in an average domestic supplier's indirect foreign debt exposure through its customers leads to an additional \$24.41 million reduction in its $SGA$. As downstream buyers facing financial distress incur higher switching costs and search frictions, domestic suppliers have less need to advertise and invest in relationship building. Thus, they can cut their operating expenses to retain customers without losing sales, resulting in higher profits.

One may argue that this positive spillover effect occurs through the indirect trade channel, as foreign debt borrowers tend to have foreign income. For instance, exporting firms may sell more in foreign markets during depreciation periods than in other periods and, thus, increase their demand for inputs from domestic suppliers. I provide two pieces of evidence indicating that such a trade channel is unlikely to be the source of the positive spillover effect. First, I add the interaction term between indirect foreign revenue exposure and exchange rate movements to the regression and continue to find a positive and significant spillover effect from indirect foreign debt exposure. Second, and more importantly, there is no substantial difference between domestic firms operating in non-tradable sectors and those operating in tradable sectors. If anything, domestic rivals in non-tradable sectors gain more during periods of currency depreciation.

The results presented above show that domestic firms experience a positive spillover effect as they obtain enhanced strategic advantages in competition and supplier–customer relationships during local currency depreciation periods. Such advantages should be more significant if the connected foreign debt borrowers are financially vulnerable. To test this hypothesis, I construct four measures of focal firms' financial vulnerability: leverage, liquidity, current ratio, and external financing dependence. I sort all focal firms into two groups based on each of these vulnerability measures, from low to high in each country annually, and calculate indirect foreign exposure within each group for the same domestic firm. As a result, I construct two versions of indirect foreign debt exposure for each domestic firm based on the two groups of focal firms: one group contains financially vulnerable foreign debt borrowers, and the other has financially resilient borrowers.

In line with my conjecture, the financial vulnerability of focal firms is a crucial driver of the positive spillover effect. The rise in a domestic firm's stock price and the decline in its credit risk are particularly pronounced if the firm is linked to financially constrained focal firms. This finding implies that foreign debt borrowers with less financial flexibility (i.e., high leverage, low liquidity, and low current ratios) and those that operate in industries characterized by a high dependence on external financing are more likely than other firms to be exploited by domestic rivals and domestic suppliers when the value of the local currency falls. In addition, I find that domestic firms' profitability is mainly derived from financially vulnerable focal firms, which corroborates the stock return and credit risk evidence and supports the notion that domestic firms transform their superior strategic advantages into future profitability.

Moreover, the industry structure of domestic firms affects their strategic advantages over distressed foreign debt borrowers. Theory suggests that domestic rivals in competitive industries are less likely to collude with their competitors (e.g., engage in price-setting behaviors) than those in concentrated industries and thus compete more intensely for a higher market share when foreign-borrowing competitors experience financial distress during depreciation periods and cannot invest in production facilities (Chen, Dou, Guo, and Ji 2020). Consistent with this hypothesis, I find that domestic rivals in industries with a low Herfindahl–Hirschman index (*HHI*) experience a larger decline in credit risk than those in industries with a high *HHI*, suggesting that the horizontal positive spillover effect is more pronounced in competitive industries than in concentrated industries.

Similarly, compared to those operating in dispersed industries, domestic suppliers operating in concentrated industries are likely to have higher bargaining power in buyer–supplier relationships and, hence, can extract higher rents from weakened customers. For instance, they can negotiate terms to receive payments faster or save more on marketing expenses without incurring business losses, as downstream customers face high switching costs to replace preexisting suppliers or find new substitutes when hit by cash flow shocks. Indeed, I find a pronounced positive spillover effect for suppliers in high *HHI* industries. Taken together, these results support the presumption that domestic firms take advantage of financially vulnerable foreign debt borrowers and benefit from increased competitive advantages or bargaining power.

At first glance, the results of this paper seem different from the literature that investigates firm-level credit shocks (e.g., Hertzel et al. 2008; Jacobson and Von Schedvin 2015; Agca et al. 2021) because exchange rate shocks weaken foreign debt borrowers but do not necessarily lead to a large wave of corporate failures in my sample. In such a situation, firms without foreign currency exposure may switch to a position of strength and benefit from their indirect foreign debt exposure in depreciation periods, especially when the connected focal firms are financially vulnerable. Therefore, this paper advances our understanding of the transmission of currency risk to the real economy and of the heterogeneous response of firms and industries to exchange rate movements (e.g., Meese and Rogoff 1983; Lane and Shambaugh 2010; Blanchard et al. 2016; Itskhoki and Mukhin 2021; Lilley et al. 2022; Du and Schreger 2022).

Nevertheless, currency risk and default risk might spill over through channels other than foreign debt exposure, such as through banking networks, internal capital markets, trade linkages, employment, and other factors that affect the aggregate economy (e.g., Acemoglu et al. 2015; Auer et al. 2019; Biermann and Huber 2019; Giannetti and Saidi 2019; Agarwal 2021; Chang et al. 2022; Di Giovanni and Hale 2022). Using micro-level data on foreign debt and firm networks, this paper provides complementary evidence that there is a "silver lining" to a dark cloud of adverse exchange rate shocks propagating domestically. Thus, this paper uncovers a new channel through which strategic competition and financial flexibility can mitigate the amplification and propagation of adverse external shocks.

*Related Literature.* My paper contributes to the large and growing literature on the risk implications of external debt positions in the corporate sector (e.g., Aguiar 2005; Chui et al. 2014; Kim et al. 2015; Alfaro et al. 2017; Hardy 2018; Niepmann and Schmidt-Eisenlohr 2021; Du and Schreger 2022; Salomao and Varela 2022). Bruno and Shin (2020) document that firms in emerging markets associated with greater dollar-bond issuance experience more stress when the local currency depreciates. Niepmann and Schmidt-Eisenlohr (2021) find that depreciation reduces the likelihood that a firm with foreign debt repays its loans and that exchange rate exposure can translate into credit risk for banks. Another closely related paper is that of Alfaro, Asis, Chari, and Panizza (2019), who use a leverage ratio as a proxy for foreign debt exposure and show that depreciation amplifies the vulnerability of large firms. The contribution of my paper is to explore a much more comprehensive and detailed dataset, which allows me to conduct an empirical analysis that more accurately identifies foreign debt exposure and inter-firm linkages.

My paper is also related to the growing literature on the propagation and amplification of shocks in production and financial networks. This line of research focuses on idiosyncratic adverse events, such as bankruptcies, defaults, credit rating downgrades, and natural disasters (e.g., Hertzel et al. 2008; Jacobson and Von Schedvin 2015; Barrot and Sauvagnat 2016; Kolay et al. 2016; Agca et al. 2021; Carvalho et al. 2021; Dou et al. 2022b; Elkamhi and Nozawa 2022). Conversely, I investigate the transmission of macro-level exchange rate shocks within networks of firms and assess the role of strategic interactions among competitor pairs or along the supply chain in the economic mechanism.

My paper also contributes to the credit risk contagion literature (e.g., Lang and Stulz 1992; Das et al. 2007; Hertzel et al. 2008; Duffie et al. 2009; Jorion and Zhang 2009; Hertzel and Officer 2012; Jacobson and Von Schedvin 2015; Costello 2020). Most of these studies use a small sample of U.S. bankruptcy cases; for instance, both Hertzel et al. (2008) and Jorion and Zhang (2009) use a sample of approximately 250 U.S. corporate bankruptcies. In contrast, as exchange rate shocks simultaneously affect all firms with external debt, I am able to use a large sample of firms in various countries and industries.

Finally, this paper is related to the literature on the links between strategic interactions, profit margin, and financial distress (e.g., Busse 2002; Hortaçsu et al. 2013; Phillips and Sertsios 2013; Koijen and Yogo 2015; Kim 2021; Dou et al. 2022a,b; Chen et al. 2022). Chen et al. (2020) develop a model to study the strategic competition between firms in the same industry. In their model, when some firms become financially distressed, their non-distressed counterparts fare better in a non-collusive equilibrium and worse in a collusive equilibrium. My findings that domestic rivals compete to capture more market share and increase their revenue are consistent with the model prediction for a non-collusive equilibrium.

The remainder of this paper is structured as follows. In Section 2, I describe my data sources and sample construction. In Section 3, I present evidence for the role of exchange rate shocks in amplifying corporate vulnerability through foreign debt exposure. In Section 4, I analyze the spillover effect of exchange rate shocks on purely domestic firms via inter-firm linkages and examine the cross-sectional determinants of the positive spillover effect. I conclude the paper in Section 5.

## 2 Data and Sample

For this study, I use several novel and comprehensive databases to combine information on firm-level currency debt composition and firm-level networks of rivals, customers, and suppliers with fundamental accounting information and stock returns to form a large cross-section of global firms.

### 2.1 Data Description

The data on debt structure and currency denomination are obtained from the FactSet Debt Capital Structure (DCS) Database. The DCS dataset begins in 2006 and contains the debt structure information of nearly 40,000 reporting entities collected from financial statements, credit agreements, and indentures worldwide. It contains the debt instruments and line items that reconcile to balance sheet debt values, including all short-term debt, revolving credit facilities, term loans, and bonds, to the extent that they are broken down in the filings. I use the *Details* file, which contains details on the individual debt instruments included in the DCS dataset (e.g., debt type, coupon, principal outstanding, issuance currency, maturity).

To capture the offshore debt issuance activities of multinational firms, I find each reporting

entity's ultimate parent firm and its domicile countries and local currencies based on a series of FactSet internal mapping files. I classify debt as foreign-currency-denominated if the issuance currency of the debt instrument is different from the home currency of its ultimate parent firm. I further sum the individual debt instruments to broad debt types according to FactSet's debt code and category: for instance, maturity (i.e., short-term debt and long-term debt), debt type (i.e., revolving credit, term loans, and bonds), and currency (i.e., USD-denominated and EUR-denominated).[1]

The firm financial and accounting data are taken from the FactSet Fundamentals database.[2] I merge the FactSet DCS Database with the Fundamentals Database by the FactSet Entity ID. To identify foreign debt borrowers, I select firms that ever issued foreign currency debt in the sample data. I convert outstanding debt values from the FactSet DCS and accounting items from the FactSet Fundamentals into U.S. dollars to facilitate comparison and ratio computation. To mitigate data error issues, I delete observations if any foreign debt ratio, domestic debt ratio, or total leverage ratio is outside the unit interval.

To restrict my dataset to meaningful economic activities and risk exposures, I retain only countries with at least ten firms in the sample period and exclude tax havens. Consequently, the home countries of the ultimate parent firms correspond to 64 economies, i.e., 27 advanced economies (AEs) and 37 emerging market economies (EMEs). Similar to Chaieb, Langlois, and Scaillet (2021), I group the 27 AEs into three regions: (i) North America (Canada and the U.S.), (ii) Developed Europe (Austria, Belgium, Denmark, Finland, France, Germany, Greece, Iceland, Israel, Italy, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland, and the United Kingdom), and (iii) Asia Pacific (Australia, Hong Kong, Japan, New Zealand, Singapore, South Korea, and Taiwan). I group the 37 EMEs into four regions: (i) Emerging Asia (Bangladesh, China, India, Indonesia, Kazakhstan, Malaysia, Pakistan, Philippines, Sri Lanka, Thailand, and Vietnam), (ii) Emerging Europe (Bulgaria, Croatia, Cyprus, the Czech Republic, Hungary, Poland, Romania, Russia, and Ukraine), (iii) Latin America (Argentina, Brazil, Chile, Colombia, Mexico, and Peru), and (iv) Middle East and Africa (Egypt, Jordan, Kenya, Kuwait, Nigeria, Oman, Qatar, Saudi Arabia, South Africa, Turkey, and the United Arab Emirates).[3]

To study the spillover effect of exchange rate shocks from foreign debt borrowers to firms without foreign currency exposure via inter-firm linkages, I exclusively focus on purely domestic

[1] I exclude *Adjustment* (debt code "BD_AM") and *Capital Leases* (debt code "BD_CL") from the computation of foreign currency debt and other broad debt types. Based on the information provided in email correspondence with the FactSet data team, certain adjustments are needed when a company provides outstanding amounts on a summary level and no breakdown is available. This could be a fair value adjustment, an amortization discount/premium, or a unit amount adjustment, among others. DCS adds a principal adjustment to reconcile the summary value available in the balance sheet. DCS does not always include capital leases as part of the debt; this depends on the company's reporting policies.

[2] I include all types of reporting frequencies (i.e., annual, semiannual, and quarterly) and regions (i.e., North America and International) to obtain a higher matching ratio with the FactSet DCS dataset. However, I focus on annual data files for the subsequent tests related to domestic firms at the firm-year level.

[3] Section A in the Internet Appendix discusses the descriptive statistics for average firm-level foreign debt exposure and its components across countries and regions.

firms with no foreign debt, assets, and sales and no geographic revenue exposure outside the home country. The foreign assets and foreign sales information is obtained from the FactSet Fundamental database. The geographic revenue distribution information is obtained from the FactSet GeoRev database. I replace the missing values in foreign exposure with zero. To establish the inter-firm linkages between domestic firms and foreign debt borrowers, I proceed to identify domestic firms' connected horizontal rivals, upstream suppliers, and downstream customers, all of which potentially have foreign debt and foreign revenue exposure.

The information about the complex networks of companies' key customers, suppliers, and competitors is obtained from the FactSet Supply Chain Relationships database. The database tracks over 31,000 firms globally and arguably provides the most comprehensive coverage of firm-level supplier–customer relationships and competitor pairs. FactSet collects information from firms' annual reports, which by regulation (e.g., Regulation S-K and SFAS No.131) must disclose the names of customers that generate more than 10% of total sales, and from a range of other sources, including press releases and announcements, investor presentations, firms' websites, and in-house proprietary research. Each relationship is identified by the entities involved and classified as a customer, supplier, partner/distributor, or competitor relationship; dates of inception and termination are also included.

Based on the start and end dates of these links, I combine multiple relationships between the same pair of competitors or supplier–customer links over different time periods into one continuous relationship. I merge domestically oriented firms with the FactSet Supply Chain database from 2006 to 2020. I also require that the ultimate parent firms of the connected competitors, suppliers, and customers be from the same country as the domestic firms in the analysis. If the fiscal period end date of related counterparties is later than that of the domestic firms, I use the prior year's financial and accounting information. In this way, I construct a snapshot of the horizontal rivals and supplier–customer relationships for each domestic firm observed at the end of each fiscal year.

The individual stock and market index data in each country are from the S&P Compustat Global and North America database after I implement a series of filters and data corrections following Bessembinder, Chen, Choi, and Wei (2021). I match firms (entities) in FactSet to Compustat using ISIN, SEDOL, CUSIP, and mapping files from FactSet.[4] I assume that the debt structure and accounting information become available to investors at least four months after the end of the reporting period. The final sample contains 14,076 foreign currency borrowers across 64 economies and 9,771 domestically oriented firms across 60 economies from 2006 to 2020.[5]

The bankruptcy data source is the *ent_entity_status* table from FactSet Data Management Solutions.[6] The default risk measures for global firms (i.e., probability of default ($PD$) and actuarial

[4] I thank Roger Chan from FactSet for providing me with helpful feedback and advice on mapping between different layers of identifiers within FactSet datasets.

[5] Because I only retain domestic firms with connected focal firms in production networks, the final number of domestic firms depends on the coverage of competitor and supplier–customer relationships.

[6] According to the FactSet data team, bankruptcy is the only current status change captured in the table.

spread ($AS$)) are obtained from the Credit Research Initiative (CRI) of the National University of Singapore. The monthly and annual exchange rate data are also from Compustat Global.

### 2.2 Summary Statistics

Table 1, Panel A, reports the summary statistics of foreign debt borrowers at the firm-month level. To alleviate look-ahead bias, I include a firm in the sample only after its first foreign currency debt issuance, leading to 1,085,681 stock-month observations with available debt structure and essential firm characteristics. The average local currency stock return in the sample is 0.91%. The foreign debt borrowers in my sample are relatively large, multinational public firms with significant foreign exposure. The average total book asset value is 11,542 million U.S. dollars, with 33.95% of sales from foreign revenues. The average firm has an 11.53% foreign debt ratio and a 16.91% domestic debt ratio. The majority of foreign debt is long-term debt in the form of term loans and bonds, and around half of these loans and bonds are denominated in U.S. dollars, consistent with the dominant role of the dollar in the international debt market (Eren and Malamud 2021). The average monthly exchange rate movement is 0.15%.

Panel B reports the descriptive statistics of purely domestic firms that are connected to foreign debt borrowers at the firm-month level. The combination of domestic rivals, domestic suppliers, and domestic customers results in 463,140 distinct stock-month observations with valid stock returns. Domestic firms tend to have a small average firm size of $4,938 million. The average local currency stock return is 0.82%. In terms of construction, these firms do not have foreign debt or foreign revenue exposure. Other firm characteristics are similar to those of foreign debt borrowers. Panel C illustrates the summary statistics of domestic rivals and suppliers at the firm-year level. An average domestic firm has total assets of $4,316 million, sales of $1,334 million, a leverage ratio of 24.10%, a tangibility ratio of 23.84%, an operating profitability of 5.27%, a profit margin of 16.15%, and a cash flow ratio of 15.18%. The average annual exchange rate movement is -0.16% with a standard deviation of 7%. The definition and construction details can be found in the note to Table 1.

## 3 Exchange Rate Risk, Foreign Debt, and Corporate Vulnerability

In this section, I study the effect of foreign debt on borrowers' distress in depreciation periods. I first outline the theoretical motivation and empirical model to examine the role of exchange rate shocks in amplifying corporate vulnerability through foreign debt exposure. I then examine the channel through which foreign debt increases default risk using exchange rate movements and U.S. monetary policy shocks.

### 3.1 Theoretical Motivation and Empirical Design

The past decade has witnessed a rapid surge in cross-border banking and international bond issuance. According to statistics from the Bank for International Settlements (BIS), total domestic and foreign credit to non-financial corporations worldwide increased from $45.39 trillion to $84.21 trillion, and outstanding international bonds grew from $1.64 trillion to $4.37 trillion between 2008 and 2020.[7] Figure 1 shows that the dollar credit (i.e., bank loans and debt securities issues denominated in U.S. dollars) outside the United States and the euro credit outside the euro area rose substantially after the global financial crisis.

Theoretical predictions on how exchange rate risk should influence corporate vulnerability are two-sided. Debt issuance in foreign currencies exposes these borrowers to financial distress, rollover risk, and currency mismatch (e.g., Aghion et al. 2004; Céspedes et al. 2004; Schneider and Tornell 2004). In particular, firms with higher reliance on FC debt become more vulnerable to global financial conditions such as U.S. monetary policy changes (e.g., Milesi-Ferretti and Tille 2011; Forbes and Warnock 2012; Bruno and Shin 2015; Rey 2015). Large-scale depreciation increases the debt burden of firms holding foreign currency debt, leading to a deterioration of their balance sheets and an increase in the cost of external financing, thus amplifying corporate distress in periods of heightened international turbulence.[8]

Nevertheless, firms can benefit from local currency depreciation through more robust demand for domestic goods and the resultant boost in sales and profits, which offset the debt repayment surge (e.g., Fleming 1962; Mundell 1963; Svensson and Wijnbergen 1989; Obstfeld and Rogoff 1995; Dao et al. 2021). Firms may also use cheaper foreign currency debt to accumulate capital and become more resilient to external shocks. Salomao and Varela (2022) develop a heterogeneous firm dynamics model to show that only highly productive firms select foreign currency borrowing, and those firms tend to be less sensitive to default, making them more tolerant of currency risk given the persistence of the productivity shock.

As I have data on the currency composition of firm-level debt, I can directly test how exchange rate risk amplifies credit risk via foreign debt exposure by estimating the following specification:

$$y_{i,s,c,t} = \alpha + \beta FDR_{i,s,c,t-1} + \lambda FDR_{i,s,c,t-1} \times \Delta EX_{c,t} + \Gamma' X_{i,s,c,t-1} + \phi_i + \eta_{s,t} + \zeta_{c,t} + \varepsilon_{i,s,c,t} \quad (1)$$

[7] Firms tend to take advantage of cheaper funding costs in foreign currency borrowing, at the cost of increases in default risk and exchange rate risk from a currency mismatch on their balance sheets, which counters the trade channel through which local depreciation boosts the performance of domestic exporters (e.g., Mundell 1963; Aghion, Bacchetta, and Banerjee 2004; Niepmann and Schmidt-Eisenlohr 2021).

[8] Financial hedging is costly and subject to liquidity and counterparty risk, while foreign exchange derivatives tend to have much shorter maturities than corporate debt. As a result, foreign currency borrowers often retain at least some exposure to exchange rate risk, as shown by Guay and Kothari (2003), Bartram et al. (2009), Allayannis et al. (2012), Caballero (2021), and Du and Schreger (2022), among others. Using detailed data on FX hedging in Chile, Alfaro, Calani, and Varela (2022) find that natural hedges are limited and financial hedges are concentrated in large firms. They also document that firms tend not to hedge *net* trade credit exposure with FX derivatives but instead hedge their *gross* exposures.

where $y_{i,s,c,t}$ is either the monthly local currency stock returns ($Ret$) or the change in the default probability ($\Delta PD$) of foreign debt borrower $i$ in sector $s$ from country $c$ in month $t$.[9] $\Delta EX_{c,t}$ is the log change in the nominal bilateral exchange rate against the U.S. dollar for country $c$ in month $t$, in which $\Delta EX > 0$ represents domestic currency depreciation.[10] The lagged firm-specific time-varying covariates, $X_{i,s,c,t-1}$, include the domestic debt ratio ($DDR$), foreign sales ($ForRev$), market beta ($Beta$), firm size ($Size$), book-to-market ratio ($BE/ME$), profitability ($ROA$), and investment ($CAPX$). I include $DDR$ and $ForRev$ to control for the domestic leverage effect and foreign trade exposure, respectively.

I include firm fixed effects ($\phi_i$) to account for unobserved, time-invariant firm heterogeneity. Moreover, I add sector-month fixed effects, $\eta_{s,t}$, to control for changes in sectors over time in terms of their need for external financing and all other supply and demand shocks that are common to all firms within the same Fama–French 48 industry. Additional country-month fixed effects, $\zeta_{c,t}$, are used to control for time-varying observed and unobserved country characteristics. The multicountry panel dimension allows me to condition on many country-specific policy changes and other macroeconomic shocks by using country-month fixed effects, such as valuation effects, financial development, and other country-specific trends.

In this setup, $\beta$ measures the influence of foreign debt on contemporaneous stock returns and the change in default probability when there are no exchange rate movements. $\lambda$ measures how the association between foreign debt and corporate distress measures varies with exchange rate movements. The main effect of the foreign exchange rate is absorbed by the country-month fixed effects. In the baseline analysis, I drop observations at the country-month level for countries whose currencies are pegged, using data from Ilzetzki, Reinhart, and Rogoff (2019) . Following Thompson (2011), I use standard errors double-clustered on country and month to account for correlations both over time within each country and across countries.

### 3.2 Baseline Results

Table 2 presents the estimation results for Equation (1). For brevity's sake, I only display coefficients and $t$-statistics for the interaction terms between $FDR$ and $\Delta EX$, which represent the incremental fragility of the foreign debt ratio in times of currency depreciation. Column (1) provides a benchmark estimate: a point estimate of -0.08 ($t = -2.07$) implies that if a firm experiences a one-standard-deviation increase in $FDR$, then its stock price declines by an additional 8 bps in response to a one-standard-deviation local currency depreciation. Similarly, Column (5) shows that the same firm's default probability increases by an additional 0.016 ($t = 3.70$) standard deviation following currency depreciation.

[9] I assume that marginal investors can reasonably anticipate corporate distress and incorporate value-relevant information into the stock price on a monthly frequency. $PD$ is computed using the forward intensity model of Duan, Sun, and Wang (2012) with 16 common and firm-specific risk factors, and is obtained from the Credit Research Initiative (CRI) of the National University of Singapore.

[10] For U.S. firms, $\Delta EX_{c,t}$ is calculated as the log change in the inverse of the dollar index from FRED.

To account for asymmetric effects between appreciation and depreciation, Columns (2) and (6) replace $\Delta EX$ with a dummy variable (i.e., $\mathbb{1}[\Delta EX>0]$) that takes the value of one if the local exchange rate is depreciated against the U.S. dollar and zero otherwise. The estimation results suggest that a firm that experiences a one-standard-deviation increase in the foreign debt ratio would see its stock price decrease by an additional 19.5 ($t = -2.65$) bps or its default probability increase by an additional 0.033 ($t = 3.65$) standard deviation in months of local currency depreciation. The amplification effect is not only statistically significant but also economically large: the point estimate of 0.195 implies a 20% decrease in the average monthly stock returns. I interpret this result as evidence that adverse exchange rate movements precipitate corporate vulnerability in foreign debt borrowers.

Columns (3)–(4) and (7)–(8) illustrate the results for the AE versus EME subsamples. Generally, the propagation effect of currency depreciation is more pronounced for firms in AEs. The weak evidence on EME stock returns contrasts with the findings of Alfaro et al. (2019) and Bruno and Shin (2020). One potential reason for this difference from previous studies is that I directly measure foreign debt from firm-level balance sheets, rather than using a rough proxy such as total leverage or dollar bond issuance.

Table A3 in the Internet Appendix examines the effect of currency depreciation on various foreign debt components using an empirical specification similar to that in Equation (1).[11] The results show that, within the foreign debt structure, firms with a larger portion of dollar-denominated, long-term debt in the form of corporate bonds tend to suffer larger declines in stock prices or experience a more significant increase in default probability during periods of domestic currency depreciation.

### 3.3 High-Frequency Identification

One concern with respect to my baseline results is that other omitted time-varying firm-level characteristics could drive both foreign debt exposure and a firm's reaction to currency depreciation, which would spuriously inflate the significance of relationships between foreign debt exposure and exchange rate movements with respect to their stock returns or credit risk outcomes. For example, distressed multinational firms would increase their borrowing of low-cost foreign debt to gamble for survival. These firms may also be highly exposed to external shocks because their business depends on foreign product markets. Anticipating exchange rate movements, firms may adjust their foreign debt ratio or other corporate policies and thus change their risk exposure. To mitigate this potential endogeneity issue, I use the U.S. monetary policy shocks of the Federal Reserve Board (FRB) to proxy for exchange rate shocks to non-U.S. firms and investigate whether foreign debt exposure can

[11] I construct variants of $FDR$ based on maturity, type, and currency: short-term FC debt ratio ($ST$), long-term FC debt ratio ($LT$), revolving credit FC debt ratio ($RC$), term loan FC debt ratio ($Loan$), bond FC debt ratio ($Bond$), dollar-denominated FC debt ratio ($USD$), euro-denominated FC debt ratio ($EUR$), and other-currency-denominated FC debt ratio ($OTH$).

explain the cross-sectional variation in stock returns on monetary policy announcement dates.[12]

High-frequency monetary policy shocks capture the surprise component in federal fund rates and the effects of forward guidance. The validity of this exercise relies on the assumption that firms' foreign debt ratios and other firm characteristics do not change substantially in narrow windows around monetary policy announcements. Because I exclude U.S. firms from this analysis, another important feature of the identification strategy is that the monetary shocks originate in the United States and are exogenous to both the destination-country and firm fundamentals.

To show how variation in the foreign debt ratio across firms explains cross-sectional differences in corporate vulnerability to exchange rate shocks, I estimate the following empirical specification:

$$r_{i,s,c,t} = \alpha + \lambda FDR_{i,s,c,t-1} \times \Delta i_{\$,t} + \Gamma' X_{i,s,c,t-1} + \eta_s + \zeta_c + \tau_t + \varepsilon_{i,s,c,t} \tag{2}$$

where $r_{i,s,c,t}$ is the date $t$ stock return for non-U.S. firm $i$ in sector $s$ from country $c$. $FDR_{i,c,s,t-1}$ is firm $i$'s foreign debt ratio prior to announcement date $t$. I also employ quintile rank dummies (i.e., Q2, Q3, Q4, Q5, with Q1 omitted) based on the cross-sectional distribution of $FDR$ and the debt structure components of $FDR$. $\Delta i_{\$,t}$ is the FRB monetary policy shock as measured by Acosta and Saia (2020).[13] A positive $\Delta i_{\$,t}$ indicates a surprise interest rate increase and is interpreted as a contractionary shock to exchange rates (i.e., other countries' currencies tend to depreciate against the U.S. dollar).

$X_{i,c,s,t-1}$ is a vector of controls as in baseline Equation (1) (including $FDR$ itself). $\tau_t$ is the date $t$ fixed effect that captures the average response of stock returns to a monetary policy shock on date $t$. The model also includes country fixed effects, $\zeta_c$, and sector fixed effects, $\eta_s$, to control for unobserved time-invariant heterogeneity at the country and sector levels. Following Nakamura and Steinsson (2018) and Zhang (2022), in the main analysis I drop the height of the financial crisis from July 2008 to June 2009 and delete observations at the country-month level for countries whose currencies are pegged, using data from Ilzetzki et al. (2019). I also use firms from countries with currency pegs as a placebo test to examine whether the international transmission of monetary policy occurs through the interest rate or financing cost channels.

The coefficient of interest in Equation (2) is $\lambda$, which serves as a "difference-in-differences" estimator and captures the effect of heterogeneity in foreign debt exposure on the magnitude of corporate vulnerability arising from exchange rate shocks. A negative $\lambda$ indicates that a contractionary FRB shock decreases stock prices more for firms with a higher foreign debt ratio than for firms within the same sector in the same country on Federal Open Market Committee (FOMC) statement dates. Equation (2) does not include the monetary shock itself because it is absorbed by the time fixed effect. The standard errors are clustered by date.

[12] Rey (2016), Wiriadinata (2018), Chari et al. (2021) and Zhang (2022), among others, show that U.S. monetary policy shocks have substantial spillover effects and affect exchange rates worldwide.

[13] Acosta and Saia (2020) build on Nakamura and Steinsson (2018) and extend their monetary policy shock measures up to 2019. This series captures the first principal component of changes in five different interest rate futures of various maturities in a 30-minute window around FRB policy announcements.

Figure 2 plots the coefficients of $\lambda$ on *FDR* quintile rank dummies (with Q1 omitted). As expected, the coefficients are all negative and monotonically decrease from Q2 to Q5. For instance, firms with a high foreign debt ratio (i.e., Q5 rank) decrease by an additional 9 bps in stock prices compared to firms with a low foreign debt ratio (i.e., Q1 rank) within the same sector in the same country following a 100-bp FRB contractionary shock on FOMC dates. This figure provides *prima facie* evidence that variations in the foreign debt ratio across firms explain cross-sectional differences in stock price responses to unexpected exchange rate shocks.

Table 3 presents the estimation results of Equation (2). Column (1) provides a benchmark estimate for $\lambda$: a point estimate of -0.037 ($t = -2.28$) implies that if a firm experiences a one-standard-deviation increase in *FDR*, then its stock price decreases by an average additional 4 bps in response to a one-standard-deviation FRB contractionary shock on FOMC dates. Columns (2)–(4) estimate the effects of different foreign debt components on corporate vulnerability in response to exchange rate fluctuations from U.S. monetary policy shocks. In line with the results in Table A3, long-term dollar bond components in the foreign debt structure respond more to exchange rate shocks (few foreign currency bonds have a less than one-year maturity).

Aside from exchange rates, interest rates and borrowing costs may also respond to U.S. monetary policy (e.g., Miranda-Agrippino and Rey 2020; Zhang 2022). As a placebo test, Columns (5)–(8) in Table 3 use observations only from countries with currency pegs. In a fixed exchange rate regime, the exchange rate channel cannot amplify the corporate distress of foreign debt borrowers. However, I do not find significant results concerning the interactions between monetary policy shocks and *FDR* (and its components), mitigating the concern that the transmission channel is through the interest rate and financing cost.

Table A4 shows the high-frequency identification results for the AE and EME subsamples. The results are the same as in the global sample: high *FDR* firms are more vulnerable to unexpected exchange rate shocks, and the dollar bond component facilitates the international transmission of U.S. monetary policy for both AE and EME firms.

To determine whether the U.S. monetary policy shocks are unique, I study the responses of firms' one-day stock returns to an additional set of monetary policy shocks using the same regression specification as in Equation (2). The alternative policy shock data are drawn from Leombroni et al. (2021), who measure changes in interest rate swaps around European Central Bank (ECB) policy announcements. The authors construct an "interest rate shock" measure ($\Delta i_{e,t}$) that captures the effect of ECB monetary policy on the future path of interest rates, using high-frequency movements in interest rate swaps around ECB announcements. The regressions exclude firms from countries that use the euro. The results in Table A5 show that firms with more euro-denominated debt are more exposed to ECB monetary policy shocks. Thus, the international transmission of monetary policy through debt denomination currencies and the exchange rate channel is not unique to the Federal Reserve.

Taken together, the results in Figure 2 and Table 3 provide strong corroborating evidence that

firms with a higher foreign debt ratio suffer more from exchange rate shocks than other firms. The dollar bond component in the foreign debt structure transmits unexpected exchange rate movements—adverse external shocks from contractionary foreign monetary policies—to corporate vulnerability.

# 4 Exchange Rate Risk, Inter-Firm Linkages, and Domestic Firms

In this section, I study the spillover of exchange rate shocks and corporate distress through competitor pairs and supply chain links focusing on domestic firms with no measurable foreign exposure. I first discuss the theoretical framework and then outline the empirical model to investigate the transmission of exchange rate risk from foreign debt borrowers to purely domestic firms via inter-firm linkages. I then present empirical analyses of domestic rivals, domestic suppliers, and domestic customers. Additionally, I exclude the foreign trade channel and financing cost channel as possible explanations for the positive spillover effects. To elucidate the potential positive propagation mechanisms, I explore a set of cross-sectional determinants related to the vulnerability of focal firms and the industry structure of domestic firms. As a final exercise, I examine domestic firms' future profitability to corroborate evidence on stock returns and credit risk and confirm the transmission mechanism.

## 4.1 Theoretical Motivation

Firms that hold foreign currency debt tend to be large and systematically important. Their corporate fragility can be transmitted further to domestic credit markets and other sectors through network effects and other spillovers (e.g., Gabaix 2011; Acemoglu et al. 2015; Alfaro et al. 2021; Niepmann and Schmidt-Eisenlohr 2021; Di Giovanni and Hale 2022).[14] Lang and Stulz (1992) document that industry rivals, on average, experience negative stock returns around the time that a competitor files for bankruptcy. Hertzel et al. (2008) show that upstream suppliers of firms in financial distress experience negative stock price returns around bankruptcy filing dates. Jacobson and Von Schedvin (2015) provide evidence that inter-firm linkages induced by trade credit propagate corporate failures via trade credit losses and demand shrinkage.

Nonetheless, exchange rate shocks increase the financial fragility of firms holding foreign currency debt but do not necessarily trigger a large wave of corporate failures in non-crisis periods. Domestic firms might take advantage of weakened foreign debt borrowers via either competition or buyer–supplier negotiation. Competitive effects can arise when exchange rate shocks enable domestic rivals to capture market share or act in an oligopolistic way. Chen et al. (2020) char-

[14] Theory predicts that liquidity shocks and credit risk are propagated and amplified throughout the economy along trade credit chains, firm size distribution, or a network of input–output linkages, potentially causing cascades of defaults and systemic failure (e.g., Kiyotaki and Moore 1997; Allen and Gale 2000; Battiston et al. 2007; Gabaix 2011; Acemoglu et al. 2012, 2015).

acterize an equilibrium in which firms do not collude with each other. In such a non-collusive industry equilibrium, adverse idiosyncratic shocks to one firm will enable other firms within the same industry to gain a competitive advantage, attaining higher cash flows through increased profit margins and market shares. Likewise, Lang and Stulz (1992) show that for a subset of firms that file for bankruptcy, their industry rivals experience positive stock returns that may be driven by the increased market power of the remaining firms.

Similarly, in a non-monotonic relationship (e.g., an inverted U-shaped curve) between the performance of suppliers and the financial strength of customers, suppliers might pivot to a position of strength and increase their bargaining power when downstream customers are hit by regular shocks but distant from the default boundary.[15] For example, foreign-borrowing customers might experience liquidity shocks in depreciation periods and thereby face higher switching costs and search frictions to replace preexisting suppliers or find new substitutes. Thus, domestic suppliers can extract more rent by cutting operating expenses devoted to maintaining buyer–supplier relationships without suffering business losses or negotiating terms to receive payment faster.

### 4.2 Empirical Design

To isolate the effect of spillover via inter-firm linkages from the direct impact of exchange rate shocks, I restrict my subsequent analysis to purely domestic firms with no measurable foreign exposure. As a placebo test, Table A6 regresses the stock returns of domestic firms on contemporaneous exchange rate movement ($\Delta EX$) and its interaction with the depreciation dummy $\mathbb{1}[\Delta EX>0]$. As expected, domestic firms do not respond to local currency depreciation regardless of model specification, and there is no pronounced difference between tradable and non-tradable sectors. These results alleviate concerns about measurement errors in relation to foreign exposure and potential general equilibrium effects. Furthermore, they lend support to the identifying assumption that exchange rate shocks affect domestic firms only through their indirect exposure tied to foreign debt borrowers via business networks.

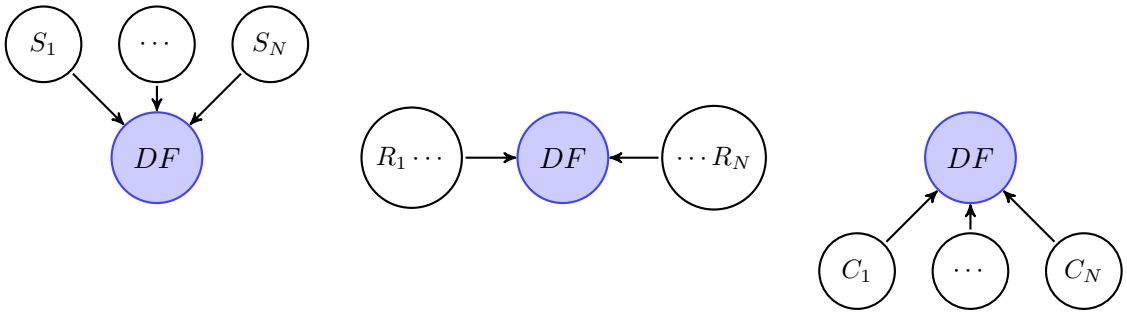
To examine whether corporate distress induced by foreign debt exposure and exchange rate shocks is propagated to domestic firms through interconnections in production networks, I estimate the following specification:

$$y_{i,s,c,t} = \alpha + \beta WFDR_{i,s,c,t-1} + \lambda WFDR_{i,s,c,t-1} \times \Delta EX_{c,t} + \Gamma' X_{i,s,c,t-1} + \phi_i + \eta_{s,t} + \zeta_{c,t} + \varepsilon_{i,s,c,t} \quad (3)$$

[15] Anecdotal evidence confirms suppliers might pivot to a position of strength when customers are financially distressed. A recent case is a home-goods retailer, Bed Bath & Beyond, in the midst of a turnaround plan. Some of its suppliers started negotiating terms to get paid faster, while others had restricted or stopped shipments after failing to receive timely payment. The interim CEO Sue Gove gave her top priorities to addressing supply-chain issues and vendor payment for over 4,000 suppliers, because the company needs to get products to its stores and customers faster. As Ms. Gove pointed out, Bed Bath & Beyond has had "regular communications and information sharing" with suppliers to improve transparency. (source: 8/20/2022 *Bloomberg*, 8/31/2022 *Wall Street Journal*, and 09/29/2022 *Supply Chain Dive*)

where $y_{i,s,c,t}$ is either the monthly local currency stock returns ($Ret$) or changes in the default probability ($\Delta PD$) of domestic firm $i$ in sector $s$ from country $c$ in month $t$. As in Equation (1), $\Delta EX_{c,t}$ is the log change in the nominal bilateral exchange rate against the U.S. dollar for country $c$ in month $t$, in which $\Delta EX > 0$ represents domestic currency depreciation. The lagged firm-specific time-varying covariates, $X_{i,s,c,t-1}$, include the weighted average indirect foreign revenue exposure ($WForRev$), market beta ($Beta$), firm size ($Size$), book-to-market ratio ($BE/ME$), profitability ($ROA$), and investment ($CAPX$). I include firm-, sector-month, and country-month fixed effects in each specification and double cluster standard errors at the country and month levels. The main effect of exchange rate movements is absorbed by the country-month fixed effects. I drop observations at the country-month level for countries whose currencies are pegged, using data from Ilzetzki, Reinhart, and Rogoff (2019).

For each year, I construct domestic firms' indirect foreign debt (revenue) exposure linked with foreign debt borrowers, $WFDR$ ($WForRev$), as a weighted average of the focal firms' foreign debt (revenue). I denote domestic firms' connected counterparties through inter-firm linkages that could potentially have foreign debt (revenue) exposure as the focal firms. For example, as shown in case A, if a domestic firm's ($DF$) role is a customer, its focal firms are upstream suppliers $S_1$, $\cdots$, $S_N$. I compute $DF$'s indirect foreign exposure linked with suppliers as a weighted average of the foreign debt (revenue) ratios of $S_1$, $\cdots$, $S_N$, using either focal firm sales and assets as weights or equal weighting. Therefore, if associated upstream suppliers hold more foreign debt, a domestic customer has a higher indirect foreign debt exposure arising from suppliers, even though it does not owe any indebtedness in foreign currency per se. Adverse exchange rate shocks directly affect foreign-borrowing suppliers and might propagate to a domestic customer through the supply chain.




A. Domestic Customer B. Domestic Rival C. Domestic Supplier

In a similar manner, a domestic rival's focal firms are its closest competitors $R_1$, $\cdots$, $R_N$ (i.e., case B). Hence, I calculate its indirect foreign debt exposure linked with foreign-borrowing competitors as a weighted average of $R_1$, $\cdots$, $R_N$'s foreign debt ratios. For a domestic supplier, downstream customers $C1$, $\cdots$, $C_N$ are its focal firms (i.e., case C). Correspondingly, I take the weighted average of $C1$, $\cdots$, $C_N$'s foreign debt ratios to obtain a domestic supplier's $WFDR$ associated with foreign-borrowing customers. When constructing $WFDR$ ($WForRev$), I require domestic firms and focal firms to come from the same country. In addition, I include firms with no

foreign debt or foreign revenue.

This empirical design assumes that domestic firms' optimal choices or disclosures of suppliers, customers, and competitors do not correlate with their counterparties' foreign debt ratios. Optimizing firms differ in their exposure to systematic risk (i.e., beta in a CAPM world) or financial distress costs in bad times. To hedge or minimize risk exposure, firms may take the beta into account when choosing horizontal competitors and vertical partners. That said, it is an innocuous assumption that firms do not select rivals or suppliers only based on their currency debt composition. Even if they do, such selection has little to do with their sensitivity to macro-level exchange rate shocks. Therefore, the construction of the *WFDR* provides a plausibly exogenous measure that can identify differences in indirect exchange rate exposure across purely domestic firms.

I exploit heterogeneity in domestic firms' indirect foreign debt exposure during the local currency depreciation. The variable of interest is $\lambda$, which captures the spillover effect of exchange rate shocks from foreign debt borrowers to domestic firms through inter-firm linkages. Because domestic firms are unlikely to have direct links to foreign exposure per se, the null hypothesis is $\lambda = 0$ if there is no propagation of corporate distress on horizontal rivals and along the supply chain. We expect to see a negative $\lambda$ for contemporaneous stock returns or a positive $\lambda$ for changes in the default probability if there is a contagion effect among competitor pairs and in buyer–supplier links (Hertzel et al. 2008; Jacobson and Von Schedvin 2015; Agca et al. 2021). In contrast, we expect to see the opposite results (i.e., positive spillovers) if domestic firms *gain* from indirect foreign debt exposure in depreciation periods.

## 4.3 Main Results

### 4.3.1 Domestic Rivals

Table 4, Panel A displays the estimation results for domestic rivals, in which *WFDR* is based on their foreign-borrowing competitors. Rather than a contagion effect of exchange rate shocks among competitor pairs, I find a positive horizontal spillover effect.

The results suggest that if a domestic rival experiences a one-standard-deviation increase in sales-weighted (indirect) exposure to competitors' foreign debt, its stock price increases by 10.7 ($t = 3.75$) more bps, and its default probability decreases by an additional 0.009 ($t = -2.94$) standard deviation, on average, in response to a one-standard-deviation depreciation in local currency. The point estimates are statistically significant and economically large. For instance, a magnitude of 0.107 is equivalent to 13% of the average monthly stock returns for domestic firms. The results are similar if I use focal firm assets as weights or employ equal-weighted *WFDR*.

Therefore, domestic rivals gain from foreign-borrowing competitors' increased distress when currency depreciation increases the local value of their debt repayment. These results are consistent with Chen et al. (2020)'s model prediction for a non-collusive equilibrium, in which domestic firms

compete to expand their customer base and grab a higher market share when their competitors are in financial distress.

### 4.3.2 Domestic Suppliers

Table 4, Panel B shows the estimation results for domestic suppliers, in which *WFDR* is calculated based on their foreign borrowing downstream customers. Surprisingly, there is no contagion effect from downstream customers to domestic suppliers. Instead, I document a substantial upstream positive spillover.

The point estimate implies that if a domestic supplier undergoes a one-standard-deviation rise in sales-weighted (indirect) exposure to customers' foreign debt, its stock price rises by 9.2 ($t = 2.77$) more bps, and its default probability declines by an additional 0.007 ($t = -2.73$) standard deviation, on average, in response to a one-standard-deviation depreciation in domestic currency. The estimated coefficients are economically large as well. Similarly, the results are robust to the weighting scheme used to construct *WFDR*.[16]

Thus, domestic suppliers do not confront negative spillovers from distressed downstream customers during depreciation periods. Conversely, they benefit from the indirect foreign debt exposure linked to foreign borrowing customers, lending support to the presumption that a non-monotonic relationship might exist between suppliers' performance and customers' financial strength. In a middle region where the shock is not extreme and customers are distant from the default boundary, domestic suppliers switch to a position of strength and extract more rents from increased bargaining power when adverse cash flow shocks weaken customers.[17]

### 4.3.3 Domestic Customers

Table 4, Panel C illustrates the estimation results for domestic customers, in which *WFDR* is constructed from their foreign-borrowing suppliers. I do not see a contagion effect or a positive spillover from foreign-borrowing suppliers to domestic downstream customers.

The point estimates are close to zero and statistically insignificant, suggesting little evidence of the downstream propagation of exchange rate shocks to domestic buyers. This result echoes

[16]For robustness, I also account for the strength of supplier-customer links and use the weighting scheme based on the relevance of the relationship. FactSet provides proprietary data on the relevance ranking of supplier-customer relationships, which is determined by a set of factors. Factors include whether the company being viewed is the discloser of the relationship, what percentage of the supplier's revenue is represented by the customer, and various types of metadata concerning the two companies involved. The results are similar to the baseline results.

[17]Previous literature (e.g., Hertzel et al. 2008; Kolay et al. 2016) uses the Compustat Segment Customer File. The mutual importance between principal customers and dependent suppliers is asymmetric. However, I use the FactSet Supply Chain Database, which includes more balanced supplier-customer links. Moreover, rather than examining a small sample of bankruptcy cases in the U.S., I work with a much larger sample of firms across many countries and industries. In addition, adverse exchange rate shocks weaken foreign debt borrowers but do not cause a large wave of corporate failures in my sample. Those could be potential reasons why I find a positive spillover effect from distressed customers to suppliers.

the findings of Hertzel et al. (2008)'s on the lack of significant customer contagion effects when suppliers file for bankruptcies. One potential reason is that customers are usually large and have multiple suppliers or substitutes. The heightened distress of some relatively small suppliers has a modest impact on customers and barely alters the bargaining power of large customers.

#### 4.3.4 Do Horizontal and Upstream Spillover Coexist?

The boundary between rivals and partners may be blurred in an increasingly complex production network. To tease out the positive spillover effects from horizontal competitors and downstream customers, Table 4, Panel D excludes potential supplier–customer links before calculating the weighted average foreign exposure of competitors for domestic rivals. In turn, I delete focal firms that are simultaneously horizontal competitors and downstream customers. In the same fashion, Panel E excludes any competitor pairs among focal firms for domestic suppliers. Thus, the focal firms of domestic suppliers consist solely of downstream customers. The point estimates are close to the baseline results in each case, indicating that the positive spillovers from horizontal competitors and downstream customers do not confound each other.[18]

Taken together, the findings thus far imply that, despite the surge in corporate financial fragility among foreign debt borrowers in times of currency depreciation, there is no contagion effect via inter-firm linkages. On the contrary, domestic rivals and suppliers appear to benefit from their indirect exchange rate exposure. When depreciation increases the debt burden and imposes liquidity pressure on foreign debt borrowers, both their connected domestic rivals and suppliers pivot towards a position of strength and thus experience a positive spillover effect (i.e., a rise in stock prices and a drop in credit risk).

To ensure completeness, I report the estimates for control variables in the Internet Appendix Tables A7 to A9 for domestic rivals, suppliers, and customers.

### 4.4 Foreign Trade Channel

The literature documents that firms tend to borrow in foreign currency when they have foreign income or foreign assets (e.g., Bleakley and Cowan 2008; Brown et al. 2011). The classic expenditure-switching channel posits that domestic devaluations positively affect the performance of exporting firms (e.g., Fleming 1962; Mundell 1963). Although I exclusively focus on domestically oriented firms with no foreign sales and assets and control their indirect exposure to focal firms' foreign revenue in each specification, it is still possible that the positive spillover stems from foreign trade.

[18]There is little mechanical overlap between three cases (i.e., domestic rivals, suppliers, and customers) after combing datasets on debt composition and supply chain. In other words, there are only a few purely domestic firms with available *WFDRs* from three directions at the same time. Moreover, even if I pool three cases together and replace missing values with zeros, the results remain similar: a horizontal positive spillover effect from competitors and a vertical positive spillover effect from customers. So, to keep the interpretation simple, I show them separately.

For instance, customers can sell more to the foreign market in depreciation periods, thus boosting their demand for inputs from domestic upstream suppliers.

To disentangle the transmission channel of foreign debt from foreign trade, I add an interaction term between the weighted average foreign revenue ($WForRev$) of focal firms and exchange rate movement ($\Delta EX$) to Equation (3) and re-estimate the empirical model with two interactions. Tables A10 and A11 in the Internet Appendix demonstrate the estimation results for domestic rivals and domestic suppliers. The point estimates on the spillover of indirect foreign debt exposure ($WFDR \times \Delta EX$) remain statistically significant and economically large in all specifications. Except for domestic suppliers' stock returns, the estimated coefficients on $WForRev \times \Delta EX$ are not significantly different from zero. Therefore, the indirect exposure to trade channels is unlikely to be the source of positive spillover for purely domestic firms.

### 4.5 Financing Cost Channel

It is plausible that firms' foreign currency borrowing decisions are related to interest rate differences (e.g., Bruno and Shin 2017; Salomao and Varela 2022). Aside from exchange rate movements, shocks to interest rates or financing costs across countries might affect spillovers from foreign debt borrowers to domestic firms because such shocks alter firms' decisions regarding foreign currency borrowing and their currency denomination choices.

However, I argue that this financing channel contradicts my findings of positive spillovers of negative external shocks. For example, an adverse shock to foreign currency borrowing costs pushes large foreign debt borrowers to turn to domestic credit markets and crowd out relatively small and purely domestic firms, thereby tightening the latter's financial constraints. As a result, we should see a contagion or amplification of the external shock. In contrast, I document solid and robust evidence of increases in the distance to default, stock prices, and future profit margins. Hence, the exchange rate channel, rather than the financing cost channel, is at the heart of the positive spillover effect from indirect foreign debt exposure in depreciation periods.

### 4.6 Focal Firm–Specific Determinants: Financial Vulnerability

Eliminating the indirect trade and financing cost channels, I proceed with an evaluation of the focal firm–specific factors affecting the puzzling positive spillover effect of exchange rate shocks. As shown in Section 3, exchange rate shocks amplify foreign debt borrowers' financial fragility. Kiyotaki and Moore (1997) propose that financially constrained firms should be more exposed to the liquidity shortfall—in this case, the surge in debt payment—than non-constrained firms. Hertzel et al. (2008) argue that highly leveraged firms have less financial flexibility and, thus, are more exposed to distress risk than other firms.

I hypothesize that domestic firms obtain an enhanced strategic advantage in competition and

supplier–customer relationships over foreign debt borrowers in depreciation periods. If this is the case, the benefits to domestic firms should be more significant when the connected foreign debt borrowers are financially vulnerable. For example, foreign-borrowing competitors cannot invest in production facilities and, hence, have less capacity to compete when they face tighter financial constraints. Similarly, it becomes more difficult for foreign-borrowing customers to replace existing suppliers or find new substitutes when they are more financially constrained. Relatedly, Caballero (2021) documents that foreign debt borrowers cut investments in depreciation periods. As a result, domestic firms might exploit the financial vulnerability of distressed firms and increase their gains when linked to financially weak firms.

To test this hypothesis, I construct four characteristics related to focal firms' financial vulnerability: leverage, liquidity, current ratio, and external financing dependence (*EFD*). Leverage is the ratio of total debt to total assets. Liquidity is the ratio of current assets to total liabilities. The current ratio is the ratio of current assets to current liabilities. *EFD* is constructed following Rajan and Zingales (1998) and based on a sample of U.S. public firms obtained from Compustat. Rajan and Zingales argue that the U.S. industry classification provides a plausibly exogenous measure that can identify differences in external financing dependencies across industries in other countries, because there should be an unrestricted supply of external financing available to U.S. public firms.

I sort all focal firms into two buckets based on each of these four financial vulnerability measures, from low to high within each country for each year, and then compute the indirect foreign debt and foreign revenue exposure separately for each bucket, using the focal firm sales as weights. Thus, for each domestic firm, I obtain two corresponding values of sales-weighted *WFDR* and *WForRev* at the end of each fiscal year: one is based on focal firms with above-median financial vulnerabilities, and the other on focal firms with below-median financial vulnerabilities. I replace the missing values with zero and re-estimate the empirical model in Equation (3).

Table 5 reports the estimation results for domestic rivals. Column (1) shows that if an average domestic firm experiences a one-standard-deviation increase in indirect foreign debt exposure linked with high-leveraged competitors, then its stock price rises by an additional 11 ($t = 3.35$) bps, and its default probability drops by an additional 0.008 ($t = -3.61$) standard deviation in response to a one-standard-deviation depreciation in the domestic currency. These magnitudes are close to the baseline results in Section 4.3 and thus economically large. In contrast, Column (2) illustrates that the point estimates on the interaction terms are not significantly different from zero if the indirect foreign debt exposure, *WFDR*, is constructed based on low-leveraged competitors.

Columns (3)–(6) of Table 5 indicate that other financial vulnerability measures tell the same story: the positive spillover for domestic firms mainly comes from competitors that borrow in foreign currency but have low liquidity and a low current ratio when they encounter exchange rate shocks. Foreign debt borrowers with high leverage, low liquidity, and a low current ratio are financially weak, particularly when depreciation increases the local value of debt repayment. These results suggest that domestic firms gain from the vulnerability of distressed foreign debt borrowers.

The possibility that firms with more foreign currency borrowing are more likely than other firms to be over-leveraged and have low liquidity may raise endogeneity concerns. That said, Columns (7)–(8) show results based on an exogenous variable that measures industry-level external financing dependence, in which domestic rivals only benefit from focal firms that operate in industries characterized by a high *EFD*.

Table 6 shows the estimation results for domestic suppliers. Similar to domestic rivals, domestic suppliers benefit from associated downstream customers characterized by high leverage, low liquidity, and a low current ratio. For instance, if an average domestic supplier experiences a one-standard-deviation rise in indirect foreign debt exposure from its above-median leverage customers, its stock price rises by an additional 7.9 ($t = 2.48$) bps, and its default probability falls by an additional 0.007 ($t = -2.43$) standard deviation when the value of the local currency falls by one standard deviation. Again, the point estimates are close to the baseline results and economically large. The estimation based on *EFD* points in the same direction, although the coefficient is marginally significant (Panel A) or not precisely estimated (Panel B).

In sum, the results I report in Tables 5 and 6 suggest that foreign debt borrowers with high financial vulnerability (i.e., high leverage, low liquidity, and a low current ratio) and that operate in industries characterized by a high *EFD* are less likely than other borrowers to transmit corporate distress to purely domestic firms. Conversely, domestic firms make use of the vulnerability of distressed firms and benefit from increases in their competitive advantage and bargaining power in negotiation.

These results appear to contradict theories predicting that the default propagation mechanism in liquidity shocks and trade credit chains should be pronounced for financially constrained firms (e.g., Kiyotaki and Moore 1997; Allen and Gale 2000; Battiston et al. 2007; Acemoglu et al. 2015). The key difference, however, is that exchange rate shocks amplify corporate distress but do not necessarily lead to corporate failures in the sample period; this is probably due to the data coverage, as shown in my subsequent analysis. Instead of succumbing to distress contagion, domestic rivals and suppliers with high indirect foreign debt exposure are increasingly likely to exploit financially constrained foreign debt borrowers during depreciation periods. The resultant increase in domestic firms' stock prices and the distance to default attenuates the spillover of transient external shocks in production networks.

### 4.7 Domestic Firm–Specific Determinants: Industry Structure

For domestic firms, the industry structure also affects their strategic advantage over distressed foreign debt borrowers. For example, domestic rivals in competitive industries are less likely to collude with competitors and thus compete more intensely to increase their market share when foreign-borrowing competitors in financial distress cannot invest in production facilities (Chen et al. 2020). Therefore, we expect a more substantial competition effect in less concentrated industries.

Likewise, domestic suppliers in concentrated industries have increased bargaining power in supplier–customer relationships. As a result, they can extract additional rents when downstream customers in financial distress face increased switching costs and search friction. Thus, we expect more significant positive spillovers for domestic suppliers in concentrated industries than for those in other industries.

To test these hypotheses, I employ the Herfindahl–Hirschman index (*HHI*) to measure industry competition, which is defined as the sum of the squared market shares of the firms competing in each Fama–French 48 industry for each country-year combination. I sort domestic firms into two buckets based on the *HHI*, and re-estimate the empirical model in Equation (3) for the two subsamples.

Table 7 displays the estimation results. As expected, the positive spillovers are significantly stronger for domestic suppliers operating in concentrated industries (i.e., high *HHI*) than for those in competitive industries (i.e., low *HHI*).[19] The magnitudes of point estimates from the high *HHI* subsample are two to four times as large as those from the low *HHI* subsample. These results suggest that increased concentration enhances the bargaining power of domestic suppliers and allows them to increase their gains from distressed customers.

Consistent with the prediction that the competition effect is more pronounced in less concentrated industry structures, domestic rivals in competitive industries experience a more considerable drop in default probability than those in concentrated industries when their competitors face a surge in debt repayment following currency depreciation. Nonetheless, the evidence pertaining to stock prices is mixed, as the point estimates seem to be similar for the two subsamples.

### 4.8 Profitability of Domestic Firms

The results show that exchange rate shocks positively affect domestic firms' stock prices and credit risk from their indirect exposure to foreign currency borrowers via inter-firm linkages. The results further suggest that the positive spillover is more substantial when the connected focal firms are financially vulnerable. If domestic rivals and suppliers indeed extract more rents from distressed foreign debt borrowers through their enhanced strategic advantage, this positive spillover should not only move monthly stock prices but also manifest in firm fundamentals. Thus, we expect to see subsequent improvements in operating profitability and profit margins for domestic firms after exchange rate shocks.

To test this hypothesis, I estimate the following specification at the firm-year level:

$$y_{i,s,c,t+1} = \alpha + \beta WFDR_{i,s,c,t-1} + \lambda WFDR_{i,s,c,t-1} \times \Delta EX_{c,t} + \Gamma' X_{i,s,c,t-1} + \phi_i + \eta_{s,t} + \zeta_{c,t} + \varepsilon_{i,s,c,t} \quad (4)$$

[19] I also examined whether input specificity is a key driver of the vertical positive spillover effect (e.g., Barrot and Sauvagnat 2016). I used suppliers' R&D expenses to capture the importance of relationship-specific investments but did not find pronounced differences between high-R&D and low-R&D domestic suppliers.

where $y_{i,s,c,t+1}$ is either the operating profitability ($OP$) or the profit margin ($PMGN$) of domestic firm $i$ in sector $s$ from country $c$ at year $t+1$. $OP$ is defined as sales minus the cost of goods sold, minus sales, general, and administrative expenses (excluding research and development expenditures), scaled by total assets (Ball et al. 2016). $PMGN$ is constructed as the earnings before interest, taxes, depreciation, and amortization, divided by sales (Gofman and Wu 2022). The construction of $WFDR$ and $\Delta EX$ is similar. The lagged firm-specific, time-varying covariates, $X_{i,s,c,t-1}$, include the weighted indirect foreign revenue exposure ($WForRev$), firm size ($Size$), leverage, tangibility ($PPE$), profitability ($OP$), and cash ratio ($Cash$). I include firm, sector-year, and country-year fixed effects in each specification and cluster standard errors at the country level.

The parameter of interest is $\lambda$, which captures the impact of exchange rate shocks on domestic firms' future profitability through inter-firm linkages (i.e., indirect exposure from foreign debt borrowers). We should see a positive and significant $\lambda$ if domestic rivals and suppliers translate their enhanced strategic advantage over focal firms during currency depreciation into a rise in operating performance.

Table 8, Panel A presents the empirical analysis for domestic rivals. Consistent with the positive spillover in the firm-month regressions, an average domestic rival's one-year-ahead operating profitability increases by 0.22% ($t = 3.96$) more following currency depreciation, if it experiences a one-standard-deviation increase in sales-weighted exposure to its competitors' foreign debt. Because the average domestic firm's assets are \$4,316 million, this point estimate implies an additional increase of \$9.5 million in operating profits. The results are similar across different weighting schemes. With respect to the profit margin, the estimated coefficients suggest an incremental increase in profit margin of approximately 0.10%, or a \$1.3 million increase in EBITDA for an average firm, which is statistically significant at the 10% (i.e., sales- and assets-weighted $WFDR$) and 5% (i.e., equal-weighted $WFDR$) levels.

Table 8, Panel B shows similar estimation results for domestic suppliers. If an average domestic supplier experiences a one-standard-deviation increase in sales-weighted indirect exposure to its downstream customers' foreign debt, it will undergo an additional 0.14% ($t = 2.25$) increase in operating profitability and an incremental 0.18% ($t = 2.43$) increase in profit margin, which collectively translates into increases of \$5.9 million in operating profitability and \$2.4 million in EBITDA over the next year. Again, the magnitudes are similar across different weighting schemes. For the sake of completeness, I report the estimates for control variables in the Internet Appendix Tables A12 and A13 for domestic rivals and suppliers in the firm-year regressions, respectively.

To unlock the drivers of the profitability increase, Table 9 uses as left-hand variables the three primary components of corporate profitability: sales, cost of goods sold ($COGS$), and selling, general, and administrative expenses ($SGA$). For domestic rivals, only the point estimates for sales are statistically significant across all weighting schemes. A one-standard-deviation increase in indirect (sales-weighted) exposure to competitors' foreign debt leads to an additional \$9.06 million (0.21% $\times$ \$4,316 million) in firm sales when the local currency experiences a one-standard-deviation

depreciation. Hence, the source of domestic rivals' improved profitability is sales growth with little additional change on the cost side, consistent with the notion that domestic rivals intensify competition when their foreign-borrowing competitors are in financial distress and thus grab a larger market share by increasing production capacity, leading to increased profits.

With respect to domestic suppliers, there are two interesting findings. First, there is no demand shrinkage when downstream customers encounter adverse exchange rate shocks in the sample period. The point estimates on $WFDR \times \Delta EX$ are even positive in the range between 0.06 and 0.16 across different weighting schemes, although the coefficients are not statistically significant. Second, the rise in profitability is due to the drop in operating expenses. In response to a one-standard-deviation depreciation in local currency, if the average domestic supplier experiences a one-standard-deviation increase in indirect (sales-weighted) exposure to downstream customers' foreign debt, its selling, general, and administrative expenses decline, on average, by an additional 1.83% ($t = -3.28$), which translates into a \$24.41 million reduction in operating expenses. These results indicate that domestic suppliers increase their bargaining power in supplier–customer relationships when financially distressed customers face increased switching costs in selecting or replacing suppliers. As a result, domestic suppliers can reduce their efforts to retain clients and enjoy the resultant lower cost of selling goods.

Taken together, the findings in Tables 8 and 9 demonstrate that the positive spillover documented in the firm-month regressions (i.e., a rise in stock prices and a drop in credit risk) is unlikely to result from measurement errors, microstructure noise, or investor bias. Rather, domestic firms experience subsequent improvements in firm fundamentals after exchange rate shocks amplify the distress of connected foreign debt borrowers. The source of profitability is the enhanced strategic advantage for domestic firms when the focal firms are financially fragile. Domestic rivals do not collude with foreign-borrowing competitors, and they expand production to capture market share, resulting in significant sales growth and profit margins (e.g., Chen et al. 2020). In addition, domestic suppliers wield bargaining power and cut their operating expenses to maintain business relationships without losses in demand, as distressed customers face increasing switching costs and search friction to replace suppliers or find new ones (e.g., Antras et al. 2017; Bernard et al. 2019).

To examine whether domestic firms profit further from financially constrained focal firms, I follow the same procedure as in Section 4.6 and sort all focal firms into two buckets based on the four financial vulnerability measures (i.e., leverage, liquidity, current ratio, and *EFD*) and then compute the indirect foreign debt and foreign revenue exposure separately for each bucket using the focal firm sales as weights. I re-estimate the empirical model in Equation (4) using the two values for sales-weighted *WFDR* and *WForRev*: one based on foreign debt borrowers with above-median financial vulnerabilities, and the other based on those with below-median financial vulnerabilities.

Table 10, Panel A illustrates that the improvement in operating profitability for domestic firms mainly derives from their financially vulnerable closest competitors, which are characterized by high leverage, low liquidity, a low current ratio, and a high *EFD*. Except for *EFD*, however, the

results in Panel B for profit margins are not precisely estimated. Furthermore, Table 11, Panel A demonstrates a similar pattern for domestic suppliers. Domestic suppliers have greater operating profitability when their associated foreign-borrowing customers exhibit less financial flexibility when encountering exchange rate shocks.[20] The estimated coefficients for profit margin in Panel B are not statistically different from zero.[21]

In sum, the results in this subsection corroborate the stock return and credit risk results, demonstrating that domestic rivals and suppliers benefit from distressed foreign debt borrowers. These results further buttress my argument regarding the transmission mechanism through which domestic firms exploit the vulnerability of distressed firms and turn their enhanced strategic advantage into future profitability.

## 4.9 Additional Results

In this subsection, I show additional results based on the empirical model in Equation (3). To further explore the source of positive spillover effects from distressed foreign debt borrowers to purely domestic firms, I first perform a series of subsample analyses according to country development, sector tradability, and time period. The results indicate that the documented positive spillovers primarily stem from firms in advanced economies post-tapering, due to resultant sample data available from merging firm-level foreign debt and supply chain data. Next, I show that the baseline results are not confined to the measures of currency depreciation and default risk used in the main analysis but rather hold under alternative exchange rate shocks and corporate distress measures.

### 4.9.1 Country Development

Table 12, Panel A presents the results for the AE and EME subsamples. Only domestic rivals and suppliers in AEs exhibit significant positive spillovers, probably due to the relatively small sample of EME firms in the analysis.[22] I note that reduced EME coverage is not caused by firm-level foreign debt data but rather by a lack of information on competitors and supplier–customer relationships in EMEs. In other words, matching firm-level foreign debt data and supply-chain data tilts the representative domestic firm sample towards AE firms, which are less likely than EME firms to experience a free-falling currency crisis in the sample period.

[20] Untabulated results reveal that the increase in sales for domestic rivals and the reduction in operating expenses for domestic suppliers also mainly arise from focal firms with less financial flexibility.

[21] Tables A14 and A15 in the Internet Appendix add the interaction term between the weighted average foreign revenue ($WForRev$) of focal firms and the exchange rate movement ($\Delta EX$) in Equation (4) and re-estimate the empirical model with two interactions. The point estimates on $WFDR \times \Delta EX$ remain statistically significant and economically large in all specifications. Except for domestic rivals' profit margin, the estimated coefficients on $WForRev \times \Delta EX$ are not significantly different from zero. Thus, the (indirect) trade channel is unlikely to drive the improvement in operating performance for purely domestic firms.

[22] For instance, in regressions in which the left-hand variable is stock returns, the AE subsample contains 222,325 observations for domestic rivals and 149,621 observations for domestic suppliers, compared with 20,421 observations for domestic rivals and 25,164 observations for domestic suppliers in the EME subsample.

#### 4.9.2 Sector Tradability

Table 12, Panel B shows the results for the non-tradable and tradable sector subsamples. There were no pronounced differences between the two subsamples. If anything, domestic rivals in non-tradable sectors achieve a larger competitive advantage—slightly larger rises in stock prices and greater drops in default probability—than those in tradable sectors. These results provide additional confirmatory evidence that the positive spillover effect is not driven mainly by the foreign trade channel.

#### 4.9.3 Subperiods

Table 12, Panel C divides the full sample into different time periods: (i) the Global Financial Crisis period (GFC, January 2007 to June 2009); (ii) the Post-Crisis period (PS-GFC, July 2009 to September 2013); (iii) the Post-Taper period (PS-Taper, October 2013 to February 2020); and (iv) the Covid-19 Pandemic period (Covid, March 2020 to December 2020). There are few observations for non-U.S. firms in the GFC period because the FactSet data coverage of firm-level foreign debt data outside the U.S. began during the GFC period. Moreover, the Covid Pandemic period only covers data from a few months because the sample period in this study ends in 2020.

The subperiod analysis demonstrates that the positive spillover is significantly strong for both domestic rivals and suppliers in the Post-Taper period, regardless of the left-hand variables. Most countries, especially EMEs, observed sharp currency depreciation in the Post-Taper period, and this mainly occurred in response to a surprise monetary policy announcement by the U.S. in May 2013. These results are consistent with the notion that domestic firms benefit from the vulnerability of foreign debt borrowers that encounter exchange rate shocks.

Domestic rivals also benefited from vulnerable foreign debt borrowers during the GFC and its aftermath. However, the point estimates in the Covid period are not significantly different from zero. The difference between the two crisis periods is that the Federal Reserve's unprecedented monetary policy of providing credit to the private sector enhanced the dollar credit and alleviated the financial distress of foreign debt borrowers (e.g., Nozawa and Qiu 2021).

Nonetheless, supply chain disruptions during the Covid period should have strengthened the bargaining power of domestic suppliers and thus enlarged the positive spillover effect. Consistent with this hypothesis, I find larger magnitudes for the point estimates and attribute the weak statistical significance to the small sample size.

#### 4.9.4 Alternative Exchange Rate Shocks

To account for the nonlinear effect of exchange rate shocks, Table 13 replaces the continuous variable $\Delta EX$ with quintile dummies of $\Delta EX$ (i.e., Q2, Q3, Q4, and Q5, with Q1 omitted) . By construction, $\Delta EX$ (Q5) represents severe currency depreciation in the sample period. For brevity's

sake, I only display the coefficients and $t$-statistics for the interaction between $WFDR$ and the Q5 dummy, which represents the difference in stock returns or default probability from being in Q5 (i.e., deep depreciation, bad times) compared to Q1 (i.e., appreciation, good times).

Consistent with the leading results in Table 4, domestic rivals and suppliers exhibit a substantial positive spillover effect when the local currency is depreciated. For instance, for the average domestic rival (supplier), a one-standard-deviation increase in the sales-weighted average of focal firms' foreign debt increases its stock returns by an additional 34.6 (29.9) bps or decreases its default probability by an additional 0.029 (0.021) standard deviation in times of deep depreciation compared to that in times of appreciation. The magnitudes are approximately three times as large as those in Table 4. Interestingly, the signs of the coefficients on domestic customers also demonstrate a positive spillover effect, but the estimation is not statistically significant at conventional levels.

Thus, these main results are robust to alternative exchange rate shocks.[23] I find no contagion effects from foreign currency borrowers to purely domestic firms, even in the most severe currency depreciation episodes within the sample period. Rather, domestic rivals and suppliers benefit more from distressed firms when exchange rate shocks are larger.

#### 4.9.5 Alternative Distress Measure

To investigate whether the baseline results hold under alternative corporate distress measures, Table 14 replaces the left-hand variable with the change in actuarial spread ($\Delta AS$), in which $AS$ is the annualized premium that is needed to compensate the counterparty for the default risk of the reference company on an actuarial basis. I use $AS$ as a proxy for credit spreads or credit default swap (CDS) spreads.

Panel A implies that if an average domestic rival (supplier) experiences a one-standard-deviation increase in its sales-weighted exposure to competitors' (customers') foreign debt, its actuarial spread drops by an additional 17.7 (11.5) bps in response to a one-standard-deviation depreciation in local currency, which is approximately 42% to 64% of the average actuarial spread in the sample. Thus, the point estimates are both statistically significant and economically large. The results are similar across different weighting schemes. Panel B corroborates that indirect exposure to foreign sales does not drive the decrease in credit spreads. Therefore, the main results are robust under alternative measures of distress risk.

[23] Currency depreciation is often accompanied by domestic economic conditions, such as economic recessions, inflation, and tighter financial conditions. My earlier results could thus be driven by the possibility that highly leveraged foreign debt borrowers suffer more during recessions or are affected by sudden increases in the interest rate. I control for these scenarios by interacting $WFDR$ with lagged GDP growth and inflation. I continue to find that the interaction between $WFDR$ and exchange rate movements remains positive and statistically significant.

# 5 Conclusion

I examine whether and how exchange rate shocks spread in the corporate sector, using novel multicountry firm-level data on foreign debt and production networks from 2006 to 2020. I first document that local currency depreciation amplifies corporate financial fragility of foreign debt borrowers. High-frequency identification from U.S. monetary policy shocks corroborates the evidence that firms with high foreign debt ratios suffer more than other firms from exchange rate shocks, and that the dollar bond component transmits such shocks.

However, there is no credit risk contagion from foreign debt borrowers to purely domestic firms without foreign exposure via inter-firm linkages. Instead, domestic rivals and suppliers appear to exploit the financial vulnerability of distressed foreign debt borrowers in depreciation periods and benefit from an enhanced competitive advantage and bargaining power, as reflected in lower credit risk, higher stock prices, and higher future profit margins. Furthermore, domestic rivals increase their gains from the revenue side as they compete more intensely to capture a larger market share. Domestic suppliers increase their gains by reducing operating expenses without demand shrinkage due to stronger bargaining power. Such positive spillover effects are pronounced when domestic firms' connected foreign debt borrowers are financially vulnerable or when the industry structure facilitates their strategic advantages.

A growing macroeconomics literature argues that microeconomic shocks can be transmitted through production networks and contribute to aggregate fluctuations (e.g., Gabaix 2011; Acemoglu et al. 2012, 2016). This paper illustrates that there is a "silver lining" to a dark could of adverse exchange rate shocks transmitting domestically. Accordingly, policies that promote competition and enhance firms' financial flexibility may help attenuate the spillover of external shocks. More importantly, theoretical models of network structure and credit risk contagion should account for counterforces from strategic behaviors among competitors or along the supply chain when a focal firm is distressed but distant from the default boundary. I leave explorations of the theoretical threshold between a negative shock's positive and negative spillovers to future research.

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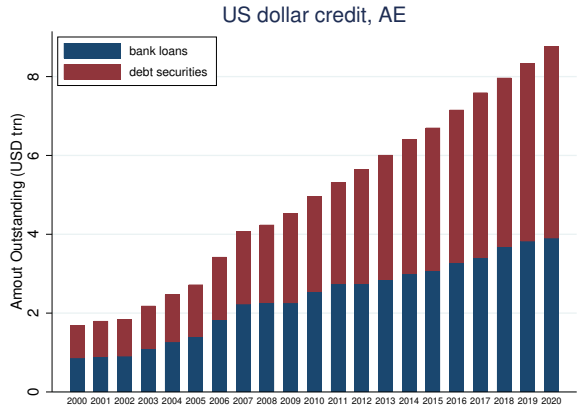
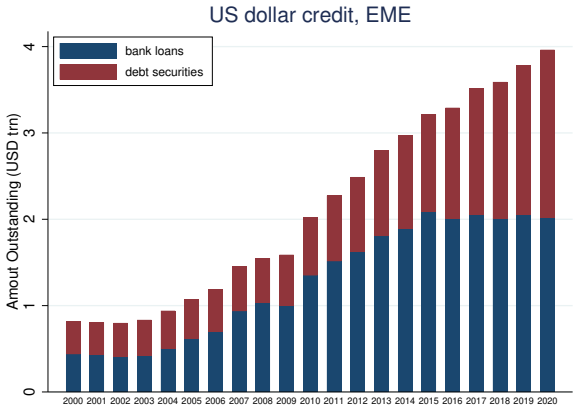
## Figure 1: Total Credit to Non-bank Borrowers by U.S. Dollars and Euros

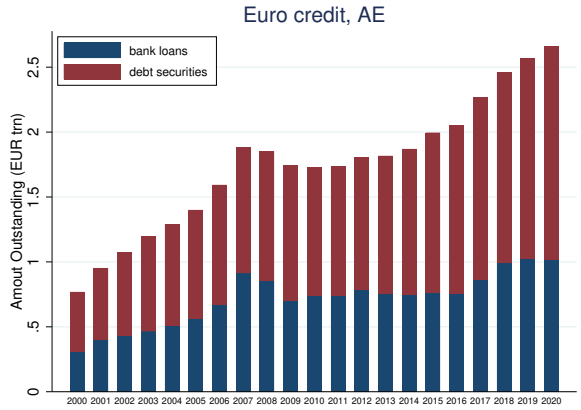
This figure plots the total annual credit to non-bank borrowers in U.S. dollars and euros from 2000 to 2020. The total credit is defined as the sum of bank loans to non-banks and debt securities issuance by non-banks. Panel A and Panel B report the bank loans and debt securities issues denominated in U.S. dollars by non-bank borrowers outside the U.S. Panel C and Panel D report the bank loans and debt securities issues denominated in euros by non-bank borrowers outside the euro zone. "AE" denotes advanced economies. "EME" represents emerging market economies. Data are obtained from the Bank for International Settlements (BIS) global liquidity indicators.



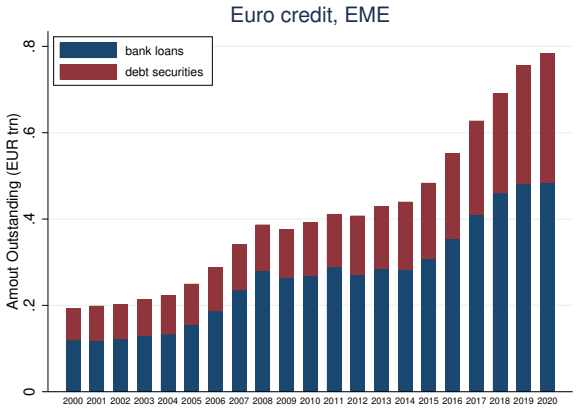

Panel A




Panel B



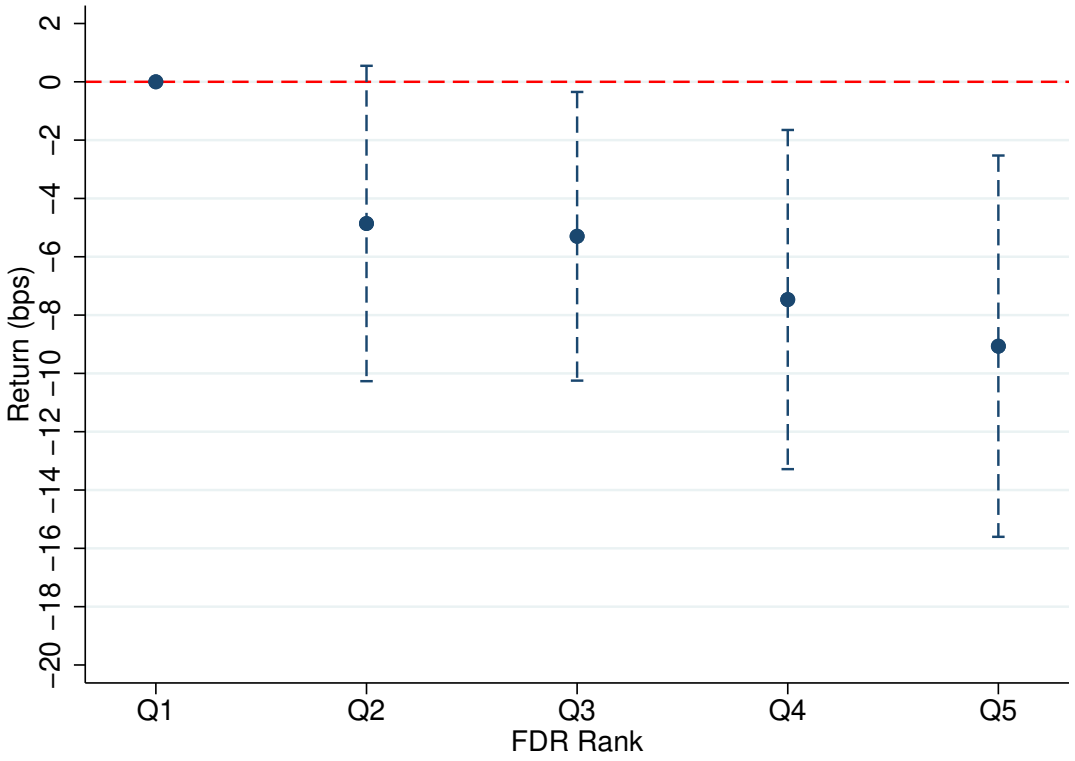

Panel C




Panel D

**Figure 2: Heterogeneous Effects of FRB Shocks on Stock Returns across FDR Ranks**

This figure plots the coefficients of $\lambda$ on *FDR* quintile dummies from estimating Equation 2. The dependent variable is the one-day stock return for non-US firms around U.S. monetary policy announcements. Firms with a low foreign debt ratio (bottom quintile Q1 in the cross-sectional rank) are omitted categories in the regression. The red horizontal dashed line represents zero stock returns. The dark blue dashed lines around the estimated coefficients represent the 95% confidence intervals.



## Table 1: Descriptive Statistics for Firm-Specific Variables

This table reports the descriptive statistics for a set of firm-specific variables used in the paper. Panel A presents data on foreign debt borrowers (i.e., focal firms) at the firm-month level. I require at least four months for the (quarterly) debt structure and fundamental information to be available to investors. To mitigate look-ahead bias, I include a firm in the sample only after its first foreign debt issuance. Panel B presents data on purely domestic firms at the firm-month level. To identify domestic firms, I require a firm with no foreign debt, no foreign assets, no foreign sales, and no geographic revenue exposure outside the home country. I replace the missing values with zero. Panel C presents data on domestic firms at the firm-year level. *Ret* is the monthly stock return in local currency. $\Delta EX$ is the log change in the nominal exchange rate, for which $\Delta EX>0$ represents depreciation of local currency against the U.S. dollar. *Assets* is the total assets in millions of U.S. dollars. *Sales* is the firm sales in millions of U.S. dollars. *FDR* is the foreign debt ratio, calculated as the total debt in foreign currency scaled by the total assets. I classify a debt as foreign currency if the currency denomination of the debt instrument differs from the local currency of the ultimate parent firm's home country. Based on the nature and currency of the FC debt, I further decompose *FDR* into various types. *ST FDR* is the short-term foreign currency debt ratio. *LT FDR* is the long-term foreign currency debt ratio. *RC FDR* is the foreign currency debt ratio for revolving credit. *Loan FDR* is the foreign currency debt ratio for term loans. *Bond FDR* is the foreign currency debt ratio for notes and bonds. *USD FDR* is the foreign currency debt ratio for debt denominated in U.S. dollars. *EUR FDR* is the foreign currency debt ratio for debt denominated in euros. *DDR* is the domestic debt ratio, calculated as the domestic debt scaled by the total assets. *ForRev* is the ratio of foreign revenue to total sales. *Beta* is the firm-level market beta, estimated using a 36-month rolling window. *BE/ME* is the book-to-market ratio. *ROA* is the return on assets. *CAPX* is the capital expenditure divided by total assets. *PD* is the probability of default. *AS* is the annualized premium that is needed to compensate the counterparty for the default risk, on an actuarial basis, of the reference company. *OP* is the operating profitability, defined as sales minus the cost of goods sold, minus sales, general, and administrative expenses (excluding research and development expenditures), scaled by total assets, following Ball, Gerakos, Linnainmaa, and Nikolaev (2016). *PMGN* is the profit margin, constructed as the earnings before interest, taxes, depreciation, and amortization, divided by sales. *Leverage* is the ratio of total debt divided by total assets. *PPE* is tangibility, defined as property, plant, and equipment, scaled by total assets. *Cash* is the ratio of cash and short-term investments to total assets. Both *PD* and *AS* are obtained from the Credit Research Initiative (CRI) of the National University of Singapore. Other data sources include the FactSet Debt Capital Structure database, FactSet Fundamental database, FactSet Supply Chain database, FactSet GeoRev database, Compustat Global, and Compustat North America. The sample covers 64 economies from 2006 to 2020.

| Variables | N | Mean | SD | P5 | P25 | P50 | P75 | P95 |
|---|---|---|---|---|---|---|---|---|
| Panel A: Focal Firms at the Firm-Month Level | | | | | | | | |
| *Ret* (%) | 1,085,681 | 0.91 | 13.53 | -18.35 | -5.36 | 0.00 | 5.87 | 22.35 |
| $\Delta EX$ (%) | 1,085,681 | 0.15 | 2.58 | -3.51 | -1.01 | 0.01 | 1.19 | 4.12 |
| *Assets* ($, mil) | 1,085,681 | 11,542 | 42,548 | 36 | 216 | 873 | 4,182 | 47,189 |
| *Sales* ($, mil) | 1,070,937 | 1,141 | 3,141 | 2 | 32 | 137 | 643 | 5,809 |
| *FDR* (%) | 1,085,681 | 11.53 | 15.50 | 0.00 | 0.09 | 4.49 | 17.55 | 45.24 |
| *DDR* (%) | 1,085,681 | 16.91 | 17.63 | 0.00 | 0.15 | 12.07 | 27.92 | 51.74 |
| *ST FDR* (%) | 1,085,681 | 2.86 | 6.85 | 0.00 | 0.00 | 0.00 | 1.86 | 17.21 |
| *LT FDR* (%) | 1,085,681 | 8.59 | 13.15 | 0.00 | 0.00 | 2.11 | 12.34 | 37.91 |
| *RC FDR* (%) | 1,085,681 | 0.69 | 2.99 | 0.00 | 0.00 | 0.00 | 0.00 | 4.34 |
| *Loan FDR* (%) | 1,085,681 | 5.60 | 11.06 | 0.00 | 0.00 | 0.00 | 5.64 | 31.16 |
| *Bond FDR* (%) | 1,085,681 | 3.18 | 7.77 | 0.00 | 0.00 | 0.00 | 1.09 | 20.54 |
| *USD FDR* (%) | 1,085,681 | 6.83 | 12.65 | 0.00 | 0.00 | 0.07 | 7.95 | 36.17 |
| *EUR FDR* (%) | 1,085,681 | 1.43 | 5.28 | 0.00 | 0.00 | 0.00 | 0.00 | 10.02 |
| *ForRev* (%) | 1,069,762 | 33.95 | 36.23 | 0.00 | 0.00 | 20.25 | 65.66 | 100.00 |
| *Beta* | 997,036 | 0.98 | 0.73 | -0.08 | 0.53 | 0.93 | 1.37 | 2.23 |
| *BE/ME* | 1,067,424 | 1.02 | 1.08 | 0.10 | 0.38 | 0.72 | 1.27 | 3.02 |
| *ROA* (%) | 1,077,888 | 1.28 | 11.44 | -17.06 | -0.01 | 2.58 | 6.08 | 14.12 |
| *CAPX* (%) | 1,067,500 | 5.85 | 7.64 | 0.05 | 1.13 | 3.47 | 7.38 | 20.24 |
| *PD* | 926,471 | 0.01 | 0.01 | 0.00 | 0.00 | 0.00 | 0.00 | 0.02 |
| *AS* (bps) | 926,471 | 34.80 | 78.77 | 0.13 | 2.82 | 10.58 | 31.75 | 140.08 |
| Panel B: Domestic Firms at the Firm-Month Level | | | | | | | | |
| *Ret* (%) | 463,140 | 0.82 | 12.81 | -17.93 | -5.10 | 0.02 | 5.71 | 20.98 |
| $\Delta EX$ (%) | 463,140 | 0.00 | 2.15 | -3.29 | -1.08 | 0.02 | 1.08 | 3.08 |
| *Assets* ($, mil) | 463,140 | 4,938 | 21,338 | 24 | 171 | 645 | 2,354 | 19,160 |
| *Sales* ($, mil) | 463,140 | 1,470 | 5,243 | 7 | 70 | 258 | 918 | 5,836 |
| *Beta* | 441,815 | 0.93 | 0.73 | -0.05 | 0.46 | 0.84 | 1.29 | 2.26 |
| *BE/ME* | 442,468 | 0.85 | 0.75 | 0.12 | 0.37 | 0.67 | 1.08 | 2.28 |
| *ROA* (%) | 445,711 | 0.97 | 14.38 | -21.30 | 0.47 | 2.39 | 5.86 | 15.01 |
| *CAPX* (%) | 463,140 | 4.56 | 7.07 | 0.00 | 0.25 | 1.91 | 5.86 | 18.34 |
| *PD* | 401,089 | 0.00 | 0.01 | 0.00 | 0.00 | 0.00 | 0.00 | 0.02 |
| *AS* (bps) | 401,089 | 27.54 | 76.41 | 0.02 | 0.76 | 4.18 | 19.20 | 122.65 |
| Panel C: Domestic Firms at the Firm-Year Level | | | | | | | | |
| $\Delta EX$ (%) | 39,642 | -0.16 | 7.00 | -10.27 | -4.32 | -0.84 | 3.64 | 9.07 |
| *Assets* ($, mil) | 39,642 | 4,316 | 13,143 | 16 | 165 | 679 | 2,482 | 18,826 |
| *Sales* ($, mil) | 39,642 | 1,334 | 3,626 | 4 | 60 | 237 | 901 | 6,039 |
| *Leverage* (%) | 39,642 | 24.10 | 24.28 | 0.00 | 3.96 | 17.43 | 37.81 | 69.31 |
| *PPE* (%) | 39,642 | 23.84 | 27.38 | 0.00 | 1.57 | 10.77 | 40.90 | 81.40 |
| *OP* (%) | 39,642 | 5.27 | 17.95 | -17.34 | 2.59 | 5.40 | 9.78 | 26.54 |
| *PMGN* (%) | 39,642 | 16.15 | 20.98 | 0.00 | 0.00 | 7.73 | 23.07 | 64.10 |
| *Cash* (%) | 39,642 | 15.18 | 21.72 | 0.00 | 0.65 | 5.79 | 20.00 | 68.93 |

## Table 2: FX Risk and Corporate Distress: Foreign Debt Borrowers

This table shows the results of panel regressions in which the dependent variable is the local currency stock returns (*Ret*) in Columns (1) to (4), or changes in default probability ($\Delta PD$) in Columns (5) to (8). *FDR* (*DDR*) is the most recent foreign (domestic) debt ratio, assuming at least four months for the debt structure information to be available. $\Delta EX$ is the log change in the nominal exchange rate, and $\mathbb{1}[\Delta EX>0]$ is a dummy variable that takes the value of one if the local exchange rate is depreciated against the U.S. dollar and zero otherwise. *PD* is obtained from the Credit Research Initiative (CRI) of the National University of Singapore and standardized to facilitate interpretation. *ForRev* is the ratio of foreign revenue to total sales. *Beta* is the firm-level market beta, estimated from a 36-month rolling window. *Size* is the log of book assets. *BE/ME* is the book-to-market ratio. *ROA* is the return on assets. *CAPX* is the capital expenditure divided by total assets. All continuous RHVs are lagged one period, winsorized at 1% and 99%, and standardized to have zero means and unit standard deviations. The sample includes 64 economies and covers the 2006 to 2020 period. "AE" denotes the 27 advanced economies. "EME" denotes the 37 emerging market economies. I drop observations at the country-month level for countries whose currencies are pegged, using the data from Ilzetzki, Reinhart, and Rogoff (2019). Firm-, sector-month, and country-month fixed effects are included in each specification. Standard errors are double clustered at the country and month levels, and *t*-statistics are reported in parentheses. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

| | LHV = Ret | | | | LHV = ΔPD | | | |
|---|---|---|---|---|---|---|---|---|
| | (1) All | (2) All | (3) AE | (4) EME | (5) All | (6) All | (7) AE | (8) EME |
| *FDR* × $\Delta EX$ | -0.080** | | | | 0.016*** | | | |
| | (-2.07) | | | | (3.70) | | | |
| *FDR* × $\mathbb{1}[\Delta EX>0]$ | | -0.195** | -0.273*** | -0.077 | | 0.033*** | 0.037*** | 0.026* |
| | | (-2.65) | (-2.90) | (-0.76) | | (3.65) | (3.16) | (1.95) |
| *FDR* | 0.378*** | 0.477*** | 0.497*** | 0.411*** | -0.015** | -0.032*** | -0.036*** | -0.021** |
| | (8.71) | (7.65) | (6.40) | (5.32) | (-2.60) | (-4.01) | (-3.63) | (-2.18) |
| *DDR* | 0.347*** | 0.347*** | 0.456*** | 0.181** | -0.004 | -0.004 | -0.012** | 0.009 |
| | (4.68) | (4.68) | (5.72) | (2.05) | (-0.55) | (-0.58) | (-2.21) | (0.95) |
| *ForRev* | -0.001 | -0.001 | -0.082 | 0.192*** | -0.001 | -0.001 | -0.000 | -0.010 |
| | (-0.02) | (-0.02) | (-1.01) | (2.84) | (-0.34) | (-0.33) | (-0.07) | (-1.25) |
| *Beta* | 0.157* | 0.157* | 0.148 | 0.210** | -0.014*** | -0.014*** | -0.013** | -0.016*** |
| | (1.93) | (1.93) | (1.65) | (2.48) | (-2.92) | (-2.91) | (-2.40) | (-4.06) |
| *Size* | -4.109*** | -4.108*** | -4.164*** | -4.059*** | 0.086*** | 0.086*** | 0.067** | 0.123*** |
| | (-18.70) | (-18.69) | (-16.86) | (-12.13) | (2.89) | (2.89) | (2.29) | (3.12) |
| *BE/ME* | 1.048*** | 1.048*** | 1.124*** | 0.990*** | -0.020* | -0.020* | -0.026* | -0.015 |
| | (8.91) | (8.92) | (8.30) | (6.09) | (-1.88) | (-1.88) | (-1.85) | (-1.58) |
| *ROA* | -0.199** | -0.199** | -0.139 | -0.350*** | 0.035*** | 0.036*** | 0.023*** | 0.064*** |
| | (-2.66) | (-2.66) | (-1.52) | (-4.65) | (3.90) | (3.90) | (3.47) | (2.77) |
| *CAPX* | -0.145*** | -0.145*** | -0.177*** | -0.090 | -0.007* | -0.007* | -0.013*** | -0.002 |
| | (-4.52) | (-4.52) | (-4.49) | (-1.69) | (-1.70) | (-1.69) | (-2.82) | (-0.29) |
| *Firm FE* | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| *Ctry-Month FE* | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| *Ind-Month FE* | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| *Observations* | 692,279 | 692,279 | 442,425 | 249,286 | 573,035 | 573,035 | 358,464 | 213,972 |
| *Adj.* $R^2$ | 0.204 | 0.204 | 0.192 | 0.232 | 0.093 | 0.093 | 0.079 | 0.112 |

## Table 3: Foreign Debt and Corporate Vulnerability: FRB Shocks

This table presents the regression results from estimating Equation 2. The dependent variable is the one-day stock return for non-U.S. firms on U.S. monetary policy announcement dates. Columns (1)–(4) drop observations at the country-month level for countries whose currencies are pegged, using data from Ilzetzki, Reinhart, and Rogoff (2019). Columns (5)–(8) include firms only from countries whose currencies are pegged. $\Delta i_{\$,t}$ is the FRB monetary policy shock measured from Acosta and Saia (2020) on FOMC dates. Refer to Table 1 for definitions of *FDR* and its components. *Controls* include the pre-determined foreign debt ratio, domestic debt ratio, foreign sales, beta, size, BE/ME, profitability, investment, momentum, and volatility. Country-, sector-, and date fixed effects are included in each specification. Standard errors are clustered by date, and $t$-statistics are reported in parentheses. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

| | Flexible Currencies | | | | Currency Pegs | | | |
|---|---|---|---|---|---|---|---|---|
| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) |
| $FDR \times \Delta i_{\$,t}$ | -0.037** | | | | -0.010 | | | |
| | (-2.28) | | | | (-0.38) | | | |
| $ST \times \Delta i_{\$,t}$ | | -0.001 | | | | -0.014 | | |
| | | (-0.10) | | | | (-1.08) | | |
| $LT \times \Delta i_{\$,t}$ | | -0.038** | | | | -0.002 | | |
| | | (-2.01) | | | | (-0.10) | | |
| $RC \times \Delta i_{\$,t}$ | | | -0.008 | | | | 0.003 | |
| | | | (-0.72) | | | | (0.24) | |
| $Loan \times \Delta i_{\$,t}$ | | | -0.015 | | | | -0.005 | |
| | | | (-1.38) | | | | (-0.34) | |
| $Bond \times \Delta i_{\$,t}$ | | | -0.042** | | | | -0.005 | |
| | | | (-2.33) | | | | (-0.23) | |
| $USD \times \Delta i_{\$,t}$ | | | | -0.045** | | | | -0.033 |
| | | | | (-2.40) | | | | (-1.32) |
| $EUR \times \Delta i_{\$,t}$ | | | | 0.003 | | | | 0.002 |
| | | | | (0.35) | | | | (0.11) |
| $OTH \times \Delta i_{\$,t}$ | | | | -0.001 | | | | 0.015 |
| | | | | (-0.12) | | | | (0.97) |
| *Controls* | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| *Country FE* | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| *Industry FE* | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| *Date FE* | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| *Observations* | 243,507 | 243,507 | 243,507 | 243,507 | 133,734 | 133,734 | 133,734 | 133,734 |
| *Adj.* $R^2$ | 0.029 | 0.029 | 0.029 | 0.029 | 0.052 | 0.052 | 0.052 | 0.052 |

## Table 4: FX Risk and Corporate Distress: Inter-Firm Linkages

This table shows panel regressions in which the dependent variable is the local currency stock returns (*Ret*) or changes in default probability ($\Delta PD$). I restrict the analysis to purely domestic firms with no foreign debt and no foreign revenue exposure. For each domestic firm $i$, its indirect foreign debt (foreign revenue) exposure through inter-firm linkages, *WFDR* (*WForRev*), is constructed as a weighted average of the foreign debt (foreign revenue) from its competitors, customers, and suppliers, respectively. I use either focal firm sales and assets as weights or equal-weighting. Panel A presents domestic rivals (*WFDR* is based on their competitors with foreign exposure). Panel B presents domestic suppliers (*WFDR* is based on their customers with foreign exposure). Panel C presents domestic customers (*WFDR* is based on their suppliers with foreign exposure). Panel D excludes any supplier–customer links for domestic rivals. Panel E excludes any competitor pairs for domestic suppliers. $\Delta EX$ is the log change in the nominal exchange rate, for which $\Delta EX>0$ represents a local currency depreciation against the U.S. dollar. *Controls* include the weighted foreign revenue (*WForRev*), beta, size, BE/ME, profitability, and investment. All continuous RHVs are lagged one period, winsorized at 1% and 99%, and standardized to have zero means and unit standard deviations. The sample includes 64 economies and covers the 2006 to 2020 period. I drop observations at the country-month level for countries whose currencies are pegged, using data from Ilzetzki, Reinhart, and Rogoff (2019). Firm-, sector-month, and country-month fixed effects are included in each specification. Standard errors are double clustered at the country and month levels, and $t$-statistics are reported in parentheses. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

| | LHV = Ret | | | LHV = ΔPD | | |
|---|---|---|---|---|---|---|
| | | Weighted by | | | Weighted by | |
| | Sale | Asset | Equal | Sale | Asset | Equal |
| Panel A: Domestic Rivals | | | | | | |
| *WFDR* × Δ*EX* | 0.107*** | 0.102*** | 0.102*** | -0.009*** | -0.009*** | -0.011*** |
| | (3.75) | (3.29) | (3.02) | (-2.94) | (-3.22) | (-3.28) |
| *WFDR* | -0.123* | -0.109 | -0.069 | 0.001 | 0.000 | -0.001 |
| | (-1.82) | (-1.65) | (-0.69) | (0.10) | (0.06) | (-0.18) |
| Panel B: Domestic Suppliers | | | | | | |
| *WFDR* × Δ*EX* | 0.092*** | 0.099*** | 0.106*** | -0.007*** | -0.007*** | -0.008** |
| | (2.77) | (2.94) | (2.94) | (-2.73) | (-2.67) | (-2.17) |
| *WFDR* | 0.064 | 0.053 | 0.050 | 0.000 | 0.001 | 0.002 |
| | (0.63) | (0.55) | (0.48) | (0.19) | (0.77) | (1.01) |
| Panel C: Domestic Customers | | | | | | |
| *WFDR* × Δ*EX* | -0.002 | -0.002 | -0.014 | -0.003 | -0.002 | -0.001 |
| | (-0.05) | (-0.08) | (-0.50) | (-0.95) | (-0.78) | (-0.55) |
| *WFDR* | -0.012 | -0.007 | 0.022 | -0.002 | -0.004 | -0.002 |
| | (-0.12) | (-0.07) | (0.18) | (-0.19) | (-0.48) | (-0.30) |
| Panel D: Domestic Rivals, Excluding Any Supplier–Customer Links | | | | | | |
| *WFDR* × Δ*EX* | 0.109*** | 0.104*** | 0.105*** | -0.010*** | -0.011*** | -0.012*** |
| | (3.74) | (3.23) | (3.11) | (-3.24) | (-3.60) | (-3.40) |
| *WFDR* | -0.103 | -0.091 | -0.058 | -0.001 | -0.000 | -0.001 |
| | (-1.51) | (-1.35) | (-0.65) | (-0.08) | (-0.05) | (-0.20) |
| Panel E: Domestic Suppliers, Excluding Any Competitor Pairs | | | | | | |
| *WFDR* × Δ*EX* | 0.080** | 0.087*** | 0.098*** | -0.008** | -0.008** | -0.008** |
| | (2.51) | (2.77) | (2.81) | (-2.22) | (-2.14) | (-1.97) |
| *WFDR* | 0.097 | 0.088 | 0.074 | 0.002 | 0.001 | 0.004 |
| | (0.95) | (0.90) | (0.69) | (0.61) | (0.41) | (0.90) |

## Table 5: Financial Vulnerability of Focal Firms and Horizontal Positive Spillovers

This table shows panel regressions in which the dependent variable is the local currency stock returns (*Ret*) in Panel A or changes in default probability ($\Delta PD$) in Panel B. I restrict the analysis to purely domestic firms with no foreign debt and no foreign revenue exposure. For each domestic firm $i$, its indirect foreign debt (foreign revenue) exposure through inter-firm linkages, *WFDR* (*WForRev*), is constructed as a weighted average of the foreign debt (foreign revenue) from its focal firms (i.e., competitors with foreign exposure). I sort all focal firms into two buckets based on four financial vulnerability measures (*Leverage*, *Liquidity*, *Current*, and *EFD*) respectively, from low to high within each country each year, and compute *WFDR* (*WForRev*) for each bucket using the focal firm sales as weights. *Leverage* is the total debt to total assets. *Liquidity* is the current assets to total liabilities. *Current* is the current ratio, defined as the current assets to current liabilities. *EFD* is external financing dependence, calculated according to Rajan and Zingales (1998) for U.S. public firms and assigned to the firms in the sample. $\Delta EX$ is the log change in the nominal exchange rate, for which $\Delta EX>0$ represents a local currency depreciation against the U.S. dollar. *Controls* include the weighted foreign revenue (*WForRev*), beta, size, BE/ME, profitability, and investment. All continuous RHVs are lagged one period, winsorized at 1% and 99%, and standardized to have zero means and unit standard deviations. The sample includes 64 economies and covers the 2006 to 2020 period. I drop observations at the country-month level for countries whose currencies are pegged, using data from Ilzetzki, Reinhart, and Rogoff (2019). Firm-, sector-month, and country-month fixed effects are included in each specification. Standard errors are double clustered at the country and month levels, and $t$-statistics are reported in parentheses. ***, **, and * indicate statistical significance at 1%, 5%, and 10% levels, respectively.

| | Leverage | | Liquidity | | Current | | EFD | |
|---|---|---|---|---|---|---|---|---|
| | High | Low | High | Low | High | Low | High | Low |
| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) |
| Panel A: LHV = Ret | | | | | | | | |
| *WFDR* × $\Delta EX$ | 0.110*** | -0.042 | -0.024 | 0.093*** | 0.027 | 0.084*** | 0.068* | 0.028 |
| | (3.35) | (-1.29) | (-1.04) | (2.81) | (1.43) | (4.50) | (1.85) | (0.79) |
| *WFDR* | -0.134*** | 0.094 | -0.030 | -0.034 | -0.000 | -0.015 | -0.018 | -0.079 |
| | (-3.01) | (1.47) | (-0.56) | (-0.82) | (-0.01) | (-0.72) | (-0.43) | (-1.33) |
| *Controls* | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| *Firm FE* | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| *Ctry-Month FE* | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| *Ind-Month FE* | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| *Observations* | 244,081 | 244,081 | 244,081 | 244,081 | 244,081 | 244,081 | 244,081 | 244,081 |
| *Adj.* $R^2$ | 0.246 | 0.245 | 0.245 | 0.246 | 0.245 | 0.246 | 0.246 | 0.245 |
| Panel B: LHV = ΔPD | | | | | | | | |
| *WFDR* × $\Delta EX$ | -0.008*** | 0.002 | 0.001 | -0.008*** | -0.005 | -0.004** | -0.008** | -0.003 |
| | (-3.61) | (0.63) | (0.16) | (-4.01) | (-1.56) | (-2.12) | (-2.42) | (-0.77) |
| *WFDR* | -0.001 | -0.006 | 0.004 | -0.009* | -0.002 | -0.007* | -0.003 | -0.001 |
| | (-0.31) | (-1.05) | (1.14) | (-1.78) | (-0.90) | (-1.83) | (-0.58) | (-0.16) |
| *Controls* | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| *Firm FE* | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| *Ctry-Month FE* | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| *Ind-Month FE* | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| *Observations* | 214,013 | 214,013 | 214,013 | 214,013 | 214,013 | 214,013 | 214,013 | 214,013 |
| *Adj.* $R^2$ | 0.069 | 0.069 | 0.069 | 0.069 | 0.069 | 0.069 | 0.069 | 0.069 |

## Table 6: Financial Vulnerability of Focal Firms and Vertical Positive Spillovers

This table shows panel regressions in which the dependent variable is the local currency stock returns (*Ret*) in Panel A or changes in default probability ($\Delta PD$) in Panel B. I restrict the analysis to purely domestic firms with no foreign debt and no foreign revenue exposure. For each domestic supplier $i$, its indirect foreign debt (foreign revenue) exposure along supply chain, *WFDR* (*WForRev*), is constructed as a weighted average of the foreign debt (foreign revenue) from its focal firms (i.e., customers with foreign exposure). I sort all focal firms (i.e., customers) into two buckets based on four financial vulnerability measures (*Leverage*, *Liquidity*, *Current*, and *EFD*) respectively, from low to high within each country each year, and compute *WFDR* (*WForRev*) for each bucket using the customer sales as weights. *Leverage* is the total debt to total assets. *Liquidity* is the current assets to total liabilities. *Current* is the current ratio, defined as the current assets to current liabilities. *EFD* is external financing dependence, calculated according to Rajan and Zingales (1998) for U.S. public firms and assigned to the firms in the sample. $\Delta EX$ is the log change in the nominal exchange rate, for which $\Delta EX>0$ represents a local currency depreciation against the U.S. dollar. *Controls* include the weighted foreign revenue (*WForRev*), beta, size, BE/ME, profitability, and investment. All continuous RHVs are lagged one period, winsorized at 1% and 99%, and standardized to have zero means and unit standard deviations. The sample includes 64 economies and covers the 2006 to 2020 period. I drop observations at the country-month level for countries whose currencies are pegged, using data from Ilzetzki, Reinhart, and Rogoff (2019). Firm-, sector-month, and country-month fixed effects are included in each specification. Standard errors are double clustered at the country and month levels, and $t$-statistics are reported in parentheses. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

| | Leverage | | Liquidity | | Current | | EFD | |
|---|---|---|---|---|---|---|---|---|
| | High | Low | High | Low | High | Low | High | Low |
| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) |
| Panel A: LHV = Ret | | | | | | | | |
| *WFDR* × $\Delta EX$ | 0.079** | -0.037 | 0.002 | 0.060* | -0.025 | 0.093** | 0.053* | -0.018 |
| | (2.48) | (-1.55) | (0.13) | (1.94) | (-1.01) | (2.29) | (1.67) | (-0.82) |
| *WFDR* | 0.033 | 0.015 | 0.027 | 0.057 | 0.001 | 0.075 | 0.031 | -0.001 |
| | (0.53) | (0.21) | (0.35) | (0.91) | (0.01) | (1.04) | (0.38) | (-0.02) |
| *Controls* | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| *Firm FE* | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| *Ctry-Month FE* | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| *Ind-Month FE* | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| *Observations* | 175,907 | 175,907 | 175,907 | 175,907 | 175,907 | 175,907 | 175,907 | 175,907 |
| *Adj.* $R^2$ | 0.226 | 0.226 | 0.226 | 0.226 | 0.226 | 0.226 | 0.226 | 0.226 |
| Panel B: LHV = ΔPD | | | | | | | | |
| *WFDR* × $\Delta EX$ | -0.007** | 0.003 | -0.002 | -0.005* | -0.000 | -0.006** | -0.004 | -0.003 |
| | (-2.43) | (1.07) | (-0.93) | (-1.82) | (-0.11) | (-2.30) | (-1.26) | (-0.70) |
| *WFDR* | 0.007*** | -0.004 | -0.002 | 0.001 | -0.010** | 0.000 | -0.001 | 0.007* |
| | (2.97) | (-0.79) | (-0.41) | (0.49) | (-2.28) | (0.11) | (-0.22) | (1.74) |
| *Controls* | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| *Firm FE* | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| *Ctry-Month FE* | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| *Ind-Month FE* | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| *Observations* | 150,826 | 150,826 | 150,826 | 150,826 | 150,826 | 150,826 | 150,826 | 150,826 |
| *Adj.* $R^2$ | 0.075 | 0.075 | 0.075 | 0.075 | 0.075 | 0.075 | 0.075 | 0.075 |

## Table 7: Industry Competition of Domestic Firms and Positive Spillovers

This table shows panel regressions in which the dependent variable is the local currency stock returns (*Ret*) or changes in default probability ($\Delta PD$). I restrict the analysis to purely domestic firms with no foreign debt and no foreign revenue exposure. For each domestic firm $i$, its indirect foreign debt (foreign revenue) exposure through inter-firm linkages, *WFDR* (*WForRev*), is constructed as a weighted average of the foreign debt (foreign revenue) from its focal firms (i.e., competitors or customers with foreign exposure). I sort all domestic firms into two buckets based on the Herfindahl–Hirschman index (*HHI*), and report the regression results for the two subsamples. *HHI* is defined as the sum of the squared market shares of the firms competing in each Fama–French 48 industry for each country-year combination. $\Delta EX$ is the log change in the nominal exchange rate, for which $\Delta EX>0$ represents a local currency depreciation against the U.S. dollar. *Controls* include the weighted foreign revenue (*WForRev*), beta, size, BE/ME, profitability, and investment. All continuous RHVs are lagged one period, winsorized at 1% and 99%, and standardized to have zero means and unit standard deviations. The sample includes 64 economies and covers the 2006 to 2020 period. I drop observations at the country-month level for countries whose currencies are pegged, using data from Ilzetzki, Reinhart, and Rogoff (2019). Firm-, sector-month, and country-month fixed effects are included in each specification. Standard errors are double clustered at the country and month levels, and $t$-statistics are reported in parentheses. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

| | Domestic Rivals | | | | Domestic Suppliers | | | |
|---|---|---|---|---|---|---|---|---|
| | LHV = Ret HHI | | LHV = ΔPD HHI | | LHV = Ret HHI | | LHV = ΔPD HHI | |
| | High | Low | High | Low | High | Low | High | Low |
| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) |
| *WFDR* × $\Delta EX$ | 0.089 | 0.075* | -0.004* | -0.011* | 0.135*** | 0.035 | -0.010*** | -0.005 |
| | (1.59) | (1.81) | (-1.96) | (-2.02) | (4.17) | (0.67) | (-3.11) | (-0.92) |
| *WFDR* | -0.240** | -0.087 | 0.004 | -0.000 | 0.080 | 0.067 | 0.011* | -0.005 |
| | (-2.53) | (-1.09) | (0.41) | (-0.05) | (0.77) | (0.47) | (1.82) | (-0.85) |
| *Controls* | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| *Firm FE* | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| *Ctry-Month FE* | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| *Ind-Month FE* | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| *Observations* | 97,853 | 144,341 | 85,565 | 126,630 | 77,762 | 96,339 | 66,541 | 82,674 |
| *Adj.* $R^2$ | 0.218 | 0.274 | 0.048 | 0.067 | 0.214 | 0.239 | 0.061 | 0.081 |

## Table 8: FX Risk and Corporate Profitability: Inter-Firm Linkages

This table shows panel regressions in which the dependent variable is the operating profitability ($OP$) or profit margin ($PMGN$). $OP$ is defined as sales minus the cost of goods sold, minus sales, general, and administrative expenses (excluding research and development expenditures), scaled by total assets. $PMGN$ is constructed as the earnings before interest, taxes, depreciation, and amortization, divided by sales. I restrict the analysis to purely domestic firms with no foreign debt and no foreign revenue exposure. For each domestic firm $i$, its indirect foreign debt (foreign revenue) exposure through inter-firm linkages, $WFDR$ ($WForRev$), is constructed as a weighted average of the foreign debt (foreign revenue) from its focal firms (i.e., competitors or customers). I use either focal firm sales and assets as weights or equal-weighting. Panel A presents domestic rivals ($WFDR$ is based on their competitors with foreign exposure). Panel B presents domestic suppliers ($WFDR$ is based on their customers with foreign exposure). $\Delta EX$ is the log change in the nominal exchange rate, for which $\Delta EX>0$ represents a local currency depreciation against the U.S. dollar. *Controls* include the weighted foreign revenue ($WForRev$), size, leverage, tangibility ($PPE$), profitability ($OP$), and cash ratio. All continuous RHVs are lagged one period, winsorized at 1% and 99%, and standardized to have zero means and unit standard deviations. The sample includes 64 economies and covers the 2006 to 2020 period. I drop observations at the country-month level for countries whose currencies are pegged, using data from Ilzetzki, Reinhart, and Rogoff (2019). Firm-, sector-year, and country-year fixed effects are included in each specification. Standard errors are clustered at the country level, and $t$-statistics are reported in parentheses. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

| | LHV = OP | | | LHV = PMGN | | |
|---|---|---|---|---|---|---|
| | Sale | Weighted by Asset | Equal | Sale | Weighted by Asset | Equal |
| Panel A: Domestic Rivals | | | | | | |
| $WFDR \times \Delta EX$ | 0.223*** | 0.223*** | 0.261*** | 0.103* | 0.103* | 0.116** |
| | (3.96) | (3.75) | (4.86) | (1.84) | (1.87) | (2.24) |
| $WFDR$ | -0.026 | 0.013 | -0.011 | -0.251 | -0.291 | -0.331* |
| | (-0.21) | (0.10) | (-0.07) | (-1.27) | (-1.51) | (-1.70) |
| Panel B: Domestic Suppliers | | | | | | |
| $WFDR \times \Delta EX$ | 0.137** | 0.136** | 0.171** | 0.178** | 0.176** | 0.168** |
| | (2.25) | (2.06) | (2.63) | (2.43) | (2.42) | (2.10) |
| $WFDR$ | 0.036 | -0.025 | 0.082 | -0.451* | -0.447** | -0.645** |
| | (0.23) | (-0.16) | (0.51) | (-1.94) | (-2.06) | (-2.12) |

## Table 9: FX Risk, Inter-Firm Linkages, and Components of Profitability

This table shows panel regressions in which the dependent variables are three primary components of corporate profitability. *SALES* is sales scaled by total assets. *COGS* is the cost of goods sold scaled by sales. *SGA* is the selling, general, and administrative expenses scaled by sales. I restrict the analysis to domestic rivals and suppliers with no foreign debt and no foreign revenue exposure. For each domestic firm $i$, its indirect foreign debt (foreign revenue) exposure through inter-firm linkages, *WFDR* (*WForRev*), is constructed as a weighted average of the foreign debt (foreign revenue) from its focal firms (i.e., competitors or customers). I use either focal firm sales and assets as weights or equal-weighting. $\Delta EX$ is the log change in the nominal exchange rate, for which $\Delta EX>0$ represents a local currency depreciation against the U.S. dollar. *Controls* include the weighted foreign revenue (*WForRev*), size, leverage, tangibility (*PPE*), profitability (*OP*), and cash ratio. All continuous RHVs are lagged one period, winsorized at 1% and 99%, and standardized to have zero means and unit standard deviations. The sample includes 64 economies and covers the 2006 to 2020 period. I drop observations at the country-month level for countries whose currencies are pegged, using data from Ilzetzki, Reinhart, and Rogoff (2019). Firm-, sector-year, and country-year fixed effects are included in each specification. Standard errors are clustered at the country level, and $t$-statistics are reported in parentheses. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

| | Domestic Rivals | | | Domestic Suppliers | | |
|---|---|---|---|---|---|---|
| | | Weighted by | | | Weighted by | |
| | Sale | Asset | Equal | Sale | Asset | Equal |
| Panel A: LHV = SALES | | | | | | |
| $WFDR \times \Delta EX$ | 0.209** | 0.207** | 0.236** | 0.109 | 0.162 | 0.059 |
| | (2.14) | (1.97) | (2.26) | (0.69) | (0.93) | (0.33) |
| $WFDR$ | -0.678 | -0.460 | -0.429 | 0.642 | 0.542 | 1.534*** |
| | (-0.82) | (-0.65) | (-0.57) | (1.27) | (0.98) | (3.31) |
| Panel B: LHV = COGS | | | | | | |
| $WFDR \times \Delta EX$ | -0.087 | -0.079 | -0.137* | -0.008 | -0.003 | -0.016 |
| | (-0.86) | (-0.77) | (-1.70) | (-0.06) | (-0.03) | (-0.11) |
| $WFDR$ | 0.044 | 0.091 | 0.275 | 0.399 | 0.438 | 0.338 |
| | (0.14) | (0.31) | (1.16) | (0.90) | (1.06) | (0.67) |
| Panel C: LHV = SGA | | | | | | |
| $WFDR \times \Delta EX$ | -0.429 | -0.354 | -0.737 | -1.825*** | -2.149*** | -2.016*** |
| | (-0.58) | (-0.49) | (-0.92) | (-3.28) | (-3.22) | (-3.68) |
| $WFDR$ | -24.527* | -23.784* | -14.229* | -11.877 | -10.701 | -12.351 |
| | (-1.85) | (-1.80) | (-1.96) | (-1.09) | (-1.05) | (-1.10) |

## Table 10: Financial Vulnerability of Focal Firms and Corporate Profitability of Domestic Rivals

This table shows panel regressions in which the dependent variable is operating profitability (*OP*) or profit margin (*PMGN*). *OP* is defined as sales minus the cost of goods sold, minus sales, general, and administrative expenses (excluding research and development expenditures), scaled by total assets. *PMGN* is constructed as the earnings before interest, taxes, depreciation, and amortization, divided by sales. I restrict the analysis to purely domestic firms with no foreign debt and no foreign revenue exposure. For each domestic firm $i$, its indirect foreign debt (foreign revenue) exposure through inter-firm linkages, *WFDR* (*WForRev*), is constructed as a weighted average of the foreign debt (foreign revenue) from its focal firms (i.e., competitors with foreign exposure). I sort all focal firms into two buckets based on four financial vulnerability measures (*Leverage*, *Liquidity*, *Current*, and *EFD*) respectively, from low to high within each country each year, and compute *WFDR* (*WForRev*) for each bucket using the focal firm sales as weights. *Leverage* is the total debt to total assets. *Liquidity* is the current assets to total liabilities. *Current* is the current ratio, defined as the current assets to current liabilities. *EFD* is external financing dependence, calculated according to Rajan and Zingales (1998) for U.S. public firms and assigned to the firms in the sample. $\Delta EX$ is the log change in the nominal exchange rate, for which $\Delta EX>0$ represents a local currency depreciation against the U.S. dollar. *Controls* include the weighted foreign revenue (*WForRev*), size, leverage, tangibility (*PPE*), profitability (*OP*), and cash ratio. All continuous RHVs are lagged one period, winsorized at 1% and 99%, and standardized to have zero means and unit standard deviations. The sample includes 64 economies and covers the 2006 to 2020 period. I drop observations at the country-month level for countries whose currencies are pegged, using data from Ilzetzki, Reinhart, and Rogoff (2019). Firm-, sector-year, and country-year fixed effects are included in each specification. Standard errors are clustered at the country level, and $t$-statistics are reported in parentheses. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

| | Leverage | | Liquidity | | Current | | EFD | |
|---|---|---|---|---|---|---|---|---|
| | High | Low | High | Low | High | Low | High | Low |
| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) |
| Panel A: LHV = OP | | | | | | | | |
| *WFDR* × $\Delta EX$ | 0.190*** | 0.014 | 0.123** | 0.149*** | 0.080* | 0.129** | 0.177*** | 0.060 |
| | (3.63) | (0.43) | (2.48) | (3.44) | (1.84) | (2.68) | (5.08) | (0.93) |
| *WFDR* | -0.133 | 0.035 | -0.144 | -0.140 | -0.138 | 0.031 | -0.068 | -0.094 |
| | (-1.16) | (0.61) | (-1.32) | (-1.58) | (-1.24) | (0.34) | (-0.72) | (-1.38) |
| *Controls* | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| *Firm FE* | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| *Ctry-Year FE* | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| *Ind-Year FE* | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| *Observations* | 24,085 | 24,085 | 24,085 | 24,085 | 24,085 | 24,085 | 24,085 | 24,085 |
| *Adj.* $R^2$ | 0.715 | 0.715 | 0.715 | 0.715 | 0.715 | 0.715 | 0.715 | 0.715 |
| Panel B: LHV = PMGN | | | | | | | | |
| *WFDR* × $\Delta EX$ | 0.051 | -0.019 | -0.029 | 0.052 | 0.048 | 0.026 | 0.094** | -0.012 |
| | (1.08) | (-0.51) | (-0.43) | (1.33) | (0.87) | (0.69) | (2.53) | (-0.16) |
| *WFDR* | -0.196 | -0.057 | -0.081 | -0.281** | 0.064 | -0.098 | 0.016 | -0.184 |
| | (-1.25) | (-0.59) | (-1.40) | (-2.45) | (0.69) | (-0.82) | (0.12) | (-1.60) |
| *Controls* | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| *Firm FE* | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| *Ctry-Year FE* | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| *Ind-Year FE* | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| *Observations* | 24,085 | 24,085 | 24,085 | 24,085 | 24,085 | 24,085 | 24,085 | 24,085 |
| *Adj.* $R^2$ | 0.861 | 0.861 | 0.861 | 0.861 | 0.861 | 0.861 | 0.861 | 0.861 |

## Table 11: Financial Vulnerability of Focal Firms and Corporate Profitability of Domestic Suppliers

This table shows panel regressions in which the dependent variable is the operating profitability (*OP*) or profit margin (*PMGN*). *OP* is defined as sales minus the cost of goods sold, minus sales, general, and administrative expenses (excluding research and development expenditures), scaled by total assets. *PMGN* is constructed as the earnings before interest, taxes, depreciation, and amortization, divided by sales. I restrict the analysis to purely domestic firms with no foreign debt and no foreign revenue exposure. For each domestic supplier $i$, its indirect foreign debt (foreign revenue) exposure through inter-firm linkages, *WFDR* (*WForRev*), is constructed as a weighted average of the foreign debt (foreign revenue) from its focal firms (i.e., customers with foreign exposure). I sort all focal firms into two buckets based on four financial vulnerability measures (*Leverage*, *Liquidity*, *Current*, and *EFD*) respectively, from low to high within each country each year, and compute *WFDR* (*WForRev*) for each bucket using the focal firm sales as weights. *Leverage* is the total debt to total assets. *Liquidity* is the current assets to total liabilities. *Current* is the current ratio, defined as the current assets to current liabilities. *EFD* is external financing dependence, calculated according to Rajan and Zingales (1998) for U.S. public firms and assigned to the firms in the sample. $\Delta EX$ is the log change in the nominal exchange rate, for which $\Delta EX>0$ represents a local currency depreciation against the U.S. dollar. *Controls* include the weighted foreign revenue (*WForRev*), size, leverage, tangibility (*PPE*), profitability (*OP*), and cash ratio. All continuous RHVs are lagged one period, winsorized at 1% and 99%, and standardized to have zero means and unit standard deviations. The sample includes 64 economies and covers the 2006 to 2020 period. I drop observations at the country-month level for countries whose currencies are pegged, using data from Ilzetzki, Reinhart, and Rogoff (2019). Firm-, sector-year, and country-year fixed effects are included in each specification. Standard errors are clustered at the country level, and $t$-statistics are reported in parentheses. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

| | Leverage | | Liquidity | | Current | | EFD | |
|---|---|---|---|---|---|---|---|---|
| | High | Low | High | Low | High | Low | High | Low |
| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) |
| Panel A: LHV = OP | | | | | | | | |
| *WFDR* × $\Delta EX$ | 0.108** | 0.018 | 0.048 | 0.155** | 0.025 | 0.195** | 0.109* | 0.073* |
| | (2.07) | (0.34) | (0.71) | (2.27) | (0.39) | (2.31) | (1.76) | (1.89) |
| *WFDR* | 0.126 | -0.040 | 0.129** | -0.061 | 0.213* | -0.199 | 0.062 | -0.032 |
| | (0.79) | (-0.28) | (2.27) | (-0.43) | (1.82) | (-1.33) | (0.40) | (-0.33) |
| *Controls* | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| *Firm FE* | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| *Ctry-Year FE* | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| *Ind-Year FE* | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| *Observations* | 18,084 | 18,084 | 18,084 | 18,084 | 18,084 | 18,084 | 18,084 | 18,084 |
| *Adj.* $R^2$ | 0.735 | 0.735 | 0.735 | 0.735 | 0.735 | 0.735 | 0.735 | 0.735 |
| Panel B: LHV = PMGN | | | | | | | | |
| *WFDR* × $\Delta EX$ | 0.085 | 0.016 | -0.016 | 0.121 | 0.059 | 0.006 | 0.050 | 0.097 |
| | (1.23) | (0.17) | (-0.18) | (1.55) | (0.65) | (0.06) | (0.66) | (1.16) |
| *WFDR* | -0.260 | -0.095 | -0.012 | -0.161 | 0.118 | -0.222 | -0.237 | -0.092 |
| | (-1.32) | (-0.61) | (-0.08) | (-0.95) | (0.74) | (-1.19) | (-1.31) | (-0.49) |
| *Controls* | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| *Firm FE* | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| *Ctry-Year FE* | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| *Ind-Year FE* | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| *Observations* | 16,490 | 16,490 | 16,490 | 16,490 | 16,490 | 16,490 | 16,490 | 16,490 |
| *Adj.* $R^2$ | 0.854 | 0.854 | 0.854 | 0.854 | 0.854 | 0.854 | 0.854 | 0.854 |

## Table 12: The Spillover of FX Risk on Domestic Firms: Country, Sector, and Subperiod

This table shows panel regressions in which the dependent variable is local currency stock returns (*Ret*) or changes in default probability ($\Delta PD$). For each domestic firm $i$, its indirect foreign debt (foreign revenue) exposure through inter-firm linkages, *WFDR* (*WForRev*), is constructed as a weighted average of the foreign debt (foreign revenue) from its focal firms (i.e., competitors or customers with foreign exposure). $\Delta EX$ is the log change in the nominal exchange rate, for which $\Delta EX>0$ represents a local currency depreciation against the U.S. dollar. *Controls* include the weighted foreign revenue (*WForRev*), beta, size, BE/ME, profitability, and investment. All continuous RHVs are lagged one period, winsorized at 1% and 99%, and standardized to have zero means and unit standard deviations. The sample includes 64 economies and covers the 2006 to 2020 period. In Panel A, "AE" denotes the 27 advanced economies. "EME" denotes the 37 emerging market economies. In Panel B, I sort all domestic firms into two buckets based on sector tradability, and report regression results for the two subsamples. I classify domestic firms into non-tradable (e.g., construction, transportation, communication, utilities, and services) and tradable sectors (e.g., agriculture, mining, and manufacturing industries) following Alfaro, Asis, Chari, and Panizza (2019). In Panel C, "GFC" denotes the Global Financial Crisis and Great Depression period from January 2007 to June 2009. "PS-GFC" denotes the post-crisis period from July 2009 to September 2013. "PS-Taper" denotes the post-Taper Tantrum period from October 2013 to February 2020. "Covid" denotes the Covid-19 Pandemic period from March 2020 to December 2020. I drop observations at the country-month level for countries whose currencies are pegged, using data from Ilzetzki, Reinhart, and Rogoff (2019). Firm-, sector-month, and country-month fixed effects are included in each specification. Standard errors are double clustered at the country and month levels, and $t$-statistics are reported in parentheses. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

| | Domestic Rivals | | | | Domestic Suppliers | | | |
|---|---|---|---|---|---|---|---|---|
| | LHV = Ret | | LHV = ΔPD | | LHV = Ret | | LHV = ΔPD | |
| Panel A: Country Development | | | | | | | | |
| | AE | EME | AE | EME | AE | EME | AE | EME |
| $WFDR \times \Delta EX$ | 0.087** | 0.066 | -0.008* | -0.005 | 0.148*** | 0.030 | -0.007** | -0.004 |
| | (2.34) | (0.89) | (-2.04) | (-1.58) | (3.72) | (0.67) | (-2.23) | (-1.17) |
| $WFDR$ | -0.141 | -0.143 | 0.007** | -0.026 | -0.042 | 0.247 | 0.003 | -0.002 |
| | (-1.63) | (-0.98) | (2.25) | (-0.94) | (-0.48) | (1.19) | (0.59) | (-0.26) |
| Panel B: Sector Tradability | | | | | | | | |
| | Yes | No | Yes | No | Yes | No | Yes | No |
| $WFDR \times \Delta EX$ | 0.007 | 0.070* | -0.001 | -0.009* | 0.145 | 0.055* | -0.007 | -0.004 |
| | (0.09) | (1.93) | (-0.10) | (-1.77) | (1.63) | (1.67) | (-1.09) | (-1.41) |
| $WFDR$ | -0.150 | -0.166*** | 0.012 | -0.004 | 0.076 | 0.068 | 0.010 | -0.006 |
| | (-1.22) | (-2.95) | (1.57) | (-0.40) | (0.34) | (0.70) | (0.80) | (-1.21) |
| Panel C: Subperiods | | | | | | | | |
| | GFC | PS-GFC | GFC | PS-GFC | GFC | PS-GFC | GFC | PS-GFC |
| $WFDR \times \Delta EX$ | 0.326** | 0.201*** | -0.029* | -0.012* | -0.146 | 0.110 | 0.025 | 0.002 |
| | (2.35) | (3.33) | (-2.07) | (-1.85) | (-0.30) | (1.24) | (0.75) | (0.16) |
| $WFDR$ | -0.146 | -0.134 | 0.020 | 0.008 | -2.233 | 0.175 | 0.143** | -0.026 |
| | (-0.76) | (-0.50) | (0.89) | (0.59) | (-1.60) | (0.52) | (2.39) | (-1.74) |
| | PS-Taper | Covid | PS-Taper | Covid | PS-Taper | Covid | PS-Taper | Covid |
| $WFDR \times \Delta EX$ | 0.111*** | -0.007 | -0.008*** | 0.000 | 0.070** | 0.151 | -0.006** | -0.024* |
| | (2.96) | (-0.06) | (-3.12) | (0.03) | (2.19) | (1.04) | (-2.53) | (-3.09) |
| $WFDR$ | -0.115* | -0.579 | -0.007 | 0.226 | 0.057 | 0.121 | 0.003 | -0.048 |
| | (-1.78) | (-1.06) | (-0.61) | (1.03) | (0.87) | (0.28) | (0.75) | (-1.00) |

## Table 13: FX Risk, Inter-Firm Linkages, and Corporate Distress: Alternative Exchange Rate Shocks

This table shows panel regressions in which the dependent variable is local currency stock returns (*Ret*) or changes in default probability ($\Delta PD$). I restrict the analysis to purely domestic firms with no foreign debt and no foreign revenue exposure. For each domestic firm $i$, its indirect foreign debt (foreign revenue) exposure through inter-firm linkages, *WFDR* (*WForRev*), is constructed as a weighted average of the foreign debt (foreign revenue) from its competitors, customers, and suppliers, respectively. I use either focal firm sales and assets as weights or equal-weighting. Panel A presents domestic rivals (*WFDR* is based on their competitors with foreign exposure). Panel B presents domestic suppliers (*WFDR* is based on their customers with foreign exposure). Panel C presents domestic customers (*WFDR* is based on their suppliers with foreign exposure). $\Delta EX$ is the log change in the nominal exchange rate, for which $\Delta EX>0$ represents a currency depreciation against the U.S. dollar. The regressions employ dummy variables for quintiles 2, 3, 4, and 5 of $\Delta EX$ with the bottom quintile omitted. For brevity's sake, I only display the interaction term between *WFDR* and quintile 5 (Q5) of $\Delta EX$. *Controls* include the weighted foreign revenue (*WForRev*), beta, size, BE/ME, profitability, and investment. All continuous RHVs are lagged one period, winsorized at 1% and 99%, and standardized to have zero means and unit standard deviations. The sample includes 64 economies and covers the 2006 to 2020 period. I drop observations at the country-month level for countries whose currencies are pegged, using data from Ilzetzki, Reinhart, and Rogoff (2019). Firm-, sector-month, and country-month fixed effects are included in each specification. Standard errors are double clustered at the country and month levels, and $t$-statistics are reported in parentheses. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

| | LHV = Ret | | | LHV = ΔPD | | |
|---|---|---|---|---|---|---|
| | Weighted by | | | Weighted by | | |
| | Sale | Asset | Equal | Sale | Asset | Equal |
| Panel A: Domestic Rivals | | | | | | |
| *WFDR* × Δ*EX (Q5)* | 0.346*** | 0.327*** | 0.306** | -0.029*** | -0.031*** | -0.039*** |
| | (3.08) | (2.74) | (2.44) | (-3.95) | (-4.07) | (-3.83) |
| *WFDR* | -0.322*** | -0.292*** | -0.242*** | 0.021** | 0.020** | 0.020** |
| | (-7.45) | (-7.56) | (-2.76) | (2.71) | (2.47) | (2.23) |
| Panel B: Domestic Suppliers | | | | | | |
| *WFDR* × Δ*EX (Q5)* | 0.299** | 0.329** | 0.367*** | -0.021** | -0.020* | -0.028* |
| | (2.55) | (2.56) | (2.80) | (-2.07) | (-1.90) | (-1.69) |
| *WFDR* | -0.093 | -0.114 | -0.135 | 0.008* | 0.009* | 0.013* |
| | (-0.71) | (-0.82) | (-0.98) | (2.00) | (1.81) | (1.95) |
| Panel C: Domestic Customers | | | | | | |
| *WFDR* × Δ*EX (Q5)* | 0.037 | 0.014 | 0.015 | -0.012 | -0.010 | -0.009 |
| | (0.33) | (0.12) | (0.16) | (-1.50) | (-1.20) | (-1.02) |
| *WFDR* | 0.005 | 0.017 | 0.045 | 0.001 | -0.001 | -0.002 |
| | (0.03) | (0.12) | (0.29) | (0.05) | (-0.11) | (-0.19) |

## Table 14: FX Risk, Inter-Firm Linkages, and Corporate Distress: Alternative Left-Hand Variable

This table shows panel regressions in which the dependent variable is the changes in actuarial spread ($\Delta AS$). $AS$ is the annualized premium that is needed to compensate the counterparty for the default risk on an actuarial basis of the reference company. I restrict the analysis to domestically oriented firms (i.e., domestic rivals and suppliers) with no foreign debt and no foreign revenue exposure. For each domestic firm $i$, its indirect foreign debt (foreign revenue) exposure through inter-firm linkages, *WFDR* (*WForRev*), is constructed as a weighted average of the foreign debt (foreign revenue) from its competitors, customers, and suppliers, respectively. I use either focal firm sales and assets as weights or equal-weighting. Panel A presents the specification with one interaction. Panel B presents the specification with two interactions. $\Delta EX$ is the log change in the nominal exchange rate, for which $\Delta EX>0$ represents a local currency depreciation against the U.S. dollar. *Controls* include the weighted foreign revenue (*WForRev*), beta, size, BE/ME, profitability, and investment. All continuous RHVs are lagged one period, winsorized at 1% and 99%, and standardized to have zero means and unit standard deviations. The sample includes 64 economies and covers the 2006 to 2020 period. I drop observations at the country-month level for countries whose currencies are pegged, using data from Ilzetzki, Reinhart, and Rogoff (2019). Firm-, sector-month, and country-month fixed effects are included in each specification. Standard errors are double clustered at the country and month levels, and $t$-statistics are reported in parentheses. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

| LHV = ΔAS | Domestic Rivals | | | Domestic Suppliers | | |
|---|---|---|---|---|---|---|
| | Weighted by | | | Weighted by | | |
| | Sale | Asset | Equal | Sale | Asset | Equal |
| Panel A: One Interaction | | | | | | |
| *WFDR* × Δ*EX* | -0.177*** | -0.187*** | -0.224*** | -0.115*** | -0.121*** | -0.138** |
| | (-2.83) | (-3.10) | (-3.21) | (-2.72) | (-2.67) | (-2.13) |
| *WFDR* | 0.014 | 0.005 | -0.020 | 0.008 | 0.018 | 0.041 |
| | (0.10) | (0.04) | (-0.15) | (0.23) | (0.88) | (1.06) |
| Panel B: Two Interactions | | | | | | |
| *WFDR* × Δ*EX* | -0.171*** | -0.183*** | -0.228*** | -0.093** | -0.107** | -0.118** |
| | (-3.19) | (-3.62) | (-3.10) | (-2.49) | (-2.51) | (-2.05) |
| *WForRev* × Δ*EX* | -0.021 | -0.013 | 0.015 | -0.067 | -0.044 | -0.065 |
| | (-0.22) | (-0.15) | (0.33) | (-1.00) | (-0.77) | (-1.12) |
| *WFDR* | 0.014 | 0.005 | -0.020 | 0.007 | 0.018 | 0.046 |
| | (0.10) | (0.04) | (-0.15) | (0.15) | (0.51) | (1.00) |
| *WForRev* | -0.059 | -0.037 | 0.050 | 0.002 | -0.003 | -0.026 |
| | (-0.71) | (-0.46) | (0.69) | (0.03) | (-0.04) | (-0.28) |

**Internet Appendix**

Yancheng Qiu

# A Descriptive Statistics for Firm-Level Foreign Debt Exposure

Table A1 provides the mean values for various debt ratios across countries and regions.[24] The geographical distributions of the average firm-level foreign debt ratio and the bond/loan ratio within the foreign debt structure are displayed in Figures A1 and A2, respectively. One can see substantial cross-country variation in the level and structure of the foreign debt ratio, suggesting the necessity and importance of a large sample of data that features a broad coverage of countries. For instance, although South Korea is the home country for 823 foreign debt borrowers, its average *FDR* (foreign debt scaled by total assets) is only 2.94%, and 79% (2.33%/2.94%) of its foreign debt is in U.S. dollars. The low foreign debt share (foreign debt scaled by total debt, 13.10%) of South Korean firms reveals a potential substitution with local currency debt, possibly due to development of the local corporate bond market during the sample period (Hale, Jones, and Spiegel 2020; Abraham, Cortina, and Schmukler 2021). The average Chinese firm, meanwhile, borrows 5.72% of its total assets in a foreign currency, of which 2.99% is U.S. dollars and 0.37% is euros, suggesting a relative diversification of foreign funding sources. Canadian firms have a relatively high foreign debt share; on average, most of their foreign debt (15.51%/17.66% = 88%) is in U.S. dollars, as they are geographically close to the U.S. financial market. Similarly, Latin American countries (e.g., Argentina, Mexico, Peru, Chile, and Brazil) also exhibit disproportionately USD-denominated foreign debt ratios due to their proximity and trade links to the U.S. One interesting phenomenon is that despite their deep and liquid home financial market, U.S. firms still borrow 24.59% in foreign currency in the debt structure, with 41% (2.57%/6.34%) of their foreign debt in euros. Additionally, European countries (e.g., Bulgaria, Hungary, Czech Republic, Romania, Croatia, and Turkey), prefer to borrow in euro term loans. The exceptions are firms from Greece, Ukraine, Ireland, the UK, and Norway, which all borrow more USD-denominated long-term debt.

In addition, Table A1 Panel B shows that on average, advanced economy (AE) firms borrow more foreign currency debt (the mean foreign debt share is 41.69%) within the debt structure than emerging market economy (EME) firms (the mean foreign debt share is 34.63%). Firms in "Developed Europe" aggressively borrow external debt, and more than half of their debt is denominated in a foreign currency. Interestingly, despite the surge in emerging market corporate bond issuance (mostly denominated in U.S. dollars) after the Global Financial Crisis (Bruno and Shin 2017), an average EME firm still relies more on term loans (5.63% of total assets) than corporate bonds (2.31% of total assets) when borrowing in a foreign currency, probably due to high fixed issuance costs. Only firms from Latin America seem to use more public debt in the sample period. Finally, in the currency denomination decomposition, one can see that the sum

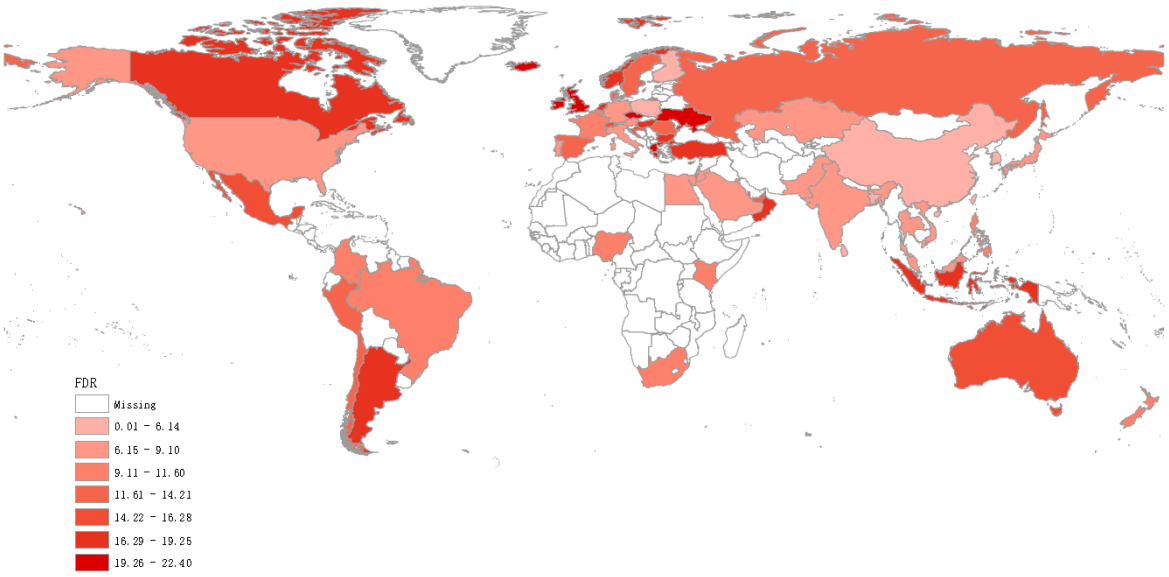
[24] Table A2 lists the 64 economies, their three-digit country codes, and geographic areas, as well as the number of firms in each country, after merging the FactSet DCS, FactSet Fundamentals, and Compustat Global datasets. Because I only include firms with non-zero foreign debt in the sample period, China has the most foreign debt issuers (1,463), followed by the U.S. (1,247), and Canada (1,074). In terms of geographic area, Asian (both "Asia Pacific" and "Emerging") and Western European ("Developed Europe") countries are two primary areas of origin for foreign debt borrowers, as shown in Panel B of Table A1.

of *USD FDR* and *EUR FDR*—the two most-traded global currencies—does not equal the total *FDR* for each country and region. This fact implies the diversity of external funding sources and motivation, which is possibly related to international trade and the global distribution of revenues. Therefore, using a sample of 64 countries, one can observe substantial cross-sectional variation in debt composition, which provides rich implications about the propagation of exchange rate shocks and distress risk from foreign debt borrowers to domestic firms, as analyzed in the paper.

Figure A3 plots the average foreign and domestic debt ratios of four portfolios in "event time." The figure is constructed in the spirit of Lemmon, Roberts, and Zender (2008). I sort global firms into quartiles (i.e., Very High, High, Medium, and Low) for each year according to their foreign and domestic debt ratios. The portfolio formation year is denoted as event year 0. Next, I compute the average *FDR* and *DDR* for each portfolio in each of the subsequent ten years, holding the portfolio composition constant. After sorting and averaging the firms for each year in the sample period, I compute the average *FDR* and *DDR* of each portfolio across the event years. The shaded areas surrounding the portfolio averages represent the 95% confidence intervals. The figure shows a great deal of cross-sectional dispersion in the initial portfolio formation period. More importantly, despite the convergence, the average *FDR* and *DDR* across the four portfolios after ten years remains significantly different, exhibiting the persistence of foreign and domestic debt ratios. Therefore, it is vital to incorporate firm fixed effects into the analysis to account for unobserved heterogeneity present in the debt capital structure.

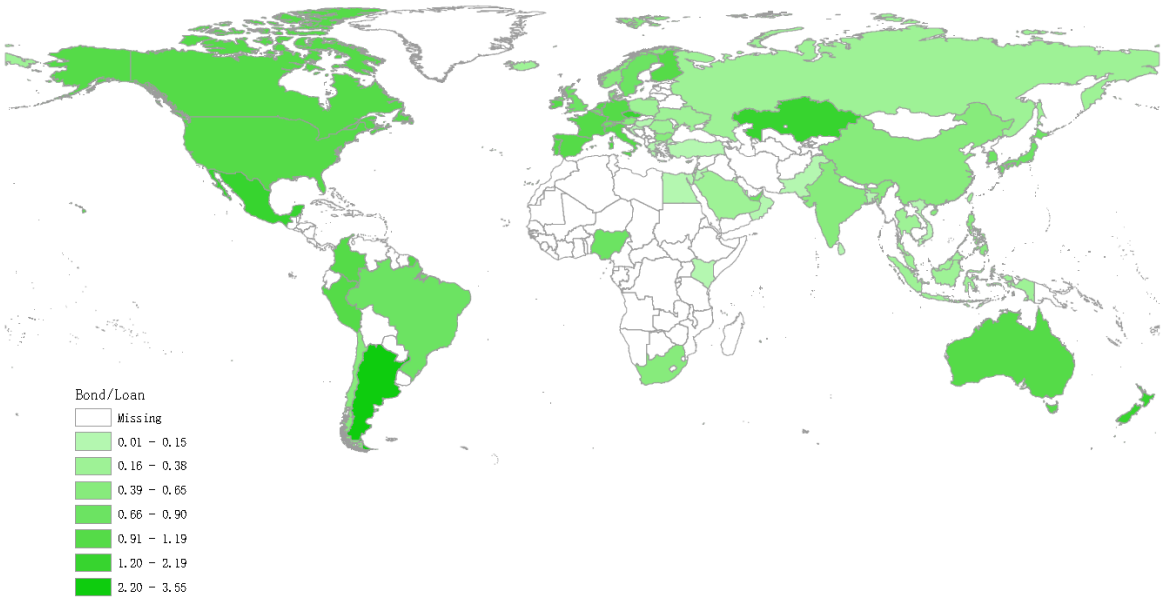
## Figure A1: Average FDR across 64 Economies

This figure presents the average firm-level foreign debt ratio (*FDR*) across 64 economies from 2006 to 2020. Firms included in the sample are those that have ever borrowed foreign currency debt and have been identified in the merged data sample after combining the FactSet DCS, FactSet Fundamentals, and Compustat Global and NA Databases. *FDR* is calculated as the total foreign currency debt outstanding scaled by total assets. All ratios are expressed in percentages.



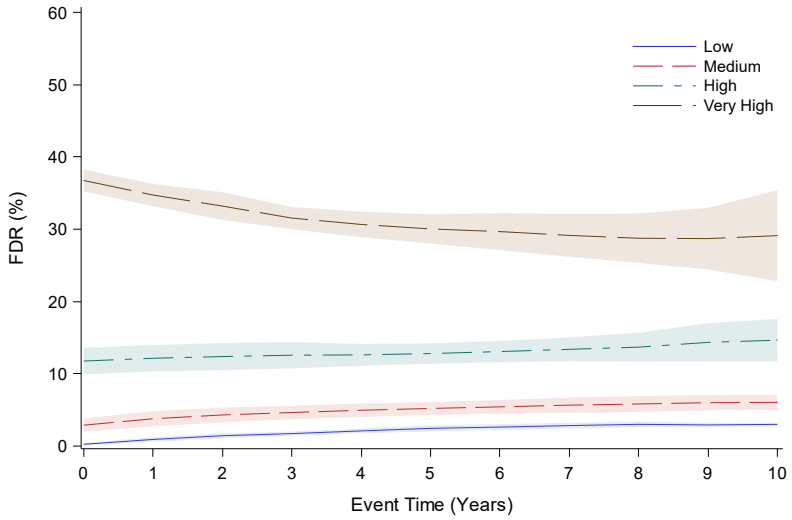
## Figure A2: Average Bond/Loan Ratio across 64 Economies

This figure presents the average firm-level bond/loan ratio within the foreign debt structure across 64 economies from 2006 to 2020. Firms included in the sample are those that have ever borrowed foreign currency debt and have been identified in the merged data sample after combining the FactSet DCS, FactSet Fundamentals, and Compustat Global and NA Databases. The bond/loan ratio is calculated as the average *Bond FDR* scaled by the average *Loan FDR*, in which *Bond FDR* is the foreign currency debt ratio for notes and bonds, and *Loan FDR* is the foreign currency debt ratio for term loans.

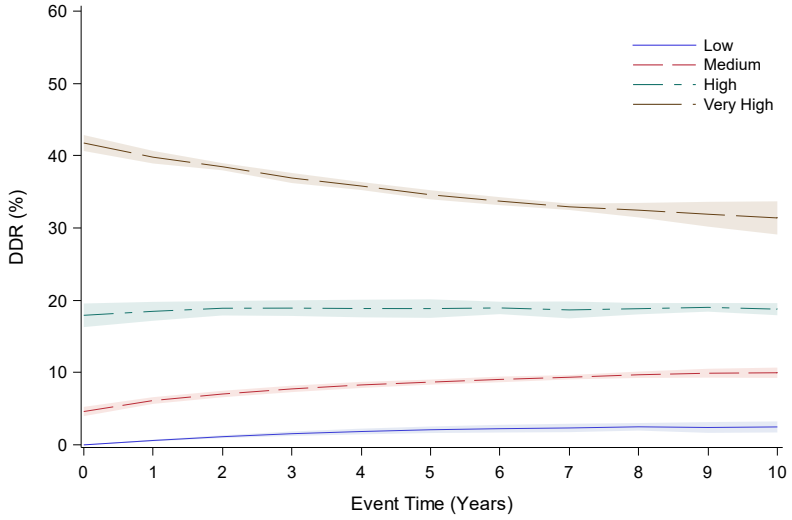


## Figure A3: Average FDR and DDR in Event Time

This figure presents the average foreign (domestic) debt ratios of four portfolios in event time, for which year zero is the portfolio formation period. Foreign (domestic) debt ratio is calculated as the total debt in foreign (domestic) currency scaled by total assets and denoted as *FDR* (*DDR*). Following Lemmon, Roberts, and Zender (2008), I form four portfolios by ranking global firms based on their *FDR* and *DDR* for each year from 2006 to 2020. Holding the portfolios fixed for the next ten years, I then compute the average value for each portfolio. After performing this sorting and averaging, I next average the average *FDR* and *DDR* across event times to obtain the mean value lines in the figure. The shaded areas surrounding the lines represent the 95% confidence intervals.




Panel A: Foreign Debt Ratio (*FDR*) Portfolios




Panel B: Domestic Debt Ratio (*DDR*) Portfolios

## Table A1: Average Firm-Level Foreign Debt Exposure Across Regions

This table reports the number of firms and mean values of various debt ratios across 64 economies. Firms included in the sample are those that have ever borrowed foreign currency (FC) debt and have been identified in the merged data sample after combining the FactSet DCS, FactSet Fundamentals, and Compustat Global and NA Databases. *Lev* is defined as the total debt divided by total assets. *FC Share* is the total FC debt divided by the total debt. *FDR* is the foreign debt ratio, calculated as the total FC debt outstanding, scaled by total assets. Other variants of FDRs depend on the foreign debt type and currency denomination; whether they are short-term ($ST$), long-term ($LT$), revolving credit ($RC$), loan, or bond; and whether the currency is denominated in USD or EUR. All ratios are expressed in percentages. The sample period is from 2006 to 2020.

| Country | # of Firms | Lev | FC Share | FDR | ST | LT | RC | Loan | Bond | USD | EUR |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Panel A: Summary statistics for 64 countries | | | | | | | | | | | |
| Argentina | 57 | 26.87 | 58.98 | 17.50 | 1.02 | 16.41 | 0.26 | 3.45 | 12.25 | 15.63 | 0.32 |
| Australia | 451 | 27.45 | 56.51 | 15.18 | 2.52 | 12.57 | 1.69 | 5.27 | 6.32 | 10.85 | 1.18 |
| Austria | 37 | 31.23 | 23.86 | 8.64 | 2.19 | 6.29 | 0.53 | 4.52 | 2.56 | 5.44 | 0.00 |
| Bangladesh | 30 | 17.11 | 21.34 | 4.23 | 0.59 | 3.63 | 0.00 | 3.67 | 0.00 | 2.78 | 0.01 |
| Belgium | 62 | 25.70 | 43.92 | 10.10 | 2.40 | 7.62 | 0.80 | 4.56 | 3.32 | 6.97 | 0.00 |
| Brazil | 209 | 34.94 | 32.46 | 11.60 | 1.15 | 10.37 | 0.22 | 5.66 | 4.76 | 10.14 | 0.62 |
| Bulgaria | 42 | 30.37 | 55.44 | 17.08 | 3.24 | 13.61 | 1.28 | 7.49 | 4.41 | 0.95 | 13.82 |
| Canada | 1,074 | 30.06 | 62.72 | 17.66 | 2.89 | 14.73 | 1.59 | 7.24 | 6.81 | 15.51 | 0.60 |
| Chile | 128 | 29.65 | 50.72 | 13.72 | 4.05 | 9.58 | 0.02 | 7.17 | 3.87 | 11.85 | 0.09 |
| China | 1,463 | 29.21 | 22.39 | 5.72 | 2.20 | 3.51 | 0.17 | 2.73 | 1.39 | 2.99 | 0.37 |
| Colombia | 20 | 26.48 | 38.21 | 9.91 | 0.98 | 9.00 | 0.21 | 4.08 | 4.75 | 8.81 | 0.00 |
| Croatia | 60 | 31.18 | 49.06 | 14.67 | 1.32 | 13.24 | 0.17 | 12.73 | 0.27 | 4.09 | 9.37 |
| Cyprus | 48 | 30.62 | 64.75 | 19.64 | 6.37 | 13.34 | 0.68 | 12.49 | 3.28 | 9.66 | 0.00 |
| Czech Republic | 13 | 32.07 | 72.10 | 20.23 | 6.17 | 14.12 | 2.17 | 4.40 | 8.97 | 0.54 | 12.98 |
| Denmark | 115 | 26.08 | 47.07 | 12.83 | 2.39 | 10.25 | 0.70 | 6.71 | 3.47 | 3.09 | 6.59 |
| Egypt | 55 | 27.99 | 31.49 | 8.76 | 2.66 | 6.00 | 0.23 | 6.04 | 0.21 | 8.31 | 0.40 |
| Finland | 47 | 26.69 | 26.84 | 5.79 | 0.91 | 4.96 | 0.65 | 2.20 | 2.33 | 1.36 | 0.00 |
| France | 288 | 27.23 | 48.42 | 11.30 | 2.69 | 8.64 | 0.87 | 4.24 | 4.56 | 5.89 | 0.00 |
| Germany | 227 | 26.32 | 38.08 | 9.36 | 1.78 | 7.57 | 0.52 | 3.82 | 4.00 | 6.14 | 0.00 |
| Greece | 46 | 44.48 | 48.90 | 22.43 | 3.73 | 18.27 | 2.76 | 16.85 | 1.07 | 21.82 | 0.00 |
| Hong Kong | 797 | 26.75 | 61.00 | 15.40 | 6.64 | 8.61 | 0.57 | 7.70 | 3.09 | 5.34 | 0.21 |
| Hungary | 24 | 28.63 | 66.34 | 19.01 | 2.87 | 16.31 | 0.41 | 14.47 | 2.16 | 0.58 | 13.58 |
| Iceland | 21 | 33.67 | 68.15 | 19.55 | 5.01 | 14.37 | 0.90 | 12.80 | 2.63 | 2.66 | 11.70 |
| India | 519 | 34.38 | 25.13 | 7.76 | 1.29 | 6.45 | 0.18 | 4.01 | 2.52 | 5.94 | 0.83 |
| Indonesia | 329 | 32.71 | 51.28 | 18.25 | 5.09 | 12.96 | 0.86 | 10.26 | 3.15 | 17.51 | 0.17 |
| Ireland | 117 | 27.84 | 83.01 | 22.95 | 2.86 | 19.90 | 1.49 | 8.27 | 11.75 | 20.25 | 0.00 |
| Israel | 263 | 36.86 | 40.27 | 13.68 | 3.87 | 9.94 | 0.58 | 8.57 | 2.06 | 8.93 | 3.14 |
| Italy | 141 | 31.42 | 31.83 | 8.80 | 2.21 | 6.57 | 0.39 | 3.37 | 3.80 | 4.10 | 0.00 |
| Japan | 340 | 26.82 | 37.90 | 8.40 | 2.63 | 5.80 | 0.77 | 3.11 | 2.88 | 4.21 | 0.73 |
| Jordan | 30 | 21.48 | 44.34 | 8.52 | 2.66 | 5.79 | 0.12 | 5.45 | 0.35 | 7.68 | 0.03 |
| Kazakhstan | 20 | 22.78 | 30.61 | 8.64 | 1.26 | 7.32 | 0.94 | 2.24 | 4.12 | 8.00 | 0.55 |
| Kenya | 28 | 19.67 | 55.43 | 10.12 | 0.92 | 9.12 | 0.43 | 8.21 | 0.39 | 8.77 | 0.47 |
| Kuwait | 91 | 30.84 | 28.81 | 7.25 | 1.59 | 5.65 | 0.21 | 5.17 | 0.73 | 5.18 | 0.25 |

**Table A1: Continued**

| Country | # of Firms | Lev | FC Share | FDR | ST | LT | RC | Loan | Bond | USD | EUR |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Malaysia | 361 | 26.62 | 29.58 | 7.59 | 2.43 | 5.13 | 0.21 | 4.27 | 1.16 | 3.74 | 0.15 |
| Mexico | 125 | 32.26 | 50.49 | 15.78 | 0.86 | 14.90 | 0.83 | 5.35 | 8.89 | 13.59 | 1.13 |
| Netherlands | 173 | 30.89 | 59.73 | 19.04 | 3.97 | 15.06 | 1.22 | 7.40 | 7.77 | 8.87 | 0.00 |
| New Zealand | 54 | 30.04 | 42.42 | 11.66 | 1.00 | 10.63 | 2.67 | 2.54 | 5.40 | 5.49 | 0.76 |
| Nigeria | 48 | 23.17 | 47.54 | 9.79 | 1.28 | 8.42 | 0.27 | 4.82 | 3.63 | 6.67 | 0.04 |
| Norway | 153 | 37.23 | 52.96 | 19.17 | 2.92 | 16.22 | 1.58 | 10.35 | 5.62 | 12.00 | 4.42 |
| Oman | 35 | 40.51 | 39.66 | 18.22 | 0.27 | 17.21 | 0.03 | 15.53 | 0.74 | 16.45 | 0.00 |
| Pakistan | 50 | 35.28 | 20.43 | 7.27 | 0.73 | 6.53 | 0.07 | 6.25 | 0.27 | 6.84 | 0.12 |
| Peru | 57 | 24.75 | 59.13 | 13.13 | 2.55 | 10.36 | 0.39 | 5.60 | 5.33 | 12.53 | 0.00 |
| Philippines | 98 | 30.52 | 36.34 | 10.00 | 1.87 | 8.14 | 0.21 | 5.63 | 2.62 | 8.33 | 0.06 |
| Poland | 188 | 24.67 | 26.64 | 5.91 | 0.91 | 4.99 | 0.69 | 3.23 | 1.07 | 0.91 | 4.07 |
| Portugal | 25 | 38.73 | 23.30 | 7.64 | 2.66 | 3.83 | 1.03 | 2.05 | 1.95 | 1.26 | 0.00 |
| Qatar | 44 | 27.73 | 60.80 | 15.99 | 3.36 | 12.51 | 0.72 | 9.79 | 3.61 | 10.44 | 0.52 |
| Romania | 31 | 26.72 | 53.47 | 14.21 | 4.21 | 9.74 | 2.16 | 6.08 | 1.56 | 2.91 | 10.20 |
| Russian | 129 | 32.94 | 40.02 | 12.33 | 2.59 | 9.77 | 0.54 | 7.66 | 2.79 | 9.54 | 2.07 |
| Saudi Arabia | 51 | 26.08 | 34.01 | 9.02 | 1.83 | 7.21 | 0.15 | 6.21 | 1.35 | 5.55 | 0.14 |
| Singapore | 351 | 27.37 | 60.61 | 16.08 | 7.11 | 8.78 | 0.45 | 9.05 | 1.89 | 8.97 | 0.12 |
| South Africa | 154 | 22.94 | 50.20 | 10.38 | 2.06 | 8.29 | 1.30 | 4.94 | 3.02 | 5.94 | 1.29 |
| South Korea | 823 | 29.20 | 13.10 | 2.94 | 1.51 | 1.44 | 0.30 | 0.69 | 0.51 | 2.33 | 0.09 |
| Spain | 130 | 32.26 | 50.91 | 13.92 | 3.10 | 10.70 | 0.74 | 5.88 | 5.57 | 6.00 | 0.00 |
| Sri Lanka | 75 | 29.43 | 21.15 | 6.14 | 1.18 | 4.93 | 0.05 | 4.90 | 0.05 | 5.08 | 0.52 |
| Sweden | 201 | 27.98 | 45.49 | 12.39 | 1.17 | 11.14 | 1.74 | 4.84 | 4.21 | 3.34 | 6.93 |
| Switzerland | 251 | 26.27 | 67.92 | 16.44 | 4.28 | 12.16 | 1.11 | 6.76 | 5.78 | 7.35 | 5.85 |
| Taiwan | 471 | 26.91 | 17.36 | 4.18 | 1.16 | 2.99 | 0.28 | 2.29 | 0.61 | 2.83 | 0.05 |
| Thailand | 196 | 35.22 | 27.96 | 8.86 | 1.63 | 7.17 | 0.22 | 5.68 | 1.70 | 5.95 | 0.22 |
| Turkey | 238 | 35.89 | 49.61 | 17.16 | 2.94 | 14.11 | 0.02 | 13.15 | 0.89 | 7.38 | 8.23 |
| Ukraine | 24 | 31.41 | 62.16 | 20.97 | 9.24 | 10.94 | 2.03 | 12.07 | 2.32 | 19.83 | 0.48 |
| UAE | 75 | 23.44 | 54.86 | 12.29 | 1.70 | 10.40 | 0.39 | 6.26 | 4.50 | 9.74 | 0.53 |
| United Kingdom | 805 | 27.99 | 73.62 | 19.84 | 3.68 | 15.89 | 1.50 | 8.18 | 7.64 | 12.58 | 3.61 |
| United States | 1,247 | 31.03 | 24.59 | 6.34 | 1.17 | 5.16 | 0.48 | 2.49 | 2.55 | 0.00 | 2.57 |
| Vietnam | 221 | 33.38 | 20.52 | 7.23 | 3.27 | 3.83 | 0.02 | 3.55 | 0.24 | 6.35 | 0.28 |
| | | | | | | | | | | | |
| Panel B: Summary statistics for regions | | | | | | | | | | | |
| World | 14,076 | 29.75 | 38.71 | 10.75 | 2.56 | 8.14 | 0.61 | 5.22 | 3.07 | 6.57 | 1.39 |
| Advanced Mkts | 8,710 | 29.35 | 41.69 | 11.24 | 2.72 | 8.46 | 0.83 | 4.91 | 3.62 | 6.30 | 1.46 |
| Emerging Mkts | 5,366 | 30.31 | 34.63 | 10.09 | 2.33 | 7.70 | 0.32 | 5.63 | 2.31 | 6.95 | 1.29 |
| Asia Pacific | 3,287 | 27.76 | 33.32 | 8.30 | 3.11 | 5.14 | 0.53 | 3.72 | 1.85 | 4.54 | 0.26 |
| Developed Europe | 3,102 | 30.11 | 52.66 | 14.86 | 2.97 | 11.80 | 1.08 | 6.69 | 5.14 | 8.38 | 2.55 |
| Emerging Asia | 3,362 | 30.52 | 27.80 | 8.20 | 2.45 | 5.70 | 0.25 | 4.46 | 1.61 | 5.92 | 0.32 |
| Emerging Europe | 559 | 28.68 | 41.61 | 11.74 | 2.46 | 9.23 | 0.76 | 7.09 | 2.04 | 4.43 | 5.42 |
| Latin America | 596 | 31.18 | 45.60 | 13.62 | 1.86 | 11.68 | 0.32 | 5.67 | 6.21 | 11.96 | 0.50 |
| Mid. E and Africa | 849 | 29.76 | 45.48 | 12.85 | 2.24 | 10.50 | 0.30 | 8.86 | 1.69 | 7.76 | 3.00 |
| North America | 2,321 | 30.64 | 39.87 | 10.87 | 1.86 | 9.00 | 0.93 | 4.39 | 4.25 | 6.21 | 1.78 |

## Table A2: Country List

This table reports the list of 64 economies, their advanced economy (AE) indicators according to the IMF, geographic area following Chaieb, Langlois, and Scaillet (2021), and by three-digit country code (ISO3).

| Obs | Country Names | AE Indicator | Geo Area | ISO3 |
|---|---|---|---|---|
| 1 | Australia | 1 | Asia Pacific | AUS |
| 2 | Hong Kong | 1 | Asia Pacific | HKG |
| 3 | Japan | 1 | Asia Pacific | JPN |
| 4 | New Zealand | 1 | Asia Pacific | NZL |
| 5 | Singapore | 1 | Asia Pacific | SGP |
| 6 | South Korea | 1 | Asia Pacific | KOR |
| 7 | Taiwan | 1 | Asia Pacific | TWN |
| 8 | Austria | 1 | Developed Europe | AUT |
| 9 | Belgium | 1 | Developed Europe | BEL |
| 10 | Denmark | 1 | Developed Europe | DNK |
| 11 | Finland | 1 | Developed Europe | FIN |
| 12 | France | 1 | Developed Europe | FRA |
| 13 | Germany | 1 | Developed Europe | DEU |
| 14 | Greece | 1 | Developed Europe | GRC |
| 15 | Iceland | 1 | Developed Europe | ISL |
| 16 | Ireland | 1 | Developed Europe | IRL |
| 17 | Israel | 1 | Developed Europe | ISR |
| 18 | Italy | 1 | Developed Europe | ITA |
| 19 | Netherlands | 1 | Developed Europe | NLD |
| 20 | Norway | 1 | Developed Europe | NOR |
| 21 | Portugal | 1 | Developed Europe | PRT |
| 22 | Spain | 1 | Developed Europe | ESP |
| 23 | Sweden | 1 | Developed Europe | SWE |
| 24 | Switzerland | 1 | Developed Europe | CHE |
| 25 | United Kingdom | 1 | Developed Europe | GBR |
| 26 | Bangladesh | 0 | Emerging Asia | BGD |
| 27 | China | 0 | Emerging Asia | CHN |
| 28 | India | 0 | Emerging Asia | IND |
| 29 | Indonesia | 0 | Emerging Asia | IDN |
| 30 | Kazakhstan | 0 | Emerging Asia | KAZ |
| 31 | Malaysia | 0 | Emerging Asia | MYS |
| 32 | Pakistan | 0 | Emerging Asia | PAK |
| 33 | Philippines | 0 | Emerging Asia | PHL |
| 34 | Sri Lanka | 0 | Emerging Asia | LKA |
| 35 | Thailand | 0 | Emerging Asia | THA |
| 36 | Vietnam | 0 | Emerging Asia | VNM |

**Table A2: Continued**

| Obs | Country Names | AE Indicator | Geo Area | ISO3 |
|---|---|---|---|---|
| 37 | Bulgaria | 0 | Emerging Europe | BGR |
| 38 | Croatia | 0 | Emerging Europe | HRV |
| 39 | Cyprus | 0 | Emerging Europe | CYP |
| 40 | Czech Republic | 0 | Emerging Europe | CZE |
| 41 | Hungary | 0 | Emerging Europe | HUN |
| 42 | Poland | 0 | Emerging Europe | POL |
| 43 | Romania | 0 | Emerging Europe | ROU |
| 44 | Russian Federation | 0 | Emerging Europe | RUS |
| 45 | Ukraine | 0 | Emerging Europe | UKR |
| 46 | Argentina | 0 | Latin America | ARG |
| 47 | Brazil | 0 | Latin America | BRA |
| 48 | Chile | 0 | Latin America | CHL |
| 49 | Colombia | 0 | Latin America | COL |
| 50 | Mexico | 0 | Latin America | MEX |
| 51 | Peru | 0 | Latin America | PER |
| 52 | Egypt | 0 | Mid. E and Africa | EGY |
| 53 | Jordan | 0 | Mid. E and Africa | JOR |
| 54 | Kenya | 0 | Mid. E and Africa | KEN |
| 55 | Kuwait | 0 | Mid. E and Africa | KWT |
| 56 | Nigeria | 0 | Mid. E and Africa | NGA |
| 57 | Oman | 0 | Mid. E and Africa | OMN |
| 58 | Qatar | 0 | Mid. E and Africa | QAT |
| 59 | Saudi Arabia | 0 | Mid. E and Africa | SAU |
| 60 | South Africa | 0 | Mid. E and Africa | ZAF |
| 61 | Turkey | 0 | Mid. E and Africa | TUR |
| 62 | United Arab Emirates | 0 | Mid. E and Africa | ARE |
| 63 | Canada | 1 | North America | CAN |
| 64 | United States | 1 | North America | USA |

## Table A3: FX Risk and Corporate Distress: Foreign Debt Decomposition

This table shows panel regressions in which the dependent variable is the local currency stock returns (*Ret*) in Columns (1) to (3), or changes in default probability ($\Delta PD$) in Columns (4) to (6). Based on the debt maturity, I decompose *FDR* into two parts: *ST FDR* is the short-term foreign currency debt ratio, and *LT FDR* is the long-term foreign currency debt ratio. Based on the debt type and nature, I break down *FDR* into three components: *RC FDR* is the foreign currency debt ratio for revolving credit, *Loan FDR* is the foreign currency debt ratio for term loans, and *Bond FDR* is the foreign currency debt ratio for notes and bonds. Based on the debt currency denomination, I decompose *FDR* into three parts: *USD FDR* is the foreign currency debt ratio for debt denominated in U.S. dollars, *EUR FDR* is the foreign currency debt ratio for debt denominated in euros, and *OTH FDR* is the foreign currency debt ratio for debt denominated in currencies other than dollars and euros. $\Delta EX$ is the log change in the nominal exchange rate, for which $\Delta EX>0$ represents a local currency depreciation against the U.S. dollar. *PD* is obtained from the Credit Research Initiative (CRI) of the National University of Singapore and standardized to facilitate interpretation. *Controls* include the domestic debt ratio, foreign revenue, beta, size, BE/ME, profitability (*ROA*), and investment (*CAPX*). All continuous RHVs are lagged one period, winsorized at 1% and 99%, and standardized to have zero means and unit standard deviations. The sample includes 64 economies and covers the 2006 to 2020 period. I drop observations at the country-month level for countries whose currencies are pegged, using data from Ilzetzki, Reinhart, and Rogoff (2019). Firm-, sector-month, and country-month fixed effects are included in each specification. Standard errors are double clustered at the country and month levels, and *t*-statistics are reported in parentheses. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

| | LHV = Ret | | | LHV = ΔPD | | |
|---|---|---|---|---|---|---|
| | (1) | (2) | (3) | (4) | (5) | (6) |
| $ST \times \Delta EX$ | -0.043 | | | 0.012** | | |
| | (-0.95) | | | (2.23) | | |
| $LT \times \Delta EX$ | -0.073** | | | 0.012*** | | |
| | (-2.32) | | | (2.94) | | |
| $RC \times \Delta EX$ | | -0.052*** | | | 0.003 | |
| | | (-3.61) | | | (1.23) | |
| $Loan \times \Delta EX$ | | -0.020 | | | 0.010*** | |
| | | (-0.68) | | | (3.12) | |
| $Bond \times \Delta EX$ | | -0.106*** | | | 0.011*** | |
| | | (-3.90) | | | (2.89) | |
| $USD \times \Delta EX$ | | | -0.091*** | | | 0.019*** |
| | | | (-2.92) | | | (4.04) |
| $EUR \times \Delta EX$ | | | -0.007 | | | 0.001 |
| | | | (-0.46) | | | (0.92) |
| $OTH \times \Delta EX$ | | | -0.017 | | | 0.003 |
| | | | (-0.27) | | | (1.04) |
| *Controls* | Yes | Yes | Yes | Yes | Yes | Yes |
| *Firm FE* | Yes | Yes | Yes | Yes | Yes | Yes |
| *Ctry-Month FE* | Yes | Yes | Yes | Yes | Yes | Yes |
| *Ind-Month FE* | Yes | Yes | Yes | Yes | Yes | Yes |
| *Observations* | 692,279 | 692,279 | 692,279 | 573,035 | 573,035 | 573,035 |
| *Adj.* $R^2$ | 0.204 | 0.204 | 0.204 | 0.093 | 0.093 | 0.093 |

## Table A4: Foreign Debt and Corporate Vulnerability: FRB Shocks, AE vs. EME

This table presents regression results from estimating Equation 2. The dependent variable is the one-day stock return for non-US firms on U.S. monetary policy announcement dates. I drop observations at the country-month level for countries whose currencies are pegged, using data from Ilzetzki, Reinhart, and Rogoff (2019). Columns (1)–(4) include firms from advanced economies (AE), and Columns (5)–(8) include firms from emerging market economies (EME). $\Delta i_{\$,t}$ is the FRB monetary policy shock, as measured by Acosta and Saia (2020), on FOMC dates. The definitions of *FDR* and its components refer to Table 1. *Controls* include the pre-determined foreign debt ratio, domestic debt ratio, foreign sales, beta, size, BE/ME, profitability, investment, momentum, and volatility. Country-, sector-, and date fixed effects are included in each specification. Standard errors are clustered by date, and $t$-statistics are reported in parentheses. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

| | AE | | | | EME | | | |
|---|---|---|---|---|---|---|---|---|
| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) |
| $FDR \times \Delta i_{\$,t}$ | -0.043** | | | | -0.027* | | | |
| | (-2.02) | | | | (-1.72) | | | |
| $ST \times \Delta i_{\$,t}$ | | -0.005 | | | | 0.004 | | |
| | | (-0.35) | | | | (0.23) | | |
| $LT \times \Delta i_{\$,t}$ | | -0.043* | | | | -0.030** | | |
| | | (-1.73) | | | | (-2.03) | | |
| $RC \times \Delta i_{\$,t}$ | | | -0.006 | | | | -0.016 | |
| | | | (-0.54) | | | | (-0.70) | |
| $Loan \times \Delta i_{\$,t}$ | | | -0.023 | | | | -0.006 | |
| | | | (-1.53) | | | | (-0.54) | |
| $Bond \times \Delta i_{\$,t}$ | | | -0.038* | | | | -0.048** | |
| | | | (-1.85) | | | | (-2.30) | |
| $USD \times \Delta i_{\$,t}$ | | | | -0.047** | | | | -0.043** |
| | | | | (-2.03) | | | | (-2.34) |
| $EUR \times \Delta i_{\$,t}$ | | | | 0.002 | | | | 0.002 |
| | | | | (0.15) | | | | (0.22) |
| $OTH \times \Delta i_{\$,t}$ | | | | -0.011 | | | | 0.023 |
| | | | | (-0.92) | | | | (1.24) |
| *Controls* | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| *Country FE* | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| *Industry FE* | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| *Date FE* | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| *Observations* | 150,755 | 150,755 | 150,755 | 150,755 | 92,748 | 92,748 | 92,748 | 92,748 |
| *Adj.* $R^2$ | 0.034 | 0.034 | 0.034 | 0.034 | 0.032 | 0.032 | 0.032 | 0.032 |

## Table A5: Foreign Debt and Corporate Vulnerability: ECB Shocks

This table presents regression results from estimating Equation 2. The dependent variable is the one-day stock return on ECB policy announcement dates. Regressions exclude firms from countries using the euro. Columns (1) - (4) drop observations at the country-month level for countries whose currencies are pegged, using data from Ilzetzki, Reinhart, and Rogoff (2019). Columns (5) - (8) include firms only from countries with currency pegs. $\Delta i_{e,t}$ is the ECB monetary policy shock as measured by Leombroni, Vedolin, Venter, and Whelan (2021). The definitions of *FDR* and its components refer to Table 1. *Controls* include the pre-determined foreign debt ratio, domestic debt ratio, foreign sales, beta, size, BE/ME, profitability, investment, momentum, and volatility. Country-, sector-, and date fixed effects are included in each specification. Standard errors are clustered by date, and $t$-statistics are reported in parentheses. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

| | Flexible Currencies | | | | Currency Pegs | | | |
|---|---|---|---|---|---|---|---|---|
| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) |
| $FDR \times \Delta i_{e,t}$ | -0.004 | | | | -0.005 | | | |
| | (-0.46) | | | | (-0.14) | | | |
| $ST \times \Delta i_{e,t}$ | | 0.010 | | | | 0.005 | | |
| | | (0.78) | | | | (0.37) | | |
| $LT \times \Delta i_{e,t}$ | | -0.010 | | | | -0.011 | | |
| | | (-1.16) | | | | (-0.32) | | |
| $RC \times \Delta i_{e,t}$ | | | 0.000 | | | | -0.006 | |
| | | | (0.05) | | | | (-0.34) | |
| $Loan \times \Delta i_{e,t}$ | | | -0.012 | | | | 0.002 | |
| | | | (-1.16) | | | | (0.07) | |
| $Bond \times \Delta i_{e,t}$ | | | -0.000 | | | | -0.012 | |
| | | | (-0.01) | | | | (-0.55) | |
| $USD \times \Delta i_{e,t}$ | | | | 0.009 | | | | -0.001 |
| | | | | (1.57) | | | | (-0.04) |
| $EUR \times \Delta i_{e,t}$ | | | | -0.028** | | | | -0.031 |
| | | | | (-2.56) | | | | (-1.12) |
| $OTH \times \Delta i_{e,t}$ | | | | 0.001 | | | | 0.007 |
| | | | | (0.18) | | | | (0.31) |
| *Controls* | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| *Country FE* | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| *Industry FE* | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| *Date FE* | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| *Observations* | 328,049 | 328,049 | 328,049 | 328,049 | 89,707 | 89,707 | 89,707 | 89,707 |
| *Adj.* $R^2$ | 0.052 | 0.052 | 0.052 | 0.052 | 0.085 | 0.085 | 0.085 | 0.085 |

## Table A6: FX Risk and Stock Returns: Purely Domestic Firms

This table shows panel regressions in which the dependent variable is the local currency stock returns (*Ret*). $\Delta EX$ is the log change in the nominal exchange rate, and $\mathbb{1}[\Delta EX>0]$ is a dummy variable that takes the value of one if the local exchange rate is depreciated against the U.S. dollar and zero otherwise. *Beta* is the firm-level market beta, estimated using a 36-month rolling window. *Size* is the log of book assets. *BE/ME* is the book-to-market ratio. *ROA* is the return on assets. *CAPX* is the capital expenditure divided by total assets. All continuous RHVs are lagged one period, winsorized at 1% and 99%, and standardized to have zero means and unit standard deviations. The sample includes 64 economies and covers the 2006 to 2020 period. I restrict the analysis to purely domestic firms with no foreign debt and no foreign revenue exposure in the sample period. I drop observations at the country-month level for countries whose currencies are pegged, using data from Ilzetzki, Reinhart, and Rogoff (2019). In Columns (5) and (6), I classify firms into non-tradable (e.g., construction, transportation, communication, utilities, and services) and tradable sectors (e.g., agriculture, mining, and manufacturing industries) following Alfaro, Asis, Chari, and Panizza (2019). Country-, month-, sector-, sector-month, and firm fixed effects are included across different specifications. Standard errors are double clustered at the country and month levels, and *t*-statistics are reported in parentheses. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

| LHV = Ret | (1) All | (2) All | (3) All | (4) All | (5) Non-tradable | (6) Tradable |
|---|---|---|---|---|---|---|
| $\Delta EX$ | 0.123 | 0.203 | 0.222 | 0.187 | 0.234 | 0.064 |
| | (0.55) | (0.96) | (0.72) | (0.60) | (0.74) | (0.20) |
| $\Delta EX \times \mathbb{1}[\Delta EX>0]$ | | | -0.052 | 0.035 | -0.068 | 0.299 |
| | | | (-0.13) | (0.09) | (-0.17) | (0.80) |
| $\mathbb{1}[\Delta EX>0]$ | | | 0.034 | 0.035 | 0.024 | 0.081 |
| | | | (0.10) | (0.10) | (0.07) | (0.19) |
| *Beta* | 0.101 | 0.100 | 0.099 | 0.132 | 0.173 | 0.040 |
| | (0.95) | (0.95) | (0.95) | (1.15) | (1.49) | (0.36) |
| *Size* | -0.285*** | -0.273*** | -0.273*** | -2.942*** | -2.693*** | -3.824*** |
| | (-3.64) | (-3.65) | (-3.68) | (-10.83) | (-8.83) | (-14.67) |
| *BE/ME* | 0.351*** | 0.345*** | 0.344*** | 1.153*** | 1.119*** | 1.243*** |
| | (8.94) | (8.28) | (8.24) | (16.04) | (15.76) | (12.20) |
| *ROA* | 0.276*** | 0.286*** | 0.286*** | -0.030 | -0.036 | 0.006 |
| | (3.22) | (3.42) | (3.41) | (-0.37) | (-0.39) | (0.09) |
| *CAPX* | -0.088* | -0.089* | -0.089* | -0.057 | -0.059 | -0.035 |
| | (-1.74) | (-1.85) | (-1.85) | (-0.99) | (-1.15) | (-0.44) |
| *Ctry FE* | Yes | Yes | Yes | Yes | Yes | Yes |
| *Month FE* | Yes | Yes | Yes | Yes | Yes | Yes |
| *Industry FE* | Yes | No | No | No | No | No |
| *Ind-Month FE* | No | Yes | Yes | Yes | Yes | Yes |
| *Firm FE* | No | No | No | Yes | Yes | Yes |
| *Observations* | 1,049,791 | 1,049,654 | 1,049,654 | 1,049,561 | 791,652 | 257,907 |
| *Adj.* $R^2$ | 0.075 | 0.094 | 0.094 | 0.100 | 0.097 | 0.102 |

## Table A7: FX Risk, Inter-Firm Linkages, and Corporate Distress: Rivals

This table shows panel regressions in which the dependent variable is the local currency stock returns (*Ret*) or changes in default probability ($\Delta PD$). I restrict the analysis to purely domestic firms with no foreign debt and no foreign revenue exposure. For each domestic firm $i$, its indirect foreign debt (foreign revenue) exposure through inter-firm linkages, *WFDR* (*WForRev*), is constructed as a weighted average of the foreign debt (foreign revenue) from its competitors with foreign exposure. I use either focal firm sales and assets as weights or equal-weighting. $\Delta EX$ is the log change in the nominal exchange rate, for which $\Delta EX>0$ represents a local currency depreciation against the U.S. dollar. *Beta* is the firm-level market beta, estimated using a 36-month rolling window. *Size* is the log of book assets. *BE/ME* is the book-to-market ratio. *ROA* is the return on assets. *CAPX* is the capital expenditure divided by total assets. All continuous RHVs are lagged one period, winsorized at 1% and 99%, and standardized to have zero means and unit standard deviations. The sample includes 64 economies and covers the 2006 to 2020 period. I drop observations at the country-month level for countries whose currencies are pegged, using data from Ilzetzki, Reinhart, and Rogoff (2019). Firm-, sector-month, and country-month fixed effects are included in each specification. Standard errors are double clustered at the country and month levels, and $t$-statistics are reported in parentheses. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

| | LHV = Ret | | | LHV = ΔPD | | |
|---|---|---|---|---|---|---|
| | | Weighted by | | | Weighted by | |
| | Sale | Asset | Equal | Sale | Asset | Equal |
| *WFDR* × $\Delta EX$ | 0.107*** | 0.102*** | 0.102*** | -0.009*** | -0.009*** | -0.011*** |
| | (3.75) | (3.29) | (3.02) | (-2.94) | (-3.22) | (-3.28) |
| *WFDR* | -0.123* | -0.109 | -0.069 | 0.001 | 0.000 | -0.001 |
| | (-1.82) | (-1.65) | (-0.69) | (0.10) | (0.06) | (-0.18) |
| *WForRev* | 0.052 | 0.037 | 0.044 | -0.002 | -0.001 | 0.003 |
| | (1.21) | (0.84) | (0.70) | (-0.59) | (-0.34) | (0.90) |
| *Beta* | 0.438*** | 0.438*** | 0.438*** | -0.026*** | -0.026*** | -0.026*** |
| | (6.66) | (6.66) | (6.64) | (-6.13) | (-6.13) | (-6.16) |
| *Size* | -2.455*** | -2.454*** | -2.456*** | 0.028*** | 0.028*** | 0.028*** |
| | (-14.60) | (-14.61) | (-14.50) | (3.11) | (3.10) | (3.13) |
| *BE/ME* | 1.168*** | 1.168*** | 1.167*** | -0.036*** | -0.036*** | -0.036*** |
| | (16.69) | (16.68) | (16.67) | (-4.10) | (-4.10) | (-4.11) |
| *ROA* | -0.442*** | -0.442*** | -0.442*** | 0.029*** | 0.029*** | 0.029*** |
| | (-6.02) | (-5.99) | (-5.93) | (3.36) | (3.35) | (3.36) |
| *CAPX* | -0.044 | -0.044 | -0.044 | -0.010** | -0.010** | -0.010** |
| | (-1.23) | (-1.26) | (-1.29) | (-2.03) | (-2.03) | (-2.05) |
| *Firm FE* | Yes | Yes | Yes | Yes | Yes | Yes |
| *Ctry-Month FE* | Yes | Yes | Yes | Yes | Yes | Yes |
| *Ind-Month FE* | Yes | Yes | Yes | Yes | Yes | Yes |
| *Observations* | 244,081 | 244,081 | 244,081 | 214,013 | 214,013 | 214,013 |
| *Adj.* $R^2$ | 0.246 | 0.246 | 0.246 | 0.069 | 0.069 | 0.069 |

## Table A8: FX Risk, Inter-Firm Linkages, and Corporate Distress: Suppliers

This table shows panel regressions in which the dependent variable is the local currency stock returns (*Ret*) or changes in default probability ($\Delta PD$). I restrict the analysis to purely domestic firms with no foreign debt and no foreign revenue exposure. For each domestic supplier $i$, its indirect foreign debt (foreign revenue) exposure through inter-firm linkages, *WFDR* (*WForRev*), is constructed as a weighted average of the foreign debt (foreign revenue) from its customers with foreign exposure. I use either focal firm sales and assets as weights or equal-weighting. $\Delta EX$ is the log change in the nominal exchange rate, for which $\Delta EX>0$ represents a local currency depreciation against the U.S. dollar. *Beta* is the firm-level market beta, estimated using a 36-month rolling window. *Size* is the log of book assets. *BE/ME* is the book-to-market ratio. *ROA* is the return on assets. *CAPX* is the capital expenditure divided by the total assets. All continuous RHVs are lagged one period, winsorized at 1% and 99%, and standardized to have zero means and unit standard deviations. The sample includes 64 economies and covers the 2006 to 2020 period. I drop observations at the country-month level for countries whose currencies are pegged, using data from Ilzetzki, Reinhart, and Rogoff (2019). Firm-, sector-month, and country-month fixed effects are included in each specification. Standard errors are double clustered at the country and month levels, and $t$-statistics are reported in parentheses. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

| | LHV = Ret | | | LHV = ΔPD | | |
|---|---|---|---|---|---|---|
| | | Weighted by | | | Weighted by | |
| | Sale | Asset | Equal | Sale | Asset | Equal |
| *WFDR* × $\Delta EX$ | 0.092*** | 0.099*** | 0.106*** | -0.007*** | -0.007*** | -0.008** |
| | (2.77) | (2.94) | (2.94) | (-2.73) | (-2.67) | (-2.17) |
| *WFDR* | 0.064 | 0.053 | 0.050 | 0.000 | 0.001 | 0.002 |
| | (0.63) | (0.55) | (0.48) | (0.19) | (0.77) | (1.01) |
| *WForRev* | -0.048 | -0.044 | -0.075 | 0.000 | -0.000 | -0.002 |
| | (-0.83) | (-0.84) | (-1.53) | (0.00) | (-0.05) | (-0.32) |
| *Beta* | 0.259** | 0.260** | 0.259** | -0.016*** | -0.016*** | -0.016*** |
| | (2.37) | (2.38) | (2.37) | (-4.19) | (-4.36) | (-4.38) |
| *Size* | -2.930*** | -2.931*** | -2.934*** | -0.027 | -0.027 | -0.027 |
| | (-17.16) | (-17.20) | (-17.34) | (-1.56) | (-1.56) | (-1.55) |
| *BE/ME* | 1.349*** | 1.349*** | 1.349*** | -0.035* | -0.035* | -0.035* |
| | (11.13) | (11.12) | (11.14) | (-1.73) | (-1.73) | (-1.73) |
| *ROA* | -0.377*** | -0.377*** | -0.376*** | 0.026*** | 0.026*** | 0.026*** |
| | (-5.30) | (-5.29) | (-5.29) | (5.29) | (5.28) | (5.27) |
| *CAPX* | -0.035 | -0.035 | -0.035 | -0.002 | -0.002 | -0.002 |
| | (-0.90) | (-0.89) | (-0.89) | (-0.66) | (-0.64) | (-0.64) |
| *Firm FE* | Yes | Yes | Yes | Yes | Yes | Yes |
| *Ctry-Month FE* | Yes | Yes | Yes | Yes | Yes | Yes |
| *Ind-Month FE* | Yes | Yes | Yes | Yes | Yes | Yes |
| *Observations* | 175,907 | 175,907 | 175,907 | 150,826 | 150,826 | 150,826 |
| *Adj.* $R^2$ | 0.226 | 0.226 | 0.226 | 0.075 | 0.075 | 0.075 |

## Table A9: FX Risk, Inter-Firm Linkages, and Corporate Distress: Customers

This table shows panel regressions in which the dependent variable is the local currency stock returns (*Ret*) or changes in default probability ($\Delta PD$). I restrict the analysis to purely domestic firms with no foreign debt and no foreign revenue exposure. For each domestic customer $i$, its indirect foreign debt (foreign revenue) exposure through inter-firm linkages, *WFDR* (*WForRev*), is constructed as a weighted average of the foreign debt (foreign revenue) from its suppliers with foreign exposure. I use either focal firm sales and assets as weights or equal-weighting. $\Delta EX$ is the log change in the nominal exchange rate, for which $\Delta EX>0$ represents a local currency depreciation against the U.S. dollar. *Beta* is the firm-level market beta, estimated using a 36-month rolling window. *Size* is the log of book assets. *BE/ME* is the book-to-market ratio. *ROA* is the return on assets. *CAPX* is the capital expenditure divided by the total assets. All continuous RHVs are lagged one period, winsorized at 1% and 99%, and standardized to have zero means and unit standard deviations. The sample includes 64 economies and covers the 2006 to 2020 period. I drop observations at the country-month level for countries whose currencies are pegged, using data from Ilzetzki, Reinhart, and Rogoff (2019). Firm-, sector-month, and country-month fixed effects are included in each specification. Standard errors are double clustered at the country and month levels, and $t$-statistics are reported in parentheses. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

| | LHV = Ret | | | LHV = ΔPD | | |
|---|---|---|---|---|---|---|
| | | Weighted by | | | Weighted by | |
| | Sale | Asset | Equal | Sale | Asset | Equal |
| *WFDR* × $\Delta EX$ | -0.002 | -0.002 | -0.014 | -0.003 | -0.002 | -0.001 |
| | (-0.05) | (-0.08) | (-0.50) | (-0.95) | (-0.78) | (-0.55) |
| *WFDR* | -0.012 | -0.007 | 0.022 | -0.002 | -0.004 | -0.002 |
| | (-0.12) | (-0.07) | (0.18) | (-0.19) | (-0.48) | (-0.30) |
| *WForRev* | -0.045 | -0.049 | -0.090 | -0.003 | -0.003 | 0.002 |
| | (-1.06) | (-1.24) | (-1.46) | (-0.91) | (-1.25) | (0.49) |
| *Beta* | 0.432*** | 0.432*** | 0.431*** | -0.029*** | -0.029*** | -0.029*** |
| | (3.82) | (3.82) | (3.83) | (-4.63) | (-4.64) | (-4.64) |
| *Size* | -2.522*** | -2.524*** | -2.523*** | 0.020 | 0.020 | 0.020 |
| | (-13.49) | (-13.50) | (-13.47) | (0.80) | (0.79) | (0.80) |
| *BE/ME* | 1.265*** | 1.265*** | 1.263*** | -0.014 | -0.014 | -0.014 |
| | (9.95) | (9.96) | (9.93) | (-0.88) | (-0.88) | (-0.88) |
| *ROA* | -0.449*** | -0.449*** | -0.450*** | 0.033*** | 0.033*** | 0.033*** |
| | (-10.20) | (-10.22) | (-10.25) | (5.61) | (5.63) | (5.61) |
| *CAPX* | -0.134** | -0.134** | -0.133** | 0.000 | 0.000 | 0.000 |
| | (-2.04) | (-2.03) | (-2.05) | (0.00) | (0.00) | (0.01) |
| *Firm FE* | Yes | Yes | Yes | Yes | Yes | Yes |
| *Ctry-Month FE* | Yes | Yes | Yes | Yes | Yes | Yes |
| *Ind-Month FE* | Yes | Yes | Yes | Yes | Yes | Yes |
| *Observations* | 205,504 | 205,504 | 205,504 | 175,450 | 175,450 | 175,450 |
| *Adj.* $R^2$ | 0.245 | 0.245 | 0.245 | 0.074 | 0.074 | 0.074 |

## Table A10: Foreign Debt vs. Foreign Revenue: Corporate Distress of Rivals

This table shows panel regressions in which the dependent variable is the local currency stock returns (*Ret*) or changes in default probability ($\Delta PD$). I restrict the analysis to purely domestic firms with no foreign debt and no foreign revenue exposure. For each domestic firm $i$, its indirect foreign debt (foreign revenue) exposure through inter-firm linkages, *WFDR* (*WForRev*), is constructed as a weighted average of the foreign debt (foreign revenue) from its competitors with foreign exposure. I use either focal firm sales and assets as weights or equal-weighting. $\Delta EX$ is the log change in the nominal exchange rate, for which $\Delta EX>0$ represents a local currency depreciation against the U.S. dollar. *Controls* include beta, size, BE/ME, profitability, and investment. All continuous RHVs are lagged one period, winsorized at the 1% and 99%, and standardized to have zero means and unit standard deviations. The sample includes 64 economies and covers the 2006 to 2020 period. I drop observations at the country-month level for countries whose currencies are pegged, using data from Ilzetzki, Reinhart, and Rogoff (2019). Firm-, sector-month, and country-month fixed effects are included in each specification. Standard errors are double clustered at the country and month levels, and $t$-statistics are reported in parentheses. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

| | LHV = Ret | | | LHV = ΔPD | | |
|---|---|---|---|---|---|---|
| | Weighted by | | | Weighted by | | |
| | Sale | Asset | Equal | Sale | Asset | Equal |
| *WFDR* × Δ*EX* | 0.088** | 0.084* | 0.094** | -0.008*** | -0.009*** | -0.011*** |
| | (2.11) | (1.88) | (2.37) | (-3.29) | (-3.75) | (-3.16) |
| *WForRev* × Δ*EX* | 0.067 | 0.060 | 0.032 | -0.002 | -0.002 | 0.000 |
| | (0.97) | (0.93) | (0.71) | (-0.39) | (-0.34) | (0.10) |
| *WFDR* | -0.122* | -0.109 | -0.068 | 0.001 | 0.000 | -0.001 |
| | (-1.80) | (-1.63) | (-0.69) | (0.10) | (0.05) | (-0.18) |
| *WForRev* | 0.053 | 0.037 | 0.043 | -0.002 | -0.001 | 0.003 |
| | (1.17) | (0.82) | (0.69) | (-0.58) | (-0.33) | (0.89) |
| *Controls* | Yes | Yes | Yes | Yes | Yes | Yes |
| *Firm FE* | Yes | Yes | Yes | Yes | Yes | Yes |
| *Ctry-Month FE* | Yes | Yes | Yes | Yes | Yes | Yes |
| *Ind-Month FE* | Yes | Yes | Yes | Yes | Yes | Yes |
| *Observations* | 244,081 | 244,081 | 244,081 | 214,013 | 214,013 | 214,013 |
| *Adj.* $R^2$ | 0.246 | 0.246 | 0.246 | 0.069 | 0.069 | 0.069 |

## Table A11: Foreign Debt vs. Foreign Revenue: Corporate Distress of Suppliers

This table shows panel regressions in which the dependent variable is the local currency stock returns (*Ret*) or changes in default probability ($\Delta PD$). I restrict the analysis to purely domestic firms with no foreign debt and no foreign revenue exposure. For each domestic supplier $i$, its indirect foreign debt (foreign revenue) exposure through inter-firm linkages, *WFDR* (*WForRev*), is constructed as a weighted average of the foreign debt (foreign revenue) from its customers with foreign exposure. I use either focal firm sales and assets as weights or equal-weighting. $\Delta EX$ is the log change in the nominal exchange rate, for which $\Delta EX>0$ represents a local currency depreciation against the U.S. dollar. *Controls* include beta, size, BE/ME, profitability, and investment. All continuous RHVs are lagged one period, winsorized at 1% and 99%, and standardized to have zero means and unit standard deviations. The sample includes 64 economies and covers the 2006 to 2020 period. I drop observations at the country-month level for countries whose currencies are pegged, using data from Ilzetzki, Reinhart, and Rogoff (2019). Firm-, sector-month, and country-month fixed effects are included in each specification. Standard errors are double clustered at the country and month levels, and $t$-statistics are reported in parentheses. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

| | LHV = Ret | | | LHV = ΔPD | | |
|---|---|---|---|---|---|---|
| | | Weighted by | | | Weighted by | |
| | Sale | Asset | Equal | Sale | Asset | Equal |
| *WFDR* × Δ*EX* | 0.052* | 0.065** | 0.070** | -0.006** | -0.006** | -0.007** |
| | (1.67) | (2.04) | (2.01) | (-2.56) | (-2.51) | (-2.08) |
| *WForRev* × Δ*EX* | 0.122*** | 0.108*** | 0.118*** | -0.004 | -0.003 | -0.004 |
| | (3.69) | (3.65) | (5.80) | (-1.05) | (-0.83) | (-1.16) |
| *WFDR* | 0.075 | 0.063 | 0.067 | 0.000 | 0.001 | 0.002 |
| | (0.71) | (0.63) | (0.63) | (0.12) | (0.48) | (0.98) |
| *WForRev* | -0.047 | -0.042 | -0.074 | -0.000 | -0.000 | -0.002 |
| | (-0.80) | (-0.80) | (-1.51) | (-0.00) | (-0.05) | (-0.33) |
| *Controls* | Yes | Yes | Yes | Yes | Yes | Yes |
| *Firm FE* | Yes | Yes | Yes | Yes | Yes | Yes |
| *Ctry-Month FE* | Yes | Yes | Yes | Yes | Yes | Yes |
| *Ind-Month FE* | Yes | Yes | Yes | Yes | Yes | Yes |
| *Observations* | 175,907 | 175,907 | 175,907 | 150,826 | 150,826 | 150,826 |
| *Adj.* $R^2$ | 0.226 | 0.226 | 0.226 | 0.075 | 0.075 | 0.075 |

## Table A12: FX Risk, Inter-Firm Linkages, and Corporate Profitability: Rivals

This table shows panel regressions in which the dependent variable is operating profitability (*OP*) or the profit margin (*PMGN*). *OP* is defined as sales minus the cost of goods sold, minus sales, general, and administrative expenses (excluding research and development expenditures), scaled by total assets. *PMGN* is constructed as the earnings before interest, taxes, depreciation, and amortization, divided by sales. I restrict the analysis to purely domestic firms with no foreign debt and no foreign revenue exposure. For each domestic firm $i$, its indirect foreign debt (foreign revenue) exposure through inter-firm linkages, *WFDR* (*WForRev*), is constructed as a weighted average of the foreign debt (foreign revenue) from its competitors with foreign exposure. I use either focal firm sales and assets as weights or equal-weighting. $\Delta EX$ is the log change in the nominal exchange rate, for which $\Delta EX>0$ represents a local currency depreciation against the U.S. dollar. *Size* is the log of total assets. *Leverage* is the ratio of total debt divided by total assets. *PPE* is property, plant, and equipment, scaled by total assets. *Cash* is the ratio of cash and short-term investments to total assets. All continuous RHVs are lagged one period, winsorized at 1% and 99%, and standardized to have zero means and unit standard deviations. The sample includes 64 economies and covers the 2006 to 2020 period. I drop observations at the country-month level for countries whose currencies are pegged, using data from Ilzetzki, Reinhart, and Rogoff (2019). Firm-, sector-year, and country-year fixed effects are included in each specification. Standard errors are clustered at the country level, and $t$-statistics are reported in parentheses. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

| | LHV = OP | | | LHV = PMGN | | |
|---|---|---|---|---|---|---|
| | Weighted by | | | Weighted by | | |
| | Sale | Asset | Equal | Sale | Asset | Equal |
| *WFDR* × $\Delta EX$ | 0.223*** | 0.223*** | 0.261*** | 0.103* | 0.103* | 0.116** |
| | (3.96) | (3.75) | (4.86) | (1.84) | (1.87) | (2.24) |
| *WFDR* | -0.026 | 0.013 | -0.011 | -0.251 | -0.291 | -0.331* |
| | (-0.21) | (0.10) | (-0.07) | (-1.27) | (-1.51) | (-1.70) |
| *WForRev* | -0.020 | -0.008 | -0.340** | -0.050 | 0.003 | -0.189 |
| | (-0.25) | (-0.10) | (-2.48) | (-0.30) | (0.02) | (-0.96) |
| *Size* | -1.197*** | -1.200*** | -1.200*** | -0.490** | -0.493** | -0.505** |
| | (-4.05) | (-4.08) | (-4.04) | (-2.57) | (-2.64) | (-2.71) |
| *Leverage* | 0.420*** | 0.420*** | 0.424*** | 0.505*** | 0.505*** | 0.506*** |
| | (3.18) | (3.18) | (3.23) | (5.62) | (5.60) | (5.67) |
| *PPE* | 0.365*** | 0.369*** | 0.353*** | 0.057 | 0.056 | 0.049 |
| | (2.86) | (2.90) | (2.77) | (0.29) | (0.29) | (0.25) |
| *OP* | 1.809*** | 1.810*** | 1.807*** | 0.797*** | 0.798*** | 0.794*** |
| | (13.51) | (13.52) | (13.85) | (17.01) | (17.05) | (17.14) |
| *Cash* | -0.655*** | -0.653*** | -0.649*** | -0.455*** | -0.457*** | -0.453*** |
| | (-6.73) | (-6.69) | (-6.84) | (-3.62) | (-3.64) | (-3.58) |
| *Firm FE* | Yes | Yes | Yes | Yes | Yes | Yes |
| *Ctry-Year FE* | Yes | Yes | Yes | Yes | Yes | Yes |
| *Ind-Year FE* | Yes | Yes | Yes | Yes | Yes | Yes |
| *Observations* | 24,085 | 24,085 | 24,085 | 24,085 | 24,085 | 24,085 |
| *Adj.* $R^2$ | 0.715 | 0.715 | 0.715 | 0.861 | 0.861 | 0.861 |

## Table A13: FX Risk, Inter-Firm Linkages, and Corporate Profitability: Suppliers

This table shows panel regressions in which the dependent variable is operating profitability (*OP*) or the profit margin (*PMGN*). *OP* is defined as sales minus the cost of goods sold, minus sales, general, and administrative expenses (excluding research and development expenditures), scaled by total assets. *PMGN* is constructed as the earnings before interest, taxes, depreciation, and amortization, divided by sales. I restrict the analysis to purely domestic firms with no foreign debt and no foreign revenue exposure. For each domestic supplier $i$, its indirect foreign debt (foreign revenue) exposure through inter-firm linkages, *WFDR* (*WForRev*), is constructed as a weighted average of the foreign debt (foreign revenue) from its customers with foreign exposure. I use either focal firm sales and assets as weights or equal-weighting. $\Delta EX$ is the log change in the nominal exchange rate, for which $\Delta EX>0$ represents a local currency depreciation against the U.S. dollar. *Size* is the log of total assets. *Leverage* is the ratio of total debt divided by total assets. *PPE* is property, plant, and equipment, scaled by total assets. *Cash* is the ratio of cash and short-term investments to total assets. All continuous RHVs are lagged one period, winsorized at the 1% and 99%, and standardized to have zero means and unit standard deviations. The sample includes 64 economies and covers the 2006 to 2020 period. I drop observations at the country-month level for countries whose currencies are pegged, using data from Ilzetzki, Reinhart, and Rogoff (2019). Firm-, sector-year, and country-year fixed effects are included in each specification. Standard errors are clustered at the country level, and $t$-statistics are reported in parentheses. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

| | LHV = OP | | | LHV = PMGN | | |
|---|---|---|---|---|---|---|
| | | Weighted by | | | Weighted by | |
| | Sale | Asset | Equal | Sale | Asset | Equal |
| *WFDR* × $\Delta EX$ | 0.137** | 0.136** | 0.171** | 0.178** | 0.176** | 0.168** |
| | (2.25) | (2.06) | (2.63) | (2.43) | (2.42) | (2.10) |
| *WFDR* | 0.036 | -0.025 | 0.082 | -0.451* | -0.447** | -0.645** |
| | (0.23) | (-0.16) | (0.51) | (-1.94) | (-2.06) | (-2.12) |
| *WForRev* | 0.194 | 0.252* | 0.177 | 0.022 | -0.021 | 0.016 |
| | (1.20) | (1.93) | (1.15) | (0.13) | (-0.14) | (0.09) |
| *Size* | -1.789*** | -1.791*** | -1.778*** | 0.099 | 0.099 | 0.092 |
| | (-3.44) | (-3.43) | (-3.41) | (0.23) | (0.23) | (0.22) |
| *Leverage* | 0.301* | 0.301* | 0.301* | 0.010 | 0.009 | 0.008 |
| | (1.73) | (1.72) | (1.75) | (0.10) | (0.08) | (0.08) |
| *PPE* | -0.317** | -0.316** | -0.320** | -0.147 | -0.139 | -0.141 |
| | (-2.58) | (-2.56) | (-2.64) | (-0.35) | (-0.33) | (-0.34) |
| *OP* | 3.982*** | 3.980*** | 3.983*** | 0.415** | 0.415** | 0.417** |
| | (10.48) | (10.49) | (10.47) | (2.55) | (2.54) | (2.58) |
| *Cash* | -1.574*** | -1.575*** | -1.576*** | -0.372** | -0.372** | -0.369** |
| | (-2.79) | (-2.80) | (-2.80) | (-2.44) | (-2.42) | (-2.46) |
| *Firm FE* | Yes | Yes | Yes | Yes | Yes | Yes |
| *Ctry-Year FE* | Yes | Yes | Yes | Yes | Yes | Yes |
| *Ind-Year FE* | Yes | Yes | Yes | Yes | Yes | Yes |
| *Observations* | 18,084 | 18,084 | 18,084 | 16,490 | 16,490 | 16,490 |
| *Adj.* $R^2$ | 0.735 | 0.735 | 0.735 | 0.854 | 0.854 | 0.854 |

## Table A14: Foreign Debt vs. Foreign Revenue: Corporate Profitability of Rivals

This table shows panel regressions in which the dependent variable is operating profitability (*OP*) or the profit margin (*PMGN*). *OP* is defined as sales minus the cost of goods sold, minus sales, general, and administrative expenses (excluding research and development expenditures), scaled by total assets. *PMGN* is constructed as the earnings before interest, taxes, depreciation, and amortization, divided by sales. I restrict the analysis to purely domestic firms with no foreign debt and no foreign revenue exposure. For each domestic firm $i$, its indirect foreign debt (foreign revenue) exposure through inter-firm linkages, *WFDR* (*WForRev*), is constructed as a weighted average of the foreign debt (foreign revenue) from its competitors with foreign exposure. I use either focal firm sales and assets as weights or equal-weighting. $\Delta EX$ is the log change in the nominal exchange rate, for which $\Delta EX>0$ represents a local currency depreciation against the U.S. dollar. *Controls* include size, leverage, tangibility (*PPE*), profitability (*OP*), and cash ratio. All continuous RHVs are lagged one period, winsorized at 1% and 99%, and standardized to have zero means and unit standard deviations. The sample includes 64 economies and covers the 2006 to 2020 period. I drop observations at the country-month level for countries whose currencies are pegged, using data from Ilzetzki, Reinhart, and Rogoff (2019). Firm-, sector-year, and country-year fixed effects are included in each specification. Standard errors are clustered at the country level, and $t$-statistics are reported in parentheses. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

| | LHV = OP | | | LHV = PMGN | | |
|---|---|---|---|---|---|---|
| | Weighted by | | | Weighted by | | |
| | Sale | Asset | Equal | Sale | Asset | Equal |
| *WFDR* × $\Delta EX$ | 0.202*** | 0.202*** | 0.234*** | 0.153*** | 0.149*** | 0.176*** |
| | (3.73) | (3.42) | (4.48) | (3.51) | (3.41) | (3.38) |
| *WForRev* × $\Delta EX$ | 0.068 | 0.067 | 0.092* | -0.161** | -0.146** | -0.204** |
| | (1.49) | (1.47) | (1.70) | (-2.43) | (-2.38) | (-2.35) |
| *WFDR* | -0.027 | 0.012 | -0.013 | -0.247 | -0.288 | -0.327 |
| | (-0.22) | (0.09) | (-0.09) | (-1.24) | (-1.49) | (-1.66) |
| *WForRev* | -0.019 | -0.007 | -0.339** | -0.054 | 0.000 | -0.191 |
| | (-0.23) | (-0.09) | (-2.56) | (-0.30) | (0.00) | (-0.91) |
| *Controls* | Yes | Yes | Yes | Yes | Yes | Yes |
| *Firm FE* | Yes | Yes | Yes | Yes | Yes | Yes |
| *Ctry-Year FE* | Yes | Yes | Yes | Yes | Yes | Yes |
| *Ind-Year FE* | Yes | Yes | Yes | Yes | Yes | Yes |
| *Observations* | 24,085 | 24,085 | 24,085 | 24,085 | 24,085 | 24,085 |
| *Adj.* $R^2$ | 0.715 | 0.715 | 0.715 | 0.861 | 0.861 | 0.861 |

## Table A15: Foreign Debt vs. Foreign Revenue: Corporate Profitability of Suppliers

This table shows panel regressions in which the dependent variable is operating profitability (*OP*) or the profit margin (*PMGN*). *OP* is defined as sales minus the cost of goods sold, minus sales, general, and administrative expenses (excluding research and development expenditures), scaled by total assets. *PMGN* is constructed as the earnings before interest, taxes, depreciation, and amortization, divided by sales. I restrict the analysis to purely domestic firms with no foreign debt and no foreign revenue exposure. For each domestic supplier $i$, its indirect foreign debt (foreign revenue) exposure through inter-firm linkages, *WFDR* (*WForRev*), is constructed as a weighted average of the foreign debt (foreign revenue) from its customers with foreign exposure. I use either focal firm sales and assets as weights or equal-weighting. $\Delta EX$ is the log change in the nominal exchange rate, for which $\Delta EX>0$ represents a local currency depreciation against the U.S. dollar. *Controls* include size, leverage, tangibility (*PPE*), profitability (*OP*), and cash ratio. All continuous RHVs are lagged one period, winsorized at 1% and 99%, and standardized to have zero means and unit standard deviations. The sample includes 64 economies and covers the 2006 to 2020 period. I drop observations at the country-month level for countries whose currencies are pegged, using data from Ilzetzki, Reinhart, and Rogoff (2019). Firm-, sector-year, and country-year fixed effects are included in each specification. Standard errors are clustered at the country level, and $t$-statistics are reported in parentheses. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

| | LHV = OP | | | LHV = PMGN | | |
|---|---|---|---|---|---|---|
| | | Weighted by | | | Weighted by | |
| | Sale | Asset | Equal | Sale | Asset | Equal |
| *WFDR* × $\Delta EX$ | 0.142** | 0.139** | 0.165*** | 0.191** | 0.187** | 0.175** |
| | (2.33) | (2.24) | (2.75) | (2.52) | (2.49) | (2.04) |
| *WForRev* × $\Delta EX$ | -0.016 | -0.013 | 0.020 | -0.044 | -0.037 | -0.023 |
| | (-0.32) | (-0.24) | (0.37) | (-0.37) | (-0.31) | (-0.19) |
| *WFDR* | 0.034 | -0.026 | 0.084 | -0.455* | -0.450** | -0.648** |
| | (0.22) | (-0.17) | (0.52) | (-1.95) | (-2.07) | (-2.15) |
| *WForRev* | 0.194 | 0.251* | 0.176 | 0.023 | -0.021 | 0.017 |
| | (1.20) | (1.93) | (1.14) | (0.14) | (-0.14) | (0.10) |
| *Controls* | Yes | Yes | Yes | Yes | Yes | Yes |
| *Firm FE* | Yes | Yes | Yes | Yes | Yes | Yes |
| *Ctry-Year FE* | Yes | Yes | Yes | Yes | Yes | Yes |
| *Ind-Year FE* | Yes | Yes | Yes | Yes | Yes | Yes |
| *Observations* | 18,084 | 18,084 | 18,084 | 16,490 | 16,490 | 16,490 |
| *Adj.* $R^2$ | 0.735 | 0.735 | 0.735 | 0.854 | 0.854 | 0.854 |