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Bank Loans, Trade Credit and Export Prices:

Evidence from Exchange Rate Shocks in China

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ABSTRACT: This paper examines the impact of trade credit and bank loans on firms' exchange rate passthrough. Using a comprehensive dataset combining customs transaction records and balance sheet data for Chinese exporters during 2000–2011, we document that firms that more intensively extend trade credit to their buyers exhibit more complete exchange rate pass-through. Further empirical investigation sheds light on the underlying mechanism. First, the use of trade credit is positively correlated with exporters' dependence on bank loans. Second, firm-level bank loan interest rates decline following home currency depreciation. Motivated by these findings, we develop a theoretical model in which exporters constrained by working capital simultaneously extend trade credit to buyers and rely on bank borrowing. The model shows that home currency depreciation improves exporters' profitability, lowers default risk, and reduces borrowing costs, ultimately enhancing exchange rate pass-through. By endogenizing the interest rate through firmlevel default risk, the model reveals a novel channel through which firms' financial activities shape the dynamics of exchange rate pass-through.

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WORKING PAPERS

Bank Loans, Trade Credit and Export Prices:

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1. Introduction

Trade credit holds significant macroeconomic relevance in the global economy. Currently, trade finance underpins approximately 80-85% of international trade transactions (International Chamber of Commerce, 2023), underscoring its role as a vital mechanism in facilitating global commerce. Despite its scale, the broader macroeconomic implications of trade credit—especially its role in propagating shocks across countries—remain insufficiently understood. Trade credit effectively represents an intertemporal payment arrangement between exporters and importers, allowing transactions to occur before full settlement. Such intertemporal financing arrangements may interact with exchange rate fluctuations, influencing the pricing behavior of internationally traded goods.

This paper examines how trade credit and bank lending influence the adjustment of export prices to exchange rate fluctuations—that is, the degree of exchange rate pass-through—and investigates the underlying mechanism. Using a rich dataset that links firm-level balance sheets with transaction-level export prices for Chinese exporters, we find that exporters extending more trade credit to foreign buyers exhibit greater exchange rate pass-through—namely, a stronger sensitivity of importer prices, expressed in destination-country currency, to exchange rate shocks.[1] Motivated by these findings, we develop a mechanism in which exporters, constrained by working-capital needs arising from the provision of trade credit, borrow from domestic banks and incur additional financing costs. Banks set interest rates based on firms' perceived default risk, which in turn varies with exchange rate movements. As a result, exporters' marginal financing costs become sensitive to exchange rate shocks, thereby influencing the degree of exchange rate pass-through. We formalize this mechanism within a theoretical framework that endogenizes the interaction between trade credit, bank lending, and exchange rate movements, and use it to quantify the implications for exchange rate pass-through. The model's predictions closely match the micro-level empirical evidence.

We begin by empirically examining how trade credit affects exchange rate pass-through and the mechanisms that underpin this relationship. Our analysis exploits a comprehensive dataset from China covering the period 2000–2011. The dataset integrates three primary sources: (i) firm-level balance sheets that report total revenue, trade credit, long-term debt, and financing costs; (ii) transaction-level Chinese customs records that provide export prices across products and destinations; and (iii) bilateral exchange rates between the Chinese renminbi (RMB) and foreign currencies. Using these data, we document three key empirical findings. First, export prices denominated in the exporter's currency are less sensitive to exchange rate shocks—implying a more complete exchange rate pass-through—for firms that more intensively extend trade credit to their buyers. Second, firm-level borrowing costs—proxied by interest expenses over total debt—decline when the home currency depreciates against the currencies of export destinations. Third, trade credit and bank loans

[1] The international economics literature defines exchange rate pass-through as the change in international prices, expressed in the buyer's currency, in response to a change in the exchange rate. A more complete exchange rate pass-through corresponds to export prices in the seller's currency being less responsive to exchange rate shocks. Throughout the paper, we refer to prices in the exporter's currency as "exporter prices" and those in the destination currency as "importer prices."

are positively correlated at the firm level, indicating complementarity between the two financing instruments. This relationship is particularly strong among larger exporters.

The first empirical finding highlights that extending trade credit moderates the effects of exchange rate shocks on prices in exporter currency, while amplifying the impact on prices in importer currency. The next two findings uncover the link between trade credit and bank financing that underlies this mechanism. When the home currency depreciates, banks lower lending rates for exporters in anticipation of reduced default risk. Lower financing costs are passed through to export prices, given exporters' dependence on trade credit for working capital. In the model, exporters that extend trade credit to buyers must borrow from banks to finance production, creating a link between trade credit provision and external borrowing. This reliance on bank finance adds a marginal financing cost component to export pricing, which declines when banks perceive a lower probability of default following a home-currency depreciation. Moreover, the sensitivity of financing costs to bilateral exchange rate shocks rises with the extent of trade credit extended, since higher trade credit entails greater borrowing and hence greater exposure to repayment risk. Consequently, the degree of trade credit shapes exchange rate pass-through by amplifying the responsiveness of marginal financing costs to exchange rate movements.

These empirical findings motivate a theoretical framework in which trade credit shapes the sensitivity of export price dynamics to exchange rate shocks. The model features a monopolistically competitive export sector and a competitive banking sector, connected through a working-capital constraint generated by the exporter's extension of trade credit. Facing exchange rate shocks, exporters choose prices to maximize expected profits while internalizing two additional margins—the amount borrowed and the probability of default on bank loans—both determined by a firm-specific interest rate. A central feature of the framework is that banks endogenously set interest rates, fully internalizing exporters' default risk—the key source of financial frictions in the model. The model delivers a first-order analytical expression for the equilibrium firm-level interest rate, which adjusts endogenously to exchange rate movements. This endogenous response of interest rates to exchange rate shocks provides the micro-foundation for the exchange rate pass-through patterns observed in the data.

Our model yields three theoretical outcomes. First, the model explicitly characterizes the optimal pricing structure. The export price incorporates an additional marginal financing cost term when the exporter extends trade credit, which increases with the trade credit-to-sales ratio and the firm-specific bank loan interest rate. This marginal financing cost term corresponds to the implicit trade credit premium documented in previous literature[2] and offers an alternative way to measure the price premium when transaction-level trade credit contracts are unobservable. Furthermore, the first-order analytical solution for the firm-level interest rate in equilibrium predicts that the interest rate decreases with a reduction in extended trade credit and with home currency depreciation, which aligns with

[2]See Amberg, Jacobson and von Schedvin (2021).

our empirical findings. Lastly, and serving as the main contribution of the paper, the model predicts that the exchange rate elasticity of importer prices increases in magnitude as exporters grant more trade credit.

We proceed by calibrating the model using reduced-form estimates to quantify the overall exchange rate pass-through at varying levels of trade credit. The simulation results reveal an inverted U-shaped curve for exchange rate pass-through elasticity as the average trade credit share in the economy increases. This finding suggests that while moderate levels of trade credit amplify the pass-through of exchange rate shocks to importer prices, excessively high trade credit shares lead to diminishing effects of exchange rate shocks on importer prices, ultimately producing the observed inverted U-shaped pattern. This result stems from the influence of trade credit share on the response of exporter-specific interest rates to exchange rate shocks. A depreciation of the home currency can either increase borrowing demand or enhance profitability, leading to an ambiguous effect on an exporter's default probability—and, consequently, on the bank loan interest rate. When trade credit extension reaches excessively high levels, the resulting surge in borrowing amplifies the borrowing demand channel, making it the dominant factor in determining the interest rate response to exchange rate shocks. This exerts downward pressure on the exchange rate pass-through elasticity.

Related literature. Our paper contributes to three strands of the literature. The first addresses the determinants of trade credit and its role in international trade. A well-established body of research suggests that financial constraints and trade credit shape firms' domestic pricing strategies, as shown by Gilchrist et al. (2017); Hardy, Saffie and Simonovska (2022); Almut, Balleer; Nikolay, Hristov; Dominik (2017); Kohn, Leibovici and Szkup (2020), yet there is limited evidence on the pricing of internationally traded goods and its implications. A number of papers explore various factors influencing firms' decisions to extend or use trade credit (Antras and Foley, 2015; Ma and Schmidt-Eisenlohr, 2023; Benguria, Garcia-Marin and Schmidt-Eisenlohr, 2023). Relevant studies focus specifically on the effects of trade credit on corporate default risk (Jacobson and Von Schedvin, 2015; Barrot, 2016; Amberg et al., 2021), the transmission of monetary policy (Nilsen, 2002; Adelino et al., 2023), and economic growth (Fisman and Love, 2003). One related line of research examines the role of trade credit in working capital and liquidity propagation. For instance, Desai, Foley and Hines Jr (2016) shows that U.S. multinationals use trade credit to transfer capital from low-tax to high-tax jurisdictions, while Lin and Ye (2018) finds that global liquidity shocks significantly affect multinationals' provision of trade credit to Chinese firms. Related to our research, Hardy, Saffie and Simonovska (2023) explores domestic trade credit relationships and their implications for dollar risk exposure. This paper extends this line of research by investigating the interplay between trade credit and bank loans in the context of exchange rate pass-through. Although explicit trade credit contracts are unobservable, we identify the impact of trade credit on firm borrowing and financing costs through both empirical analysis and theoretical modeling, revealing the mechanism by which trade credit affects the pricing of internationally traded goods and exchange rate pass-through.

Second, this study relates to the body of work on exchange rate pass-through and underlying mechanism. There is a large body of work that focuses on different reasons why the exchange rate pass-through is incomplete, such as markup adjustment, local costs, or barriers to prices adjustment (Amiti, Itskhoki and Konings, 2014; Atkeson and Burstein, 2008b; Campa and Goldberg, 2005; Gopinath, Itskhoki and Rigobon, 2010; Burstein and Gopinath, 2014; Auer and Schoenle, 2016; Berman, Martin and Mayer, 2012; Kim and Lee, 2024). This paper sheds light on an understudied source for facilitating exchange rate pass-through to importer prices, which is trade credit interacted with bank loans. Strasser (2013) explores the effects of credit constraints on exports responses to shocks in terms of prices and quantities in international markets. We contribute to this literature both new empirical evidence and a theoretical model disentangling the mechanism through which the interaction between trade credit and bank loans is connected and how this, in turn, affects the degree of exchange rate pass-through.

Third, our paper contributes to the literature relating firms' liquidity constraints and pricing decisions. Liquidity constraints can be divided into financial constraints related to domestic banks and trade credit. As regards bank loans, Gilchrist et al. (2017) shows that liquidity-constrained firms increased prices during the Great Recession in 2008, while unconstrained firms decreased prices. In contrast, Kim (2021) finds that a negative credit supply shock decreases output prices during the Lehman Brothers failure. In terms of trade credit, Amberg, Jacobson and von Schedvin (2021) finds firms issuing more trade credit increased product prices significantly more during the Great Recession. All of this literature focuses on the domestic prices of firms, while our paper expands into the international markets and, at the same time, combines in a model both mechanisms of the trade credit offered by firms and the financial constraints related to bank loans.

Finally, our paper complements the literature on the financial channel of exchange rates that emphasizes liability dollarization, whereby a dollar appreciation tightens exporters' balance sheets, raises marginal costs, and depresses output and exports (Bruno and Shin, 2023; Ma and Schmidt-Eisenlohr, 2023; Kim and Lee, 2023; Casas, Meleshchuk and Timmer, 2023; Kim, Lee and Lee, 2025). We study a different environment—China during 2000–2011—where corporate borrowing is largely domestic and, critically, predominantly denominated in RMB. As a result, the conventional balance-sheet channel is muted. In this setting, a home-currency depreciation reduces firms' local-currency borrowing costs, and among exporters that rely more on trade credit (and thus on bank finance), this interest-rate or default-risk channel dominates. The result is stronger exchange-rate pass-through to importer prices—the opposite sign of the effect predicted in liability-dollarized economies.

This paper is organized as follows. Section 2 describes the data and institutional background. Section 3 presents the main empirical findings. Section 4 introduces a model that accounts for the empirical patterns and details a mechanism behind these patterns. In Section 5, we calibrate the model and conduct quantification. Section 6 concludes.

2. Data and Institution Background

In this section, we describe the dataset used for our empirical analysis and outline the institutional background.

2.1 Data

Our sample of firms is drawn from two primary data sources in China. First, we obtain firm-level balance sheet data from the survey of Chinese manufacturing firms conducted by the National Bureau of Statistics of China. The survey covers the performance of more than 190,000 manufacturing firms from 2000 to 2011.[3] These survey data provide variables related to the firm's credit conditions, including trade credit (recorded on the balance sheet as accounts receivable), long-term debt, and interest costs. Additionally, we include variables that indicate firm size, such as annual employment and sales. Second, we utilize a panel from Chinese customs that encompasses the universe of Chinese trade transactions with over 80 trade partners. This dataset contains information on export and import flows by firm, product (at the 8-digit HS code level), and trade partners for each year. We merge these two datasets for the period 2000 to 2011 using firm identifiers and construct the sample for our empirical analysis [4].

The dependent variable in our primary empirical analysis is the export price, which is conventionally proxied by unit value, calculated as export value divided by export quantity at the firm-product-destination level. To account for measurement error or compositional changes within HS codes, we exclude observations where the annual percentage change in unit values exceeds 200 percent.

A key variable of interest is the level of trade credit that the exporter extends to buyers. To measure the relative scale of trade credit usage at the firm level, we calculate the trade credit share as the ratio of trade credit to total revenue. Specifically, the trade credit share for firm i in year t is calculated as

$$\phi_{i,t} = \frac{\text{Accounts Receivable}_{i,t}}{\text{Total Revenue}_{i,t}} \tag{1}$$

where the accounts receivable entry in the balance sheet represents the year-end outstanding balance of sales yet to be collected from buyers. The term structure of this variable is ambiguous, as it does not specify the time frame for when the trade credit will be repaid. Therefore, we do not discuss the duration of the trade credit here. In our empirical practice, we use the averaged value of this variable over time to obtain a firm-level measure of trade credit. We will elaborate on key stylized findings related to trade credit from the dataset in the following section. In addition to the firm panel, we also use annually averaged nominal bilateral exchange rates from the IMF to construct exchange rate shocks at the importing-country level. onInstitution Background

[3]We focus on this time period due to data availability.

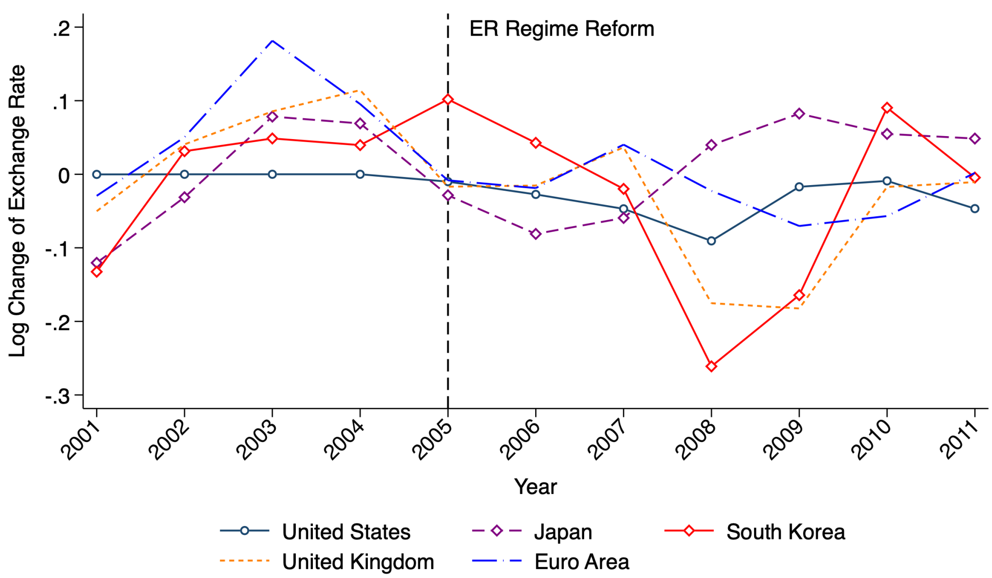
[4]To avoid noise in the survey, we deleted unusual entries, including negatives of key variables in the balance sheet and missing data.

In this section, we introduce the exchange rate regime and the role of trade credit in China, particularly its significance for exporters and implications for firm behavior. Additionally, we discuss the factors determining the trade credit share.

2.2 Institution Background

Exchange Rate Regime in China. Figure 1 shows the paths of bilateral exchange rate shocks between the Chinese RMB and the currencies of major trade partners from 2000 to 2011, reflecting the influence of China's exchange rate regime. Before 2005, the Chinese government maintained a fixed exchange rate policy pegged to the US dollar. As a result, there were no bilateral exchange rate shocks between China and the United States before 2005. In July 2005, China implemented a reform to make its exchange rate more flexible, transitioning to a managed float using a basket of currencies as an anchor and allowing for some fluctuation bands. These bands were frequently adjusted, and the variation in exchange rates increased over time. After temporarily setting aside the goal of a managed floating exchange rate during the financial crisis, the Chinese government renewed its focus on exchange rate flexibility in 2010. Although China's exchange rate was managed during the sample period, significant variation in bilateral exchange rates can still be observed, providing a robust context for empirically examining the impacts of exchange rate fluctuations.

Figure 1: Times Series of Change in Exchange Rates

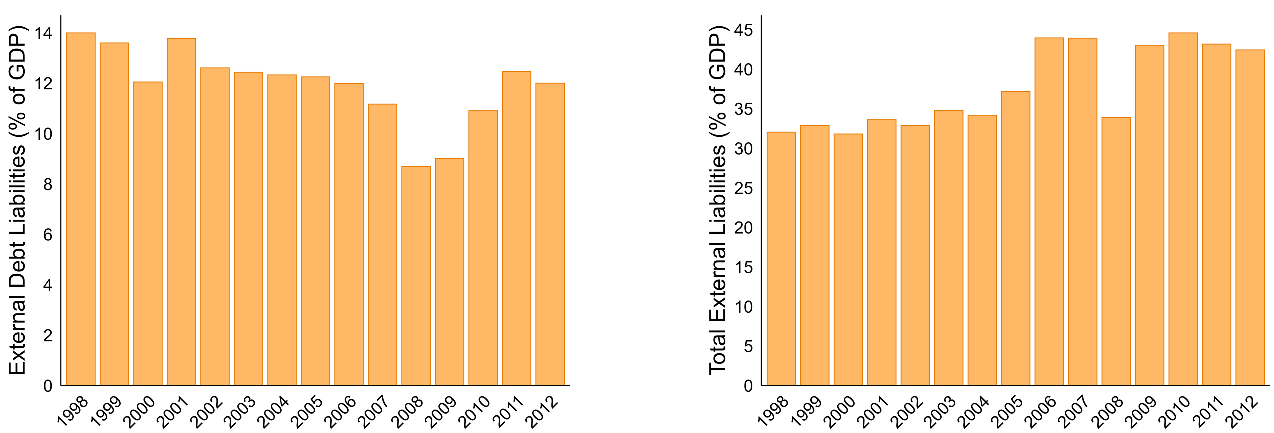


Note: This figure shows the log change of exchange rates between Chinese RMB and foreign currencies from 2001 to 2011. The annual exchange rate is calculated as Chinese RMB per 1 unit of exporting destination's currency averaged from monthly data. The vertical dash line indicates year 2005 when China implemented a reform to make its exchange rate more flexible, transitioning to a managed float using a basket of currencies as an anchor and allowing for some fluctuation bands.

Chinese Foreign Debt. Figure 2 documents the evolution of China's external debt and total external liabilities during 1998–2012 using data from the External Wealth of Nations (EWN) Mark II database (Lane and Milesi-Ferretti, 2007). External debt liabilities remained modest—generally between 9 and 14 percent of GDP—reflecting China's limited reliance on foreign borrowing and the predominance of equity-type liabilities in its external balance sheet. By contrast, total external liabilities (including foreign direct investment and portfolio equity) rose more sharply, underscoring that most external financing entered through FDI rather than debt issuance.

These patterns indicate that, during our sample period, China's corporate sector relied primarily on domestic, Renminbi-denominated borrowing. This feature of China's financial structure plays a central role in our analysis: with limited exposure to foreign-currency debt, the conventional balance-sheet channel of exchange rates—whereby dollar appreciation tightens firms' balance sheets—is largely absent. Instead, exchange-rate movements affect firms mainly through domestic credit conditions and the cost of bank finance, shaping a distinct financial channel of pass-through analyzed below.[5]

Figure 2: China: External Debt and Total Liabilities, 1998–2012



(a) External Debt (% of GDP) **(b)** Total External Liabilities (% of GDP)

Note: Data from the External Wealth of Nations (EWN) Mark II database (Lane and Milesi-Ferretti, 2007). Panel (a) plots China's external debt liabilities as a share of GDP, and Panel (b) shows total external liabilities—including debt and equity—relative to GDP. Both series cover the period 1998–2012.

Trade Credit in Global and Chinese Context. Trade credit is a central margin of external finance in global supply chains and an especially important feature of China's export-oriented economy. Classic theories explain why suppliers lend despite being non-financial intermediaries: they can monitor buyers through repeated transactions, condition future deliveries on repayment, and mitigate diversion of inputs—advantages that banks typically lack (Petersen and Rajan, 1997; Burkart and Ellingsen, 2004; Cunat, 2007; Garcia-Appendini and Montoriol-Garriga, 2013). In international trade, the choice

[5]Institutional features may also influence lending conditions (Bi, Cao and Dong, 2024). Our empirical specifications include firm and time fixed effects, which absorb persistent differences in credit access and policy-related factors.

between open account (post-shipment credit), cash-in-advance, and letters of credit allocates payment risk and working-capital needs across importers, exporters, and banks. Both theory and evidence show that contract choice responds to financial conditions, enforcement quality, and relationship capital (Schmidt-Eisenlohr, 2013; Antras and Foley, 2015). Empirically, firms with limited access to bank finance rely more heavily on supplier credit, and trade credit acts as a stabilizer when bank lending tightens (Fisman and Love, 2003; Garcia-Appendini and Montoriol-Garriga, 2013). During the 2008 global crisis, IMF and World Bank reports documented a sharp contraction in bank-intermediated trade finance and the subsequent scale-up of public facilities—such as the IFC's Global Trade Finance Program (GTFP)—to sustain global trade flows (Ahn, 2020; World Bank, 2017).

China now accounts for roughly one-fifth of world merchandise exports, making it the largest single participant in global production networks where trade credit is most pervasive. Lin and Ye (2018) document that global liquidity shocks—such as the U.S. monetary tightening cycle—significantly affect the supply of trade credit to Chinese firms, illustrating how international financial conditions transmit through supplier financing channels. Cun et al. (2022) find that China's 2005–2011 credit expansion disproportionately benefited upstream, bank-connected industries but failed to spill over through trade credit, limiting the transmission of monetary easing to downstream firms and the broader manufacturing sector. Together, this evidence positions China as a key laboratory for studying the intersection of trade credit, bank lending, and exchange-rate dynamics.

Table 1: Summary Statistics by Firm Size Quartile

	Full Sample		Small Firms (0–25%)		Large Firms (75–100%)	
Variable	Mean	S.D.	Mean	S.D.	Mean	S.D.
Receivables (RMB '000)	23.4	202.7	3.9	23.3	70.0	399.1
Payables (RMB '000)	26.6	242.9	3.6	10.7	88.6	493.2
Debt (RMB '000)	89.1	682.8	12.4	96.3	281.3	1,337.5
Receivables/Sales	0.167	0.199	0.167	0.207	0.169	0.189
Payables/Sales	0.161	0.218	0.153	0.220	0.172	0.207
Interest Rate[a]	0.0316	1.331	0.0269	0.752	0.0252	0.274
Interest Cost (RMB '000)	1.51	14.9	0.18	1.41	4.73	29.4

Notes: Summary statistics on trade credit and debt by firm size. Means and standard deviations (S.D.) are reported separately. Firm-size quartiles are defined by employment, with Quartile 1 (0–25%) representing the smallest and Quartile 4 (75–100%) the largest firms. Receivables denote the value of trade credit extended by exporters; payables denote credit received from suppliers; debt refers to total bank borrowing. Ratios are truncated at 2 to mitigate the influence of outliers. *(a)* Interest rate is defined as interest expenses divided by total debt. The full sample includes all firm–year observations with non-missing employment values. Appendix A.2.3, Table 12, provides an extended version of this table by quartiles.

Table 1 summarizes trade credit and debt by firm-size quartiles. Three patterns stand out. First, both receivables and payables rise monotonically with firm size, consistent with larger firms' broader buyer–supplier networks and greater capacity to intermediate liquidity along the supply chain. Second, payables exceed receivables across all quartiles, indicating that Chinese manufacturers on average receive more supplier credit than they extend. Third, the receivables-to-sales ratio is roughly constant across firm sizes, whereas payables-to-sales decline modestly with size.[6] These patterns reinforce

[6] The implied interest rate—interest expenses divided by total debt—is about 2%, lower than quoted commercial lending

that trade credit is a pervasive financing mechanism in China's export sector, reallocating liquidity toward financially constrained buyers and linking domestic credit conditions to global trade finance. In Section 3, we exploit cross-firm variation in trade-credit intensity to study how exporters' pricing responses to exchange-rate shocks depend on their financing structure, and in Section 4 we formalize the mechanism linking working-capital needs, bank interest rates, and pass-through.

Additionally, the receivables-to-sales ratio is higher for smaller firms, meaning trade credit plays a more significant role in their overall sales. For larger companies, these ratios are lower, indicating that trade credit is less central to their operations, reflecting their ability to manage sales and credit more independently.

The Determinants of Trade Credit Share. We begin by examining how firm characteristics correlate with the use of trade credit, measured as the ratio of accounts receivable to total sales. Table 2 reports estimates based on specifications analogous to Petersen and Rajan (1997), and Love, Preve and Sarria-Allende (2007), emphasizing firm size, leverage, liquidity, and financing constraints as key determinants.

Larger firms, measured by the log of total assets, extend significantly more trade credit relative to sales, consistent with their stronger balance sheets and greater ability to intermediate liquidity along supply chains. Older firms extend less credit, likely reflecting more established buyer relationships and reduced need to use trade credit as a relationship-building device. Firms with higher leverage—whether measured by total or short-term debt to sales—also extend more trade credit, suggesting complementarity between bank borrowing and supplier financing. Profitability is positively associated with trade credit provision, indicating that financially sound firms can afford to finance their buyers, while firms with higher gross margins extend less, consistent with tighter working-capital constraints among low-margin producers. Firms with greater cash holdings also extend more trade credit, while those experiencing rapid sales growth extend less, reflecting liquidity pressures associated with expansion.

The third column introduces the Love, Preve and Sarria-Allende (2007) control set, incorporating explicit liquidity and financing variables. The positive coefficient on cash-to-assets implies that firms with stronger liquidity buffers are more willing or able to provide supplier credit, consistent with trade credit acting as a substitute lending channel when internal funds are ample. Similarly, the positive relationship between short-term debt-to-assets and receivables indicates that firms drawing on bank credit lines also extend more credit to their customers, underscoring complementarity between bank finance and trade credit. By contrast, the negative coefficient on lagged sales growth suggests that rapidly expanding firms curb the provision of trade credit, likely because expansion strains internal liquidity and heightens working-capital needs.

Besides the firm characteristics, the trade credit share is also shaped by various factors related

rates because total debt includes lower-cost obligations such as policy loans or supplier financing, especially among large firms.

Table 2: Determinants of Receivables-to-Sales

	(1) Petersen–Rajan	(2) Petersen–Rajan	(3) Love et al
ln(Total assets)	0.0362***	0.0359***	
	(0.00265)	(0.00210)	
ln(1 + Firm age)	-0.00676***	-0.00682***	
	(0.00130)	(0.00117)	
Total debt / Sales	0.0481***		
	(0.00889)		
Short-term debt / Sales		0.0595***	
		(0.00797)	
Profit / Sales	0.0656***	0.0740***	
	(0.0149)	(0.0130)	
Gross profit	-6.30e-07***	-6.59e-07***	
	(2.85e-08)	(2.78e-08)	
Cash / Total assets			0.1611***
			(0.0224)
Short-term debt / Total assets			0.0432***
			(0.0073)
Sales growth, $t-1$ (%)			-0.000036***
			(0.0000069)
N	385,551	385,091	145,537
R^2	0.609	0.617	0.644
Absorbed FE	Firm, Year	Firm, Year	Firm, Year
Clustered SE	Firm	Firm	Firm

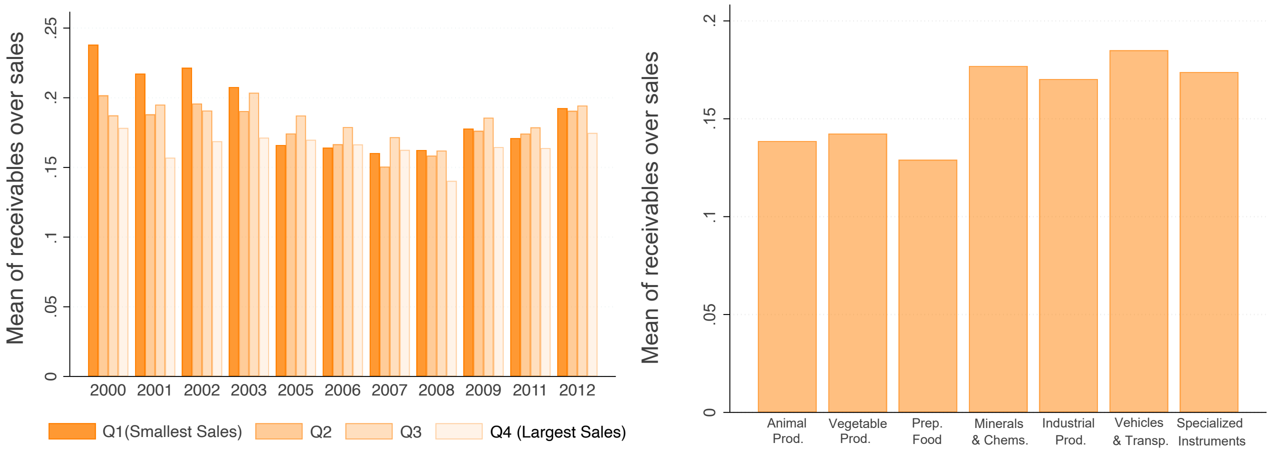
Notes: Dependent variable is accounts receivable divided by total sales. Column (1) follows Petersen and Rajan (1997) using total-debt-to-sales; column (2) replaces it with short-term-debt-to-sales; column (3) follows Love, Preve and Sarria-Allende (2007) with liquidity controls (cash-to-assets, short-term-debt-to-assets) and lagged sales growth. Size is log(total assets); age is $\log(1 + \text{firm age})$; profitability is profit-to-sales; gross profit equals main-business sales minus cost of main business. All regressions include firm and year fixed effects. Standard errors clustered at the firm level. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

to market conditions, financial structures, and institution in China. First, access to formal credit varies across firms, particularly for small and medium-sized enterprises (SMEs), which often turn to trade credit as a supplementary financing tool. While larger firms may have greater access to bank loans, SMEs frequently rely on trade credit to manage liquidity and sustain operations. This reliance suggests that trade credit is influenced by external financial conditions and credit availability rather than purely firm-specific choices.

Second, trade credit arrangements are shaped by broader market forces, including supply chain relationships and competition in international markets. Chinese exporters, for example, frequently extend trade credit to foreign buyers as part of their competitive strategy to secure market share and maintain long-term business relationships. These decisions are influenced by external demand conditions and industry norms rather than solely by a firm's internal financial considerations. As a result, the receivables-to-sales ratio is often driven by factors beyond a firm's direct control, such as global trade dynamics and buyer financing needs.

Lastly, regulatory frameworks and financial policies also play a role in determining trade credit practices. Instruments such as export credit insurance and other policy measures provide firms with additional mechanisms to manage trade-related financing risks. Firms may adjust their trade credit policies in response to these regulatory and policy incentives, reinforcing the idea that trade credit conditions are influenced by external institutional settings.

Figure 3 shows that trade credit shares remain broadly stable across years, sectors, and firm sizes. This limited variation suggests that, at least in the short run, firm-level trade credit shares adjust only gradually and are shaped by relatively persistent factors such as market structures, financing access, and institutional environments.



Panel A: Trade Credit Share Over Time

Panel B: Trade Credit Share Across Sectors

Figure 3: Trade Credit Share Over Time and Across Sectors

Notes: Panel A shows the mean of receivables divided by sales over the years by firm sizes in quartiles according to their sales. Panel B shows the mean of receivables divided by sales across sectors. Sectors are measured as HS2 products.

Although firms can in principle negotiate trade credit terms with their trading partners, the empirical stability of these ratios implies that adjustments are slow and constrained by external conditions. Factors such as credit availability, industry norms, and policy or institutional settings limit the firm's ability to flexibly alter its trade credit exposure in response to shocks. For this reason, we treat the firm-level trade credit share as predetermined in the short run in both our empirical analysis and the model.

To summarize, our analysis reveals substantial variation in trade credit usage among exporters, with trade credit shares demonstrating rigidity across multiple dimensions. We also observe the price premium associated with trade credit extension in export prices. In the following section, we examine how heterogeneous trade credit share influences exchange rate pass-through patterns among Chinese exporters.

3. Empirical Evidence

This section establishes the relationship between export prices and financing practices, including trade credit and bank loans. We begin by showing the relationship between exchange rate pass-through and the trade credit share. Building on this key finding, we empirically investigate the underlying mechanism driven by the interaction between bank loans and trade credit. The section concludes with a series of robustness tests.

3.1 Main Empirical Findings

Fact I: Higher Firm-level Trade Credit Extension is Associated with More Complete Exchange Rate Pass-through.

We begin by examining how exporters adjust prices in response to exchange rate shocks in the context of trade credit usage. In addition to the standard estimation of exchange rate pass-through elasticity, we introduce an interaction term between bilateral exchange rate shocks and the firm-level trade credit share, as defined in equation (1), to capture cross-sectional variation in the pass-through. Our primary empirical specification is constructed as follows.

$$\Delta p_{i,j,k,t} = \underbrace{[\alpha + \beta\phi_{i,0}]}_{1-ERPT} \Delta e_{k,t} + n_{i,t} + \varphi_{j,k} + \varphi_i + \varphi_t + \varepsilon_{i,j,k,t} \tag{2}$$

where $\Delta p_{i,j,k,t}$ represents the log change in the price of good j denominated in the producer's currency (Chinese RMB), exported by firm i to destination country k at time t. $\Delta e_{k,t}$ is the log change in the bilateral exchange rate (Chinese RMB per unit of destination k's currency). An increase in $e_{k,t}$ corresponds to a depreciation of the Chinese RMB relative to the currency of destination k. In our main specification, we use $\phi_{i,0}$ which is firm i's trade credit (receivables) as a share of total sales in the first year that the firm appears in the dataset.

In our exchange rate pass-through regression, we include product-destination fixed effects to control for time-invariant factors like marginal production costs and competitive conditions—such as the number of suppliers in the market, buyer price sensitivity, and market concentration. These fixed effects capture specific characteristics of each product-market pair that might otherwise confound the relationship between exchange rates and pricing. We also add time-fixed effects to control for temporal shocks and global economic conditions affecting all firms simultaneously, such as commodity price fluctuations or global demand changes. Additionally, to account for the role of firm size in exchange rate pass-through, we include $n_{i,t}$, defined as the log of employment for firm i at time t, interacted with the bilateral exchange rate. This term allows us to observe how exchange rate sensitivity changes with firm size, yielding a clearer view of how trade credit and exchange rate dynamics vary across firms of different scales.

The exchange rate pass-through elasticity to be estimated is $\alpha + \beta\phi_{i,0}$. Since we are using export prices in the producer's currency as the dependent variable, complete pass-through of exchange rate shocks to export prices occurs when $\alpha + \beta\phi_{i,0} = 0$. In this case, an x% depreciation of the Chinese RMB would not affect the export price in RMB, but would result in an x% decrease in the good's price denominated in the destination country's currency.

The coefficient β in the regression is our main coefficient of interest. It quantifies the extent to which the trade credit share influences the response of export prices to exchange rate shocks. Even under a fixed exchange rate regime or with minor exchange rate fluctuations, the coefficient β remains meaningful as we include in the regression bilateral exchanges, which means we have many exchange rates besides Chinese RMB-US dollars. Therefore, the exchange rates with other currencies still move even if the Chinese RMB-US dollar exchange rate is fixed. A negative β suggests that a higher ϕ_i enhances the transmission of exchange rate shocks to the price in the buyer's currency, resulting in a more complete exchange rate pass-through. For instance, for a 1% depreciation of the Chinese RMB, the export price in RMB would increase by $\alpha + \beta\phi_i$% for an exporter with a trade credit share of ϕ_i, which is less than that for an exporter who does not extend trade credit.

Table 3 presents the main results from estimating equation (2). We begin by estimating the direct average elasticity of export prices with respect to exchange rate shocks, as shown in column 1. The exchange rate pass-through elasticity to prices in the producer's currency is 0.05 in our sample, which corresponds to a 95 percent pass-through.

Table 3: Trade Credit Share and Exchange Rate Pass-through

Dependent Variable: $\Delta p_{i,j,k,t}$	(1)	(2)	(3)	(4)	(5)	(6)
$\Delta e_{k,t}$	0.0496***	0.0603***	0.0849***		0.0578**	0.133***
	(0.0113)	(0.0140)	(0.0148)		(0.0224)	(0.0510)
$\phi_{i,0}$		-0.0709***	-0.0611***	-0.0665***	-0.104***	-0.104***
		(0.00877)	(0.00819)	(0.00883)	(0.0120)	(0.0120)
$\Delta e_{k,t} \times \phi_{i,0}$		-0.200***	-0.150***	-0.160***	-0.207***	-0.215***
		(0.0408)	(0.0353)	(0.0434)	(0.0531)	(0.0539)
$n_{i,t}$					-0.00596***	-0.00624***
					(0.00189)	(0.00185)
$\Delta e_{k,t} \times n_{i,t}$						-0.0119*
						(0.00649)
Fixed Effects:						
$\varphi_{j,k} + \varphi_i + \varphi_t$	Yes	Yes	No	No	Yes	Yes
$\varphi_{j,t} + \varphi_i + \varphi_k$	No	No	Yes	No	No	No
$\varphi_{j,k,t} + \varphi_i$	No	No	No	Yes	No	No
$\Delta e_{k,t} \times \textit{Import Intensity}_{it}$	No	Yes	Yes	Yes	Yes	Yes
$\Delta e_{k,t} \times \textit{MarketShare}_{i,k,s,t}$	No	Yes	Yes	Yes	Yes	Yes
N	2317813	2317813	2378787	2110993	1612961	1612961
R^2	0.118	0.118	0.0897	0.209	0.149	0.149

Column 2 presents the primary result from our main specification. We use firm fixed effects to account for unobservable time-invariant firm characteristics and time fixed effects to capture changes over the years. Product-destination fixed effects control for specific costs within each product-destination pair. The estimated value of α increases significantly, as the simple average coefficient in column 1 incorporates firm heterogeneity. Firms' trade credit share levels contribute to differing responses of export prices to the same exchange rate shock. Exporters with a higher trade credit share relative to total sales exhibit a higher exchange rate pass-through. Specifically, a 10 percent higher trade credit share results in a 1.92 percent increase in pass-through to export prices. Based on the results in column 2, a firm without delayed payments in sales exhibits a 93 percent (= $1 - 0.0603$) exchange rate pass-through, while a firm with 20 percent of total revenue extended as trade credit demonstrates a 98 percent (= $1 - 0.0603 + 0.2 * 0.2$) exchange rate pass-through.

By controlling for different fixed effects, we can account for unobservable changes in various factors. Column 3 presents the regression results with firm, destination, and product-time fixed effects included in the specification. The product-time fixed effects control for time-varying marginal costs that are common to producers of the same product. The coefficient for the trade credit share interaction term is -0.15, only slightly lower in magnitude compared to that in column 2. In column 4, we introduce even stricter product-destination-time fixed effects to capture all marginal costs that are not firm-specific. The coefficient on the exchange rate shock is absorbed into the fixed effects. Comparing the point estimates in column 4 with those in column 3, the results show little variation, and the estimates remain highly significant.

To assess whether firm size impacts the pass-through of exchange rate shocks to export prices, which could potentially diminish the role of trade credit in this process, we include the log of firm i's employment in year t and an interaction term with the exchange rate shock in the regression. The results are presented in columns 5 and 6 respectively. Compared to the point estimates in column 2, the estimated β remains largely unchanged when controlling for firm size. Column 6 also indicates that firm size does not influence the exchange rate pass-through elasticity.

We also control for firms' market share in export markets, following Atkeson and Burstein (2008a), who define market share as the ratio of a firm's exports of a given product to the total exports of that product to the same destination and in the same year:

$$\textit{Market Share}_{ikst} = \frac{\text{Exports}_{ikst}}{\sum_i \text{Exports}_{ikst}}, \tag{3}$$

where Exports_{ikst} denotes the value of firm i's exports of product s to destination k in year t. This measure captures the firm's relative importance within each product–destination market and accounts for differences in competitive exposure to exchange rate movements. Including market share as a control ensures that our estimates of exchange rate pass-through are not confounded by variation in firms' pricing power associated with their position in the export market.

Since exporters that grant trade credit to their foreign buyers could be also among the largest importers—and given the evidence that more import-intensive exporters exhibit significantly lower exchange rate pass-through into their export prices due to offsetting exchange rate effects on their marginal costs Amiti, Itskhoki and Konings (2014)—we control for this channel. Specifically, we include an interaction term between the bilateral exchange rate shock and the firm's import intensity, measured as:

$$Import\ Intensity_{it} = \frac{\text{Total Imports}_{it}}{\text{Main business cost}_{it}} \tag{4}$$

All specifications in our baseline results incorporate this interaction as a control, and our main results remain unchanged when doing so. In addition, Section 3.3 presents several variations of the import-intensity measure to test the robustness of our findings.

To summarize, our main result demonstrates that the pass-through of exchange rate shocks to export prices varies with the firm-level trade credit share. The empirical analysis shows that the response of export prices to exchange rate shocks is stronger for exporters with a larger share of revenue in trade credit. Section 3.3 provides a series of robustness checks for this empirical finding.

3.2 Mechanism

Building on empirical evidence that a higher trade credit share amplifies the response of export prices in buyer's currency to exchange rate shocks, we seek to elucidate the underlying mechanism by which trade credit plays this role.

Fact II: Firm-level Interest Rate Decreases in Response to Home Currency Depreciation

We estimate equation 5 to examine how proxied firm-level interest rates respond to exchange rate shocks:

$$r_{i,t} = \alpha + \beta \Delta e_{i,t} + \varphi_i + \varphi_t + \varepsilon_{i,t} \tag{5}$$

where $r_{i,t}$ is calculated by financing costs or interest costs over total debt balance outstanding of firm i in year t. We use $r^F_{i,t}$ and $r^I_{i,t}$ to represent them respectively. φ_i and φ_t are firm and time fixed effects. $\Delta e_{i,t}$ is the firm-level exchange rate shock constructed as

$$\Delta e_{i,t} = \sum_{k \in \Omega_{i,t}} \Delta e_{k,t} \times \Gamma_{i,k,t}$$

where $\Gamma_{i,k,t}$ is the exporting share of firm i to destination k in period t. $\Omega_{i,t}$ is the a set of exporting countries of firm i in period t. The regression results are shown in Table 4.

We use costs associated with firm external financing over debt to approximate the firm-level interest rate. Table 4 shows that when the Chinese RMB depreciates relative to the rest of the world, the firm-level interest rate decreases. This finding suggests that banks adjust the financing costs faced by exporters downward in response to home currency depreciation. This adjustment occurs because currency depreciation benefits exporting firms, which are expected to achieve higher profitability. Increased profitability allows exporters to secure more borrowing from local banks at lower interest rates, reflecting a reduced default risk on bank loans. Exporters with external borrowing incorporate marginal financing costs into the pricing of export goods, creating an additional channel for marginal cost sensitivity to exchange rate fluctuations.

We also run equation 5 using trade credit share to examine if firms adjust their trade credit share upon exchange rate fluctuations. Table 4 column 6 shows that firm-level trade credit share generally does not respond to exchange rate shocks, aligning with the assumption that it is relatively rigid in the short run.

Table 4: Firm-level Interests and Exchange Rate Shocks

	(1)	(2)	(3)	(4)	(5)	(6)
Dependent Variables:	$r^F_{i,t}$	$r^F_{i,t}$	$r^F_{i,t}$	$r^I_{i,t}$	$r^I_{i,t}$	$\phi^I_{i,t}$
$\triangle e_{i,t}$	-0.556***	-0.498***	-0.474**	-0.155*	-0.211**	0.00586
	(0.158)	(0.163)	(0.203)	(0.0838)	(0.106)	(0.00460)
$\triangle e_{i,t-1}$			-0.287		-0.00896	
			(0.219)		(0.114)	
Fixed Effects:						
$\varphi_i + \varphi_t$	Yes	No	Yes	No	No	Yes
$\varphi_i + \varphi_{j,t}$	No	Yes	No	Yes	Yes	No
N	347197	346850	196791	360111	202865	402287
R^2	0.511	0.523	0.544	0.595	0.634	0.636

Notes: This table reports the regression results from equation 5. Column 1-3 use financing costs over debt as dependent variable. Column 4-5 use interest costs over debt as dependent variable. Column 3 and 5 also control for lagged-one-year exchange rate shocks. Standard errors are reported in parenthesis. Fixed effects: $\varphi_i + \varphi_t$ is the combination of firm and time effects; $\varphi_i + \varphi_{j,t}$ is the combination of firm and sector-time fixed effects. * Significant at 10 percent level.** Significant at 5 percent level. *** Significant at 1 percent level.

Table 5 further explores the heterogeneity of the interest rate response by distinguishing between firms that use trade credit and those that do not. The results show that only firms with trade credit experience a statistically significant decline in their financing and interest costs following a home currency depreciation, while firms without trade credit exhibit no systematic response. This pattern reinforces the interpretation that financial intermediaries adjust the cost of credit in line with firms' working capital conditions. In particular, exporters that extend or receive trade credit are likely perceived by banks as having stronger revenue prospects and network stability during depreciation, leading to a reduction in their borrowing costs. This evidence supports the idea that the interest rate channel is more relevant among financially connected firms, consistent with the mechanism in our model linking exchange rate movements, expected revenues, and credit conditions.

Table 5: Exchange Rate Shocks and Interest Rates: Firms With vs. Without Trade Credit

Dependent Variables:	(1) $r^F_{i,t}$	(2) $r^F_{i,t}$	(3) $r^F_{i,t}$	(4) $r^I_{i,t}$	(5) $r^I_{i,t}$
Firms with trade credit					
$\Delta e_{i,t}$	-0.580***	-0.531***	-0.506**	-0.156*	-0.228**
	(0.178)	(0.184)	(0.227)	(0.092)	(0.116)
$\Delta e_{i,t-1}$			-0.299		0.013
			(0.230)		(0.117)
N	347,354	347,007	204,151	360,128	210,519
Firms without trade credit					
$\Delta e_{i,t}$	0.725	-0.473	1.395	-0.159	-0.706
	(1.172)	(1.405)	(1.456)	(0.581)	(0.854)
$\Delta e_{i,t-1}$			-0.170		0.593
			(1.822)		(0.671)
N	11,679	10,153	6,893	11,385	6,513
Fixed Effects:					
$\varphi_i + \varphi_t$	Yes	No	Yes	No	No
$\varphi_i + \varphi_{j,t}$	No	Yes	No	Yes	Yes

Notes: Column 1-3 use financing costs over debt as dependent variable. Column 4-5 use interest costs over debt as dependent variable. Column 3 and 5 also control for lagged-one-year exchange rate shocks. Standard errors are reported in parenthesis. Fixed effects: $\varphi_i + \varphi_t$ is the combination of firm and time effects; $\varphi_i + \varphi_{j,t}$ is the combination of firm and sector-time fixed effects. * Significant at 10 percent level. ** Significant at 5 percent level. *** Significant at 1 percent level.

The Impact of Currency Depreciation on Firm Performance. One of the assumptions underlying our mechanism is that firms obtain lower interest rates from banks because banks expect them to become more profitable—specifically, by expanding their sales in export markets. We test this prediction directly. Table 6 reports how firms' outcomes respond to exchange rate changes.

Column 1 shows that quantities increase significantly following an exchange rate depreciation, indicating that firms expand production. Column 2 confirms that exports also rise sharply, consistent with the idea that firms become more competitive abroad. Column 3 shows a smaller but positive response of total sales, while column 4 reports an increase in imports, suggesting higher demand for intermediate inputs. Finally, column 5 shows that accounts receivable rise moderately, consistent with increased activity in foreign markets.

Table 7 reports how firms' borrowing responds to exchange rate movements. The dependent variable is the log change in total debt, and the key regressor is the firm-level exchange rate shock, weighted by export destinations. Across all firms (column 1), a home-currency depreciation is associated with a statistically significant increase in borrowing: a one-percent depreciation raises firms' debt by about 0.11 percent on average. The effect is stronger among firms with high trade credit exposure (column 2), where debt rises by roughly 0.13 percent, consistent with these firms expanding borrowing to finance larger liquidity needs when the domestic currency weakens. In contrast, the

Table 6: Effects of an Exchange Rate Shock on Firm Outcomes

	(1)	(2)	(3)	(4)	(5)
Dependent Variables:	$\Delta \ln(\text{Quantities}_{i,t})$	$\Delta \ln\left(\text{Exports}_{i,t}\right)$	$\Delta \ln(\text{Sales}_{i,t})$	$\Delta \ln\left(\text{Imports}_{i,t}\right)$	$\Delta \ln(\text{Receivables}_{i,t})$
$\Delta e_{i,t}$	0.426***	0.560***	0.135***	0.194*	0.107*
	(0.102)	(0.087)	(0.030)	(0.118)	(0.060)
Fixed Effects:					
$\varphi_i + \varphi_{t,\text{ind}}$	Yes	Yes	Yes	Yes	Yes
N	231,491	231,491	231,491	137,766	231,491
R^2	0.260	0.271	0.332	0.231	0.168

Note: This table reports the response of firm-level outcomes to exchange rate changes. All specifications include firm and industry×time fixed effects as indicated. Standard errors are clustered at the industry×time level.
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

response is smaller and statistically insignificant for firms with low trade credit (column 3) and becomes negative but insignificant among firms without trade credit (column 4). These results suggest that exporters more engaged in trade credit relationships increase their reliance on bank financing following currency depreciation, consistent with the mechanism that stronger export revenues and lower perceived default risks ease credit constraints.

Table 7: Effects of an Exchange Rate shock on Debt

Dependent Variable:	$\Delta \ln(\text{Debt}_{i,t})$			
	(1) **All firms**	(2) **High TC**	(3) **Low TC**	(4) **Without TC**
$\Delta e_{i,t}$	0.1106***	0.1287***	0.0771	-0.3355
	(0.0411)	(0.0462)	(0.0698)	(0.3532)
Fixed Effects:				
$\varphi_i + \varphi_{t,\text{ind}}$	Yes	Yes	Yes	Yes
N	255,184	128,651	96,222	8,353
R^2	0.1917	0.2742	0.2662	0.4410

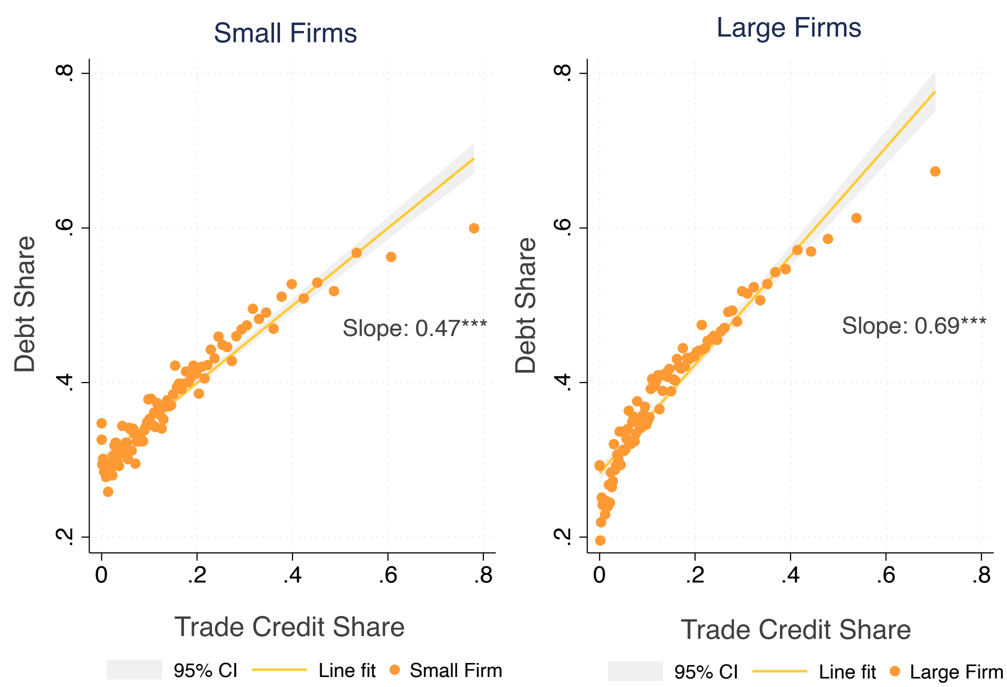
Notes: Standard errors in parentheses, clustered at the industry–time level. Column (1) includes all firms in the sample. Column (2) includes firms with high trade credit, defined as those with receivables above the median. Column (3) includes firms with low trade credit, defined as those with receivables below the median. Column (4) excludes firms without trade credit. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

These results support the assumption that firms benefiting from exchange rate depreciations expand their export activity and, consequently, their expected profitability—consistent with the mechanism through which banks may offer them more favorable lending conditions.

Fact III: Higher Trade Credit is Associated with Higher Bank Loans

Not all Chinese exporters grant trade credit to foreign buyers due to the high liquidity costs involved, as it ties up capital that could otherwise fund production or expansion. However, access to a variety of financial instruments, such as bank loans, often enables firms to provide trade credit without sacrificing operational flexibility. Despite the constraints, trade credit ratios remain relatively stable and rigid, as firms have limited ability to adjust them quickly in response to changing financial conditions or demand. We examine how Chinese exporters strategically use bank loans to cover trade credit costs, maintain cash flow, and balance liquidity needs, aiming to understand the interplay between trade credit practices and financing options in export-driven operations.[7].

Figure 4: Correlation between Trade Credit Share and Bank Loans



Note: This figure shows the relationship between trade credit and bank loans for small and large firms. In the vertical axis, the debt share corresponds to bank loans/sales and, in the horizontal axis, trade credit/sales.

Figure 4 illustrates the interplay between trade credit and outstanding bank loans across the universe of Chinese exporters. In both panels, the debt share is denoted as the ratio between bank loans and sales at the firm level. The trade credit share corresponds to the ratio between the trade credit and sales. The plot is a binscatter showing the relationship between these two variables for two types of firms: small and large.

The main takeaway is that the higher the trade credit granted by the exporter, the higher the debt that the firm holds with domestic banks. The intuition behind this finding is that exporters might face a financial constraint while offering trade credit and will solve it by taking loans from domestic banks.

[7]Studies such as Hardy, Saffie and Simonovska (2022) analyze the relationship between these instruments but from the perspective of the firms receiving trade credit from their suppliers. In this paper, we shift the focus to the suppliers granting trade credit and how the extent of trade credit is related to their access and costs of bank loans.

Figure 4 also reveals that the strength of the relationship between trade credit and bank loans varies with firm size. Small firms find it difficult to support trade credit with bank loans to cover delayed payments. A potential reason for this is small firms have less access to bank loans, while large firms might be automatically connected with banks willing to grant them credits. The lack of access could be translated into higher interests costs of bank loans.

This fact corresponds to a key intuition for our theoretical model. It motivates the connection between domestic banks behavior and exporters' trade credit. In the Appendix, we include more detailed statistics on the relationship between trade credit and other financial instruments.

3.3 Robustness

In this section, we conduct a series of robustness checks on our main specification to further validate the role of trade credit in influencing exchange rate pass-through. These checks include controls for exporters' accounts payable, alternative definitions of trade credit share, the use of alternative samples, dominant currency paradiam (DCP), import intensity, bank access and export share.

Payables and Firm Debt. While exporters extend trade credit to buyers, they concurrently rely on trade credit when sourcing production inputs, resulting in a net balance of trade credit outstanding. Although our paper focuses on how trade credit extended by exporters affects export pricing, one might ask whether the trade credit received by exporters in this context also plays a role in the pricing process. The impact of receiving trade credit on production, however, is complex. On one hand, trade credit defers payment obligations, potentially lowering marginal costs by reducing the immediate need for external financing. Conversely, suppliers can embed a trade credit premium into input prices, which could raise marginal costs of exporters. Both mechanisms may contribute to how export prices respond to exchange rate shocks.

To explore how receiving trade credit might influence the degree to which extending trade credit to buyers affects exchange rate pass-through, we incorporate additional controls for net trade credit balance and accounts payable in the primary regression model. We define $NetReceivables_{i,t}$ as accounts receivables less accounts payable, scaled by total sales, while $Payables_{i,t}$ represents accounts payable as a share of total revenue.

The results in column 1 of Table 8 indicate that an increase in the net accounts receivable share only slightly amplifies the sensitivity of export prices to exchange rate fluctuations. One possible explanation is that receivables carry the meaningful foreign exchange exposure and payables do not, therefore netting the two variables imposes an overly restrictive offset and mechanically attenuates the estimate, understating the total effect. To further dissect the net balance outstanding, we introduce an interaction term between payable share and exchange rate shocks within the primary specification, with and without the trade credit share controls. The results, reported in columns 2 and 3 of Table 8, show that while the interaction coefficient between trade credit share and exchange rate shock

Table 8: Robustness With Payables Controls

Dependent Variable: $\triangle p_{i,j,k,t}$	(1)	(2)	(3)
$\triangle e_{k,t}$	0.0784***	0.106***	0.109***
	(0.0195)	(0.0194)	(0.0197)
$\triangle e_{k,t} \times NetReceivables_{i,t}$	0.0413*		
	(0.0227)		
$\triangle e_{k,t} \times \phi_{i,0}$		-0.152***	-0.180***
		(0.0384)	(0.0380)
$\phi_{i,0}$			-0.0154***
			(0.00330)
$\triangle e_{k,t} \times Payables_{i,t}$		-0.0372**	-0.0368**
		(0.0159)	(0.0159)
Fixed Effects:			
$\varphi_{j,k} + \varphi_t$	Yes	Yes	Yes
N	2588698	2376396	2376396
R^2	0.0761	0.0787	0.0787

Notes: This table reports the results of equation (2) replacing $\phi_{i,0}$ with $NetReceivables_{i,t}$ and including additional variable $Payables_{i,t}$. Standard errors are clustered at country-time level and reported in parenthesis. Products are at 8-digit HS code level. Fixed effects: $\varphi_{j,k} + \varphi_t$ is the combination of product-destination and time fixed effects.
* Significant at 10 percent level.** Significant at 5 percent level. *** Significant at 1 percent level.

decreases slightly, it remains statistically significant and substantial. The interaction between payable share and exchange rate shocks is negative and significant, though notably smaller in magnitude than that of the trade credit share. This finding implies that exporters who receive a higher share of trade credit relative to total sales are more inclined to set lower export prices in the producer's currency when faced with exchange rate shocks. Consequently, they shift a greater portion of exchange rate fluctuations onto importers.

In conclusion, controlling for accounts payable does not significantly alter the coefficient of the interaction term between trade credit share and exchange rate shocks, underscoring the robustness of our primary specification. The findings suggest that export pricing strategies are principally influenced by the trade credit extended to importers, with additional trade credit received by exporters playing a lesser role.

Given the mechanism we propose in the paper, a possible alternative explanation is that the observed effect is not driven by trade credit itself, but rather by firms' overall debt exposure. Since we have already documented that firms with higher debt ratios also tend to hold higher levels of trade credit, the main results might be capturing the effect of overall indebtedness rather than trade credit per se. To address this, we re-estimate the baseline regressions including the share of debt as an additional control variable.

We consider three alternative measures of debt: (i) current debt over current sales, (ii) initial debt over current sales, and (iii) initial debt over initial sales. Table 9 reports the results. Columns 1–2 use current debt over current sales, columns 3–4 use initial debt over current sales, and columns 5–6 use initial debt over initial sales.

Table 9: Exchange Rate Pass-Through with Trade Credit and Debt Controls

Dependent variable: $\triangle p_{i,j,k,t}$	(1)	(2)	(3)	(4)	(5)	(6)
$\triangle e_{k,t}$	0.0950**	0.130***	0.0963**	0.129***	0.0954**	0.133***
	(0.0477)	(0.0497)	(0.0468)	(0.0492)	(0.0475)	(0.0500)
$\phi_{i,0}$		-0.104***		-0.0958***		-0.103***
		(0.0117)		(0.0120)		(0.0116)
$\triangle e_{k,t} \times \phi_{i,0}$		-0.226***		-0.248***		-0.219***
		(0.0590)		(0.0638)		(0.0546)
$n_{i,t}$	-0.00146	-0.00622***	-0.00299	-0.00605***	-0.000639	-0.00588***
	(0.00177)	(0.00184)	(0.00182)	(0.00186)	(0.00182)	(0.00187)
$\triangle e_{k,t} \times n_{i,t}$	-0.00864	-0.0107*	-0.00829	-0.00991	-0.00793	-0.00969
	(0.00627)	(0.00629)	(0.00624)	(0.00628)	(0.00621)	(0.00623)
Debt	-0.00392***	0.000419	-0.0120***	-0.00262		
	(0.00129)	(0.00117)	(0.00230)	(0.00176)		
$\triangle e_{k,t} \times$ Debt	0.00171	0.0171*	-0.00690	0.0144	-0.00746	-0.00386
	(0.00811)	(0.00936)	(0.00831)	(0.0108)	(0.00861)	(0.00874)
Fixed Effects:						
$\varphi_{j,k} + \varphi_i + \varphi_t$	Yes	Yes	Yes	Yes	Yes	Yes
N	1644295	1,644,295	1628559	1628559	1628559	1628559
R^2	0.150	0.150	0.150	0.150	0.150	0.150

Notes: Debt is defined as Debt/Sales. Columns 1–2 use current debt over current sales; columns 3–4 use initial debt over current sales; columns 5–6 use initial debt over initial sales. Standard errors clustered at the country–time level. * Significant at 10 percent level. ** Significant at 5 percent level. *** Significant at 1 percent level.

In all cases, the debt variable is statistically insignificant once trade credit is included, and the coefficient on trade credit remains stable in both magnitude and significance. This indicates that the relationship we document is not driven by firms' overall debt exposure.

Dominant Currency Paradiam (DCP) . A rising literature emphasis the important role of currency invoicing in ERPT (Gopinath, Itskhoki and Rigobon, 2010; Gopinath et al., 2020). In this section, we discuss if currency invoicing affect our mechanism. The Dominant Currency Paradigm (DCP) suggests that a significant share of global trade is invoiced in a small number of dominant currencies, with the U.S. dollar playing an outsized role (Gopinath, Itskhoki and Rigobon, 2010; Gopinath et al., 2020). Under this framework, exporters typically set prices in a dominant currency and adjust them infrequently. In our context, Chinese exporters primarily invoice their goods in U.S. dollars, making the dollar the likely dominant currency.

According to DCP, for exports to non-U.S. countries, exchange rate pass-through into import prices (in the importer's home currency) should be high and largely determined by fluctuations in the dollar exchange rate, rather than the bilateral exchange rate between China and the importing country. In contrast, for exports to the United States, pass-through into U.S. import prices should be relatively low, since both pricing and invoicing occur in dollars.

While the DCP framework may shape exchange rate pass-through patterns, we argue that it does not alter our main conclusions. We leverage a ER regime change in China. From 2001 to 2005, the Chinese currency had a fixed exchange rate with US dollar ($\triangle e_{CN,k,t} = \triangle e_{USD,k,t}$). We conduct three robustness checks: First, we restrict the sample to the period 2000–2011 using only the USD bilateral exchange rate (Column 2, Table 10) and run the following regression:

$$\Delta p_{i,j,k,t} = \left(\alpha + \beta\phi_{i,0}\right) \Delta e^{\$}_{k,t} + n_{i,t} + \varphi_{j,k} + \varphi_i + \varphi_t + \varepsilon_{i,j,k,t} \tag{6}$$

where $\Delta e^{\$}_{k,t}$ is the exchange rate between US dollar and importer's currency in year t. The other variables are the same as those in Equation 2. Second, we split the sample into two sub-periods—2000–2005 and 2006–2011 (Columns 4 and 3 in Table 10, respectively). Third, we broaden the sample to include dollarized or predominantly dollar-invoicing economies (Column 5 in Table 10).

Table 10: Robustness with Dominant Currency Paradigm

Dependent Variables: $\triangle p_{i,j,k,t}$	USD ER (1)	2000-2011 (2)	2006-2011 (3)	2000-2005 (4)	Dollarized (5)
$\triangle e^{\$}_{k,t}$	0.0500***	0.0756***	0.0633***		
	(0.0111)	(0.0128)	(0.0226)		
$\phi_{i,0}$		-0.0677***	-0.0520***	-0.0795***	-0.0940***
		(0.00849)	(0.0133)	(0.0135)	(0.0147)
$\triangle e^{\$}_{k,t} \times \phi_{i,0}$		-0.210***	-0.197***		
		(0.0402)	(0.0719)		
$\triangle e_{k,t}$				0.0611***	0.0717***
				(0.0132)	(0.0245)
$\triangle e_{k,t} \times \phi_{i,0}$				-0.175***	-0.167**
				(0.0498)	(0.0814)
Fixed Effects:					
$\varphi_{j,k} + \varphi_i + \varphi_t$	Yes	Yes	Yes	Yes	No
$\varphi_{j,t} + \varphi_i + \varphi_k$	No	No	No	No	Yes
N	2368425	2368425	1411588	918028	327333
R^2	0.119	0.119	0.169	0.124	0.185

Notes: This table reports the regression results from equation 2 using bilateral exchange rate between US Dollar and currency of country k (USD/currency k), alternative periods, and subsample of export destinations to account for the dominant currency paradigm. Standard errors are clustered at country-time level and reported in parenthesis. Products are at 8-digit HS code level. Fixed effects: $\varphi_{j,t} + \varphi_i + \varphi_k$ is the combination of product-time, firm and country fixed effects; $\varphi_{j,k} + \varphi_i + \varphi_t$ is the combination of product-destination, firm and time fixed effects.
* Significant at 10 percent level.** Significant at 5 percent level. *** Significant at 1 percent level.

In Column 2 in Table 10, we re-estimate our baseline using only the USD exchange rate for all countries between 2000 and 2011. This isolates the role of the dollar as the pricing currency across all destinations, consistent with DCP. In Columns 3 and 4 in Table 10, we split the sample into pre- and post-reform periods. In Column 4, the 2000–2005 window captures the era when the RMB was effectively pegged to the U.S. dollar, implying that bilateral exchange rates with most destinations moved in sync with the dollar. In Column 3, we focus on 2006–2011, when the RMB was allowed to appreciate, and local currency fluctuations became more relevant. In both cases, our key coefficients remain stable.

Finally, in Column 5 in Table 10, we include exports to dollarized economies or countries with widespread dollar invoicing—contexts where DCP is most likely to dominate pricing behavior and bilateral exchange rate pass-through should be minimal. The continued relevance of trade credit in this context reinforces the idea that our mechanism—operating through financing constraints—is orthogonal to pricing currency effects and not simply a reflection of nominal price rigidity under DCP.

Taken together, these tests demonstrate that the dominant currency framework does not overturn our main findings. Even when pricing in dollars, exporters' financial constraints—shaped by trade credit and bank lending—continue to influence the degree of exchange rate pass-through. This highlights a distinct mechanism that operates alongside, but independently from, the dominant currency pricing effects.

Firm Characteristics. We next examine whether firms' financial structures influence the estimated exchange-rate pass-through. We augment the baseline specification with firm-level variables commonly used in the literature to capture financing constraints and liquidity conditions. Following Love, Preve and Sarria-Allende (2007), we include the ratios of liquid assets and short-term debt to total assets, which proxy for internal cash buffers and reliance on short-term credit. Following Petersen and Rajan (1997), we add profitability, leverage, firm size, and age—specifically, profits over sales, gross margins, debt-to-sales ratio, the logarithm of total assets, and $\log(1 + \text{firm age})$.

Each variable enters interacted with the exchange-rate shock, allowing pass-through to vary across firms with different balance-sheet characteristics. This extension is important because firms with stronger liquidity or access to credit may be less likely to adjust prices mechanically to exchange-rate changes—absorbing shocks through margins or financing—whereas more financially constrained firms may transmit exchange-rate movements more directly to prices. Omitting these variables could therefore bias pass-through coefficients upward if financially weaker firms both face higher credit frictions and are more exposed to exchange-rate fluctuations.

As shown in Table 11, the inclusion of financial variables does not materially alter the main results. Exchange-rate pass-through remains statistically significant and of similar magnitude, while the coefficients on liquidity and profitability interactions are modest and consistent with partial cushioning of shocks among less constrained firms. To address potential endogeneity in trade credit intensity, we use firm-level determinants as instruments and re-estimate exchange rate pass-through via 2SLS. The estimates, shown in Appendix Tables 18 and 19, remain stable. These results reinforce

Table 11: Exchange Rate Pass-Through with Firm Financial Characteristics

Dependent variable: $\Delta p_{i,j,k,t}$	(1)	(2)	(3)
$\Delta e_{k,t}$	0.152***	0.031	0.056
	(0.058)	(0.062)	(0.070)
$\phi_{i,0}$	−0.104***	−0.103***	−0.103***
	(0.012)	(0.012)	(0.012)
$\Delta e_{k,t} \times \phi_{i,0}$	−0.209***	−0.233***	−0.222***
	(0.054)	(0.060)	(0.060)
Fixed effects:			
$\varphi_{j,k} + \varphi_i + \varphi_t$	Yes	Yes	Yes
Other controls:			
Employment, market share, import intensity	Yes	Yes	Yes
Liquidity and short-term financing ratios	Yes	No	Yes
Profitability, leverage, size, and age	No	Yes	Yes
N	1,612,961	1,612,888	1,612,888
R^2	0.149	0.149	0.149

Notes: The dependent variable is the change in the log import price at the firm–product–destination–month level. All specifications include product–destination, firm, and time fixed effects. Employment controls include employment levels and their interactions with the exchange-rate shock. Liquidity and short-term financing ratios follow Love, Preve and Sarria-Allende (2007) and include liquid assets and short-term liabilities over total assets. Profitability, leverage, size, and age controls follow Petersen and Rajan (1997) and include profits over sales, gross margins, debt-to-sales ratio, log(assets), and $\log(1 + \text{firm age})$. All financial variables enter interacted with the exchange-rate shock. Standard errors are clustered at the country–period level. *, **, *** denote significance at the 10%, 5%, and 1% levels, respectively.

that the baseline estimates capture genuine pricing-to-market behavior rather than differences in firms' financial capacity to smooth shocks.

Bank Access. As a further robustness test, we examine whether local banking access affects the sensitivity of exporters' prices to exchange rate shocks. A greater number of nearby bank branches can improve exporters' access to external financing and hedging instruments, potentially mitigating financial frictions that influence exchange rate pass-through. Table 13 in Appendix reports the results when we augment our baseline specification with the log of one plus the number of commercial bank branches within a given radius of each exporter, as well as its interaction with the bilateral exchange rate shock. Across all specifications, the estimated coefficients on the main variables—the exchange rate change ($\Delta e_{k,t}$), the trade credit share ($\phi_{i,0}$), and their interaction—remain stable and statistically significant, consistent with our baseline findings in Table 3.

Export Share. Table 14 in Appendix reports the distribution of firms' export shares. The majority of firms export only a small fraction of their sales: over 95 percent of firm–year observations have export shares below 0.2.[8] Table 15 in Appendix examines how exchange rate pass-through (ERPT)

[8]Approximately 69,000 observations report an export share greater than one. In this table, these values are capped at one. Such cases likely reflect timing mismatches between the survey and customs data. We retain these observations to

varies with firms' export intensity. The estimated effect of the trade credit share on exchange rate pass-through remains robust after adding export share controls.

Import Intensity. We explore two alternative measures of import intensity. The first, used in the baseline regressions, is defined at the firm–time level for each period. The second is a firm-level measure, constructed as the average of the variable across all periods.

Table 16 in Appendix reports the distribution of these variables, while Table 17 in Appendix presents the baseline regressions that control for the interaction between the bilateral exchange-rate shock and each import-intensity measure. The distributions closely resemble the patterns documented in Amiti, Itskhoki and Konings (2014). Moreover, the estimated coefficients on import intensity are very similar to those in that paper, and the coefficient on trade credit is essentially unchanged relative to the baseline across all specifications. These results indicate that our main findings are not sensitive to how import intensity is measured.

Alternative Trade Credit Share Measures. As discussed in Section 2.2, we observe that the average trade credit to total revenue ratio remains consistent over time and stable across different groups, emphasizing the rigidity of this trade credit measure. To ensure that the results are not sensitive to how we construct the firm-level trade credit share, we employ a range of alternative methods and fixed effects to address this issue. The results are reported in Table 20 in the Appendix. Using time-varying, lagged time-varying, initial-year trade credit share (based on the first year the firm appears in the dataset), and the average trade credit share across years, the estimated coefficients remain consistent and robust, as shown in Table 3.

Alternative Samples. To further assess the robustness of our results, we conduct analyses on alternative subsamples of the dataset, varying both time periods and export destinations. The results, presented in Table 21 in the Appendix, reflect similar patterns to those observed in the benchmark regression.

4. Theoretical Framework

Motivated by the empirical findings, this section introduces a theoretical framework to show how firm-level trade credit intensity shapes the degree of exchange rate pass-through to export prices. Our model combines key features of trade credit provision, bank financing, and default risk in a coherent partial equilibrium setting.

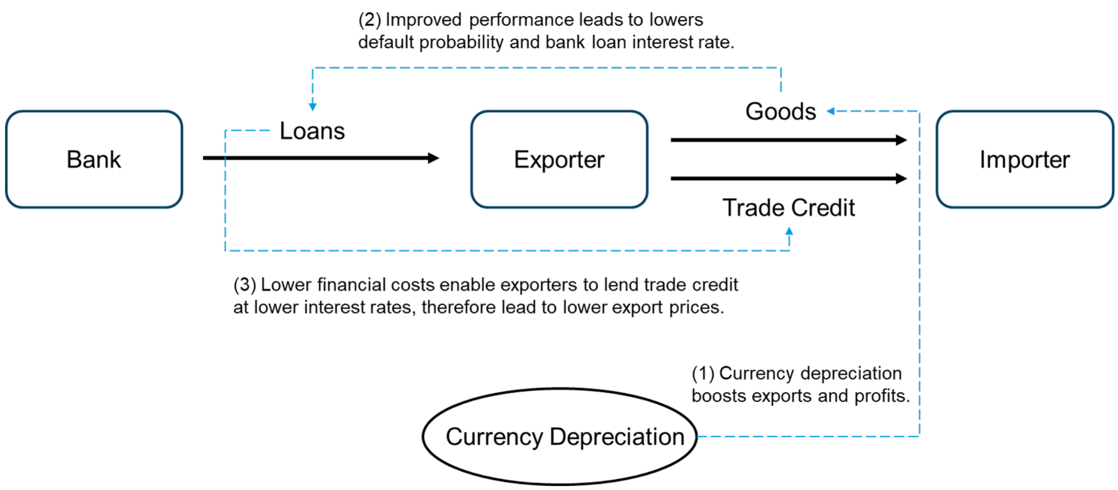
4.1 Model Setup

There is one source country, denoted by m, and multiple destination countries denoted by $k \in K$ and multiple sectors indexed by $s \in S$. In our model there are three groups of agents: exporters, foreign

maintain consistency with the baseline sample.

buyers and domestic banks. Exporters are monopolistic competitive variety producers in the source country. The domestic banking sector is perfectly competitive. There are two exogenous shocks: an exchange rate shock and a liquidity shock. Exporters sell their goods to foreign buyers, offering them delayed payment options (trade credit) while seeking loans from domestic banks. In Figure 5 we illustrate the connection between the agents, and in the remainder of this section, we describe each agent and their maximization problem in detail.

Figure 5: Model Environment and Mechanism



This figure displays the model environment and key mechanism. This figure illustrates the mechanism through which currency depreciation affects exporter behavior. Currency depreciation increases exporter profits (1), reducing default risk and lowering loan interest rates from banks (2). These lower financial costs, in turn, enable exporters to offer trade credit at lower rates, facilitating increased exports through more competitive pricing (3).

The timeline of trade and financial contracting is as follows. First, exchange rates and trade credit shares are realized. Second, the bank sets an interest rate to the exporter. Third, the exporter sets prices, borrows bank loans, and receives prepayments from buyers. Fourth, an exogenous liquidity shock is realized, reducing export profits. Fifth, the variety arrives at the destination, buyers finish the payments, and the exporter decides whether to default to the bank. In the end, the bank collects the repayments. This timeline is illustrated in Figure 6.

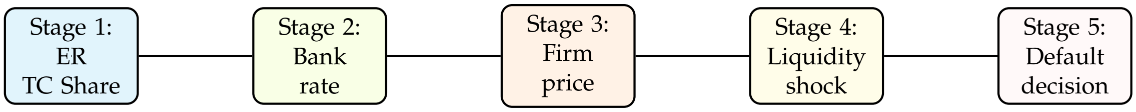
4.2 Foreign Buyers

The consumer preference in country k is characterized by a Cobb-Douglas aggregator $U_k = \prod_{s=1}^{S} Q_{ks}^{\theta_{ks}}$ over CES aggregators over varieties in each sector

$$Q_{ks} = \left[\sum_{i \in \Omega_{ks}} \gamma_{ik}^{1/\varepsilon} q_{ik}^{(\varepsilon-1)/\varepsilon} \right]^{\varepsilon/(\varepsilon-1)} \tag{7}$$

where θ_{ks} is the share of each sector in country k's total expenditure ($\theta_{ks} \in (0,1)$ and $\sum_s \theta_{ks} = 1$), Ω_{ks} is the set of varieties in sector s available to country k, γ_{ik} is a demand shifter reflecting country-specific

Figure 6: Timeline of stages in the model



This figure displays the model timeline. First, exchange rates and trade credit shares are realized. Second, the bank sets an interest rate to the exporter. Third, the exporter sets prices, borrows bank loans, and receives prepayments from buyers. Fourth, an exogenous liquidity shock is realized, reducing export profits. Fifth, the variety arrives at the destination, buyers finish the payments, and the exporter decides whether to default to the bank. In the end, the bank collects the repayments.

preference in a variety and ε is the elasticity of substitution ($\varepsilon > 1$). Thus, country k's demand for a variety can be expressed as a decreasing function of the price p^*_{ik}:

$$q_{ik} = \gamma_{ik}\theta_{ks}Y_k p_{ik}^{*-\varepsilon} P_{ks}^{\varepsilon-1} \tag{8}$$

where P_{ks} is the sectoral price index in country k. We define the exchange rate e_{mk} as units of Chinese currency (*Renminbi*, RMB) per currency of the destination country k. An increasing e_{mk} indicates RMB depreciation relative to currency k.[9]

4.3 Exporters

Financing, liquidity shock and default. Exporters face liquidity constraints in financing their working capital, meaning that the variable cost has to be covered through borrowing. There are two ways to finance working capital, as shown in Figure 5. First, the exporter can request an upfront payment from its foreign buyer at the beginning of the period. When the variety arrives at the destination, the buyer can transfer the rest of payments to the exporter. The end-of-period payments are defined as trade credits, which is known as receivables. Trade credit share ϕ_i is the share of receivables over sales. In this model, we assume that ϕ_i is exogenously determined. Second, the exporter can borrow bank loans b_{ik} at a given interest rate r_{ik}. The exporter can default on the bank loans. The bank expects to collect the loan repayments with probability $\lambda_{ik} \in (0, 1)$. In the model, λ_{ik} is endogenously determined by the exchange rate between country m and k.

The uncertainty of default is introduced by an liquidity shock. The exporter defaults to bank loans if the exogenous liquidity shock reduces total profits to less than zero. Thus, default probability λ_{ik} is

$$\lambda_{ik} = Pr[\pi_{ik} - F_{ik} < 0], \tag{9}$$

where $\pi_{ik} = p^*_{ik}e_{mk}q_{ik} - \tau_{mk}c_{ms}q_{ik} - r_{ik}b_{ik}$ is the profit and F_{ik} is an exogenous liquidity shock. Suppose the liquidity shock follows a probability distribution characterized by the cumulative distribution

[9] For simplicity, we use k to denote both the destination country and its currency.

function $G(F)$ and has a mean value of $\bar{F}$. The default probability can be expressed as

$$\lambda_{ik} = 1 - G(\pi_{ik}). \tag{10}$$

Exporter's Problem. Firms in country m can export to each country k by incurring iceberg trade costs such that $\tau_{mk} > 1$ units of a variety need to be exported for each unit to arrive at the destination. Exporters choose export price and quantity in each market k to maximize expected profits:

$$\Pi_{ik} = (1 - \lambda_{ik})(\pi_{ik} - \bar{F}) = (1 - \lambda_{ik})\left(p^*_{ik} e_{mk} q_{ik} - \tau_{mk} c_{ms} q_{ik} - r_{ik} b_{ik} - \bar{F}\right) \tag{11}$$

subject to foreign demand (Equation 8), default probability (Equation 10) and credit constraint

$$(1 - \phi_i) p^*_{ik} e_{mk} q_{ik} + b_{ik} \geq \tau_{mk} c_{ms} q_{ik}. \tag{12}$$

The profit expression indicates that the exporter earns profits equal to sales revenue minus variable production costs, borrowing costs, and the expected liquidity shock, provided the contract is fully enforced. In the event of default, the exporter earns no profits. The credit constraint captures the fact that the exporter finances its variable production costs through a combination of prepayments from buyers and bank borrowing.

Notice that the exporter's default probability explicitly depends on the export price, as the price directly influences sales revenue, borrowing needs, and thus liquidity risk. To analytically solve the exporter's profit maximization problem with this endogenous default probability, we introduce the following lemma, which shows that the maximization of expected and variable profits are equivalent.

Lemma 1. *Conditional on firm entering the market, maximizing expected profits Π_{ik} is equivalent to maximizing variable profits π_{ik}:*

$$\frac{\partial \pi_{ik}}{\partial p^*_{ik}} = 0 \Leftrightarrow \frac{\partial \Pi_{ik}}{\partial p^*_{ik}} = 0, \quad \frac{\partial^2 \pi_{ik}}{\partial p^{*2}_{ik}} < 0 \Leftrightarrow \frac{\partial^2 \Pi_{ik}}{\partial p^{*2}_{ik}} < 0$$

Proof. See Appendix A.1.1 □

Given Lemma 1, the optimal export price can be solved as

$$p^*_{ik} = \left(\frac{\varepsilon}{\varepsilon - 1}\right) \frac{\tau_{mk} c_{ms}}{e_{mk}} \frac{1 + r_{ik}}{1 + (1 - \phi_i) r_{ik}}. \tag{13}$$

Equation (13) illustrates the impact of trade credit share on the firm's pricing in international markets. Beyond the standard factors governing export price such as the exchange rate e_{mk}, the markup $\frac{\varepsilon}{\varepsilon-1}$, trade cost τ_{mk} and marginal input costs c_{ms}, the export price expressed in the destination country's local currency is also shaped by firm-specific marginal financing costs. These costs arise from the interaction between trade credit and bank borrowing, and are captured by the term $\frac{1+r_{ik}}{1+(1-\phi_i)r_{ik}}$.

This component introduces heterogeneity across firms by linking financing to pricing behavior.

This marginal financing costs corresponds to the trade credit premium discussed in Section 2.2. Since the model is structured within a single period, there is no term structure for the implicit trade credit premium; rather, this financial term indicates the implicit trade credit interest rate. The implicit trade credit interest rate functions similarly to the principles of a conventional credit market: a higher trade credit share (ϕ_i) indicates that the exporter extends more credit to buyers relative to sales, while a higher bank interest rate (r_{ik}) increases the opportunity cost of lending, thereby making firm-to-firm trade credit more costly. We summarize the theoretical results in Proposition 4.1.

Proposition 4.1. ***Exporters lending trade credit more intensively set higher exporting prices.*** *Exporters charge a trade credit premium, which is embedded in the export good price when trade credit is offered. The trade credit share, ϕ_i, and the external finance interest rate, r_{ik}, jointly determine the implicit trade credit interest rate. All else being equal, a higher trade credit share or a higher interest rate leads to an increase in the implicit trade credit interest rate, which, in turn, raises the export price:*

$$\frac{\partial p^*_{ik}}{\partial \phi_i} > 0, \quad \frac{\partial p^*_{ik}}{\partial r_{ik}} > 0. \tag{14}$$

Proof. See Appendix A.1.2 □

4.4 Banks

In the perfectly competitive banking market, banks set the interest rate r_{ik} by equating the expected return on lending to exporters with the alternative risk-free return r_f. Assuming the recovery amount in the event of borrower default is zero, the bank sets r_{ik} by solving

$$b_{ik}(1 + r_f) = (1 - \lambda_{ik})(1 + r_{ik})b_{ik} + \lambda_{ik} \cdot 0 \tag{15}$$

From this, the firm-level interest rate is calculated as

$$r_{ik} = \frac{r_f + \lambda_{ik}}{1 - \lambda_{ik}} \tag{16}$$

Equation (16) illustrates the intuitive relationship where the bank sets a higher loan interest rate to compensate for a higher default probability.

4.5 Equilibrium

Suppose the liquidity shock F_{ik} follows a uniform distribution over the range $[0, F^H]$[10]. By equation (10), the default probability is given by

$$\lambda_{ik} = 1 - \frac{\pi_{ik}}{F^H} \tag{17}$$

[10] We assume that the lower bound of the distribution for F_{ik} is 0 to focus on liquidity shocks that only reduce net profits and the firm's ability to repay.

Combining equations (13), (16) and (17) and applying a first-order approximation to r_{ik}, we can solve for the equilibrium interest rate[11]

$$r_{ik} = \frac{\xi_{ik} e_{mk}^{-\varepsilon} - 1}{2 - \varepsilon \phi_i} \tag{18}$$

where $\xi_{ik} = \frac{1+r_f}{\gamma_{ik}} F^H (\varepsilon - 1) \left(\frac{\varepsilon}{\varepsilon - 1} \tau_{mk} c_{ms} \right)^{\varepsilon} \left(\frac{\theta_{ks} Y_k}{P_{ks}^{1-\varepsilon}} \right)^{-1} (\tau_{mk} c_{ms})^{-1}$ is the inverse of a positive combination of exogenous country, sectoral, and variety demand shocks, excluding the exchange rate shock.[12]. A lower ξ_{ik} indicates an increase in demand for variety i in destination k, leading to higher profitability for the exporter and resulting in a lower r_{ik}.

Home currency depreciation increases the demand for goods exported from China to country k, reducing the default probability for all firms exporting to that market, prompting the bank to lower the interest rate.

Given that the interest rate is responsive to exchange rate shocks, equation (18) further demonstrates how the trade credit share ϕ_i influences the elasticity of interest rate with respect to exchange rate shocks. We summarize this in Proposition 4.2.

Proposition 4.2. ***Interest Rate Sensitivity to Exchange Rate Movements and Trade Credit Share***
In a perfectly competitive banking market, the bank sets the interest rate based on the exporter's default probability. Under mild regularity conditions, the equilibrium interest rate decreases with a depreciation of the home currency and increases with the trade credit share extended by the exporter to buyers.

$$\frac{\partial r_{ik}}{\partial e_{mk}} < 0, \quad \frac{\partial r_{ik}}{\partial \phi_i} > 0$$

Proof. See Appendix A.1.4 □

4.6 Exchange Rate Pass-through

Armed with Proposition 4.1 and 4.2, we examine how the pass-through of bilateral exchange rate shocks to export prices is affected by the trade credit share that exporters extend to buyers:

$$\Psi_{ik}^* \equiv \frac{\partial \log p_{ik}^*}{\partial \log e_{mk}} = -1 + \psi_{ik} + \frac{\phi_i}{(1 + r_{ik})[1 + (1 - \phi_i) r_{ik}]} \frac{\partial r_{ik}}{\partial \log e_{mk}} \tag{19}$$

where $\psi_{ik} \equiv \frac{\partial \log \frac{\varepsilon}{\varepsilon - 1} \tau_{mk} c_{ms}}{\partial \log e_{mk}}$ includes the elasticities of variables with respect to exchange rate shocks that have been studied in previous literature (e.g., markups or marginal costs from inputs[13]). Complete exchange rate pass-through occurs when $\Psi_{ik}^* = -1$, meaning that p_{ik}^* decreases by the same percentage as the home currency depreciates. Empirical and theoretical evidence shows that ψ_{ik} is positive, leading to exchange rate pass-through being less than 1. With trade credit lending, the response

[11] See Appendix A.1.3 for derivation of r_{ik} and the detailed form of ξ_{ik}.
[12] The unit of ξ_{ik} is (RMB/currency of country k)$^{\varepsilon}$
[13] See Amiti, Itskhoki and Konings (2014); Juarez (2024), among others.

of the firm-level bank loan interest rate to exchange rate shocks enters the process of determining exchange rate pass-through and mitigates the incompleteness.

To further explore how the trade credit share affects the exchange rate pass-through elasticity into export prices, we use equation (19) to derive the partial derivative of the pass-through elasticity Ψ_{ik} with respect to the trade credit share ϕ_i.

$$\frac{\partial \Psi^*_{ik}}{\partial \phi_i} = \frac{\partial}{\partial \phi_i}\left(\frac{\phi_i}{(1+r_{ik})[1+(1-\phi_i)r_{ik}]}\right)\frac{\partial r_{ik}}{\partial \log e_{mk}} + \frac{\phi_i}{(1+r_{ik})[1+(1-\phi_i)r_{ik}]}\frac{\partial}{\partial \phi_i}\left(\frac{\partial r_{ik}}{\partial \log e_{mk}}\right) \tag{20}$$

From equation (20), we observe that the trade credit share ϕ_i influences the pass-through elasticity through two distinct channels. The first term reflects how the trade credit share affects the overall magnitude of the exchange rate pass-through. As ϕ_i increases, the exporter's borrowing costs rise due to increased reliance on external finance. The interaction of r_{ik} and ϕ_i amplifies the exchange rate pass-through, as a larger trade credit share implies a greater proportion of the firm's operations are exposed to interest rate variations that are influenced by exchange rate fluctuations. The second term captures the direct effect of changes in ϕ_i on the sensitivity of the interest rate r_{ik} to exchange rate variations. As banks increase borrowing costs for firms with a larger share of sales on delayed payment terms, the interest rate becomes more responsive to exchange rate shocks for exporters with a higher trade credit share. These two channels together demonstrate how trade credit affects the elasticity of export prices to exchange rate shocks.

Proposition 4.3. ***Impact of Trade Credit on Exchange Rate Pass-Through Level***
Exporters who grant higher trade credit share to buyers respond less intensively on pricing in home currency given exchange shocks.

$$\frac{\partial \Psi^*_{ik}}{\partial \phi_i} < 0$$

Proof. See Appendix A.1.5 □

Intuitively, if the interest rate is set independently of exchange rate movements, it would not affect the level of exchange rate pass-through via this channel. Although interest rates are determined in the domestic credit market, the mechanism differs from that of borrowers selling domestically. For exporters, profitability is directly influenced by exchange rate shocks, which in turn causes firm-specific interest rates to respond to these shocks.

Incorporating trade credit into the analysis introduces a new dimension to understanding exchange rate pass-through. When exporters offer trade credit, it affects both the cost structure and the pricing behavior of the firm, leading to changes in the pass-through of exchange rate fluctuations to export prices. By factoring in the share of trade credit granted to buyers, we can observe a more complete pass-through of exchange rate shocks into prices, as compared to models that do not account for trade credit.

5. Quantitative Results

In this section, we calibrate the model using Chinese data to quantify the impact of changes in trade credit share on exchange rate pass-through. We calibrate key parameters using the coefficients estimated in Section 3.1, and based on this, we present the baseline quantitative results. We then simulate the path of exchange rate pass-through elasticity in response to changes in Chinese benchmark lending rates and quantify the significance of managing monetary policy under varying average levels of trade credit in the economy.

5.1 Linearization

From the theoretical results, we can quantitatively derive how trade credit share influences the pass-through of exchange rate shocks to export prices in equilibrium. By combining the optimal pricing equation (13) with the equilibrium interest rate equation (18), we obtain the equilibrium export price in the destination country's currency, which depends on trade credit share and demand shocks.

$$p_{ik}^{*} = e_{mk}^{-1} \frac{\varepsilon}{\varepsilon - 1} \tau_{mk} c_{ms} \frac{1 + D_{ik} - \varepsilon \phi_i}{2 - \varepsilon \phi_i + (1 - \phi_i)(D_{ik} - 1)} \tag{21}$$

where $D_{ik} = \xi_{ik} e_{mk}^{-\varepsilon}$ includes all potential demand shifters, such as exchange rate shocks and other exogenous demand shocks at various levels. Notably, equation (21) demonstrates a nonlinear relationship between ϕ_i and exchange rate pass-through elasticity Ψ_{ik}^{*}. However, due to the general insignificance of nonlinearities, we focus on the first-order approximation of equation (21). By taking log and first-order approximate D_{ik} and ϕ_i around $\bar{D}$ and $\bar{\phi}$, we have[14]

$$\Psi_{ik}^{*} = \left[-1 + g\left(\bar{\phi}\right) - g'\left(\bar{\phi}\right)\bar{\phi}\right] + g'\left(\bar{\phi}\right)\phi_i \tag{22}$$

where $g\left(\bar{\phi}\right) = -\frac{\varepsilon \bar{D}}{1+\bar{D}-\varepsilon\bar{\phi}} + \frac{(1-\bar{\phi})\varepsilon\bar{D}}{2-\varepsilon\bar{\phi}+(1-\bar{\phi})(\bar{D}-1)}$ and $g'\left(\bar{\phi}\right) = -\frac{\varepsilon^2 \bar{D}}{\left(1+\bar{D}-\varepsilon\bar{\phi}\right)^2} + \frac{-\varepsilon\bar{D}(2-\varepsilon)}{\left[2-\varepsilon\bar{\phi}+(1-\bar{\phi})(\bar{D}-1)\right]^2}$.

5.2 Parameterization

Next, we aim to calibrate ε and $\bar{D}$ using our dataset to achieve the best fit for counterfactual analyses. Since the exchange rate pass-through elasticity Ψ_{ik}^{*} cannot be explicitly observed in data, we cannot directly estimate equation (22). To address this, we transform equation (22) by replacing differentials with changes over time ($\triangle$), resulting in the following expression for export prices in producer currency:

$$\triangle \log p_{ik} = \left[\left(g\left(\bar{\phi}\right) - g'\left(\bar{\phi}\right)\bar{\phi}\right) + g'\left(\bar{\phi}\right)\phi_i\right] \triangle \log e_{mk} + \varepsilon_{ik} \tag{23}$$

[14] See Appendix A.1.6 for proof.

This gives closed-form expressions for the coefficients α and β in specification (2)

$$\alpha = g\left(\bar{\phi}\right) - g'\left(\bar{\phi}\right)\bar{\phi}, \quad \beta = g'\left(\bar{\phi}\right) \tag{24}$$

Equation (24) shows that when the average trade credit share in the sample changes, both α and β adjust, contributing to the overall variation in exchange rate pass-through elasticity. The average trade credit share $\bar{\phi}$ in the dataset is 0.4. Substituting this value of $\bar{\phi}$, along with the estimated coefficients from Table 3 ($\alpha = 0.0734$, $\beta = -0.192$), we obtain the following calibrated parameter values:

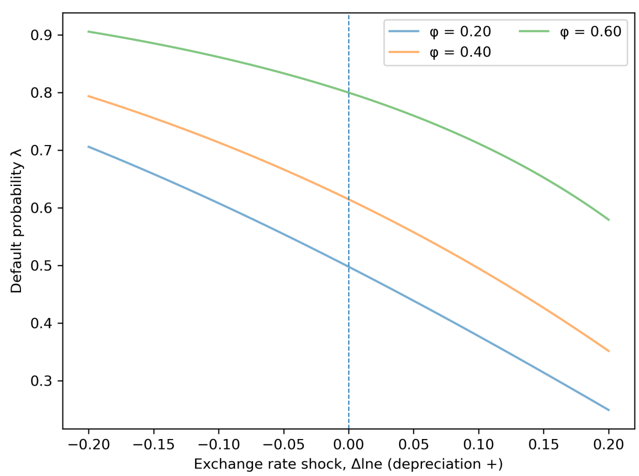
$$\varepsilon = 2.723, \quad \bar{D} = 10.$$

5.3 Quantification of Exchange Rate Pass-Through

After obtaining the values of key parameters, we can now quantify how exporter default probabilities and bilateral exchange rate pass-through changes with respect to variations in the average trade credit share, as predicted by our model, and compare these results with those from the reduced-form estimation.

Figure 7 shows that the firm default probability decreases as the home currency depreciates and increases with appreciations. As the trade-credit intensity ϕ rises, exporters extend a larger share of revenue in trade credit, become more working-capital constrained, and demand more borrowing, which raises default risk.

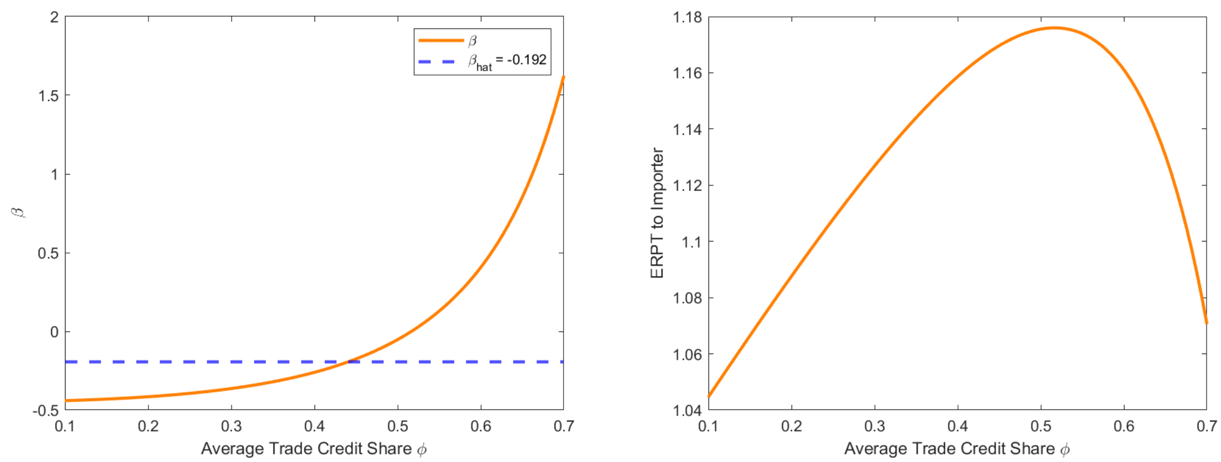
Figure 7: Default Probability under Exchange-Rate Shocks across Trade-Credit Intensities



Notes: The figure plots the response of the default probability λ to exchange-rate shocks across different levels of the trade-credit share ϕ. A positive $\Delta \ln e$ represents domestic currency depreciations.

By adjusting the average trade credit share level in the economy, we compute the corresponding values of β, which reflect the extent to which exchange rate pass-through elasticity is influenced by the trade credit share level, and the overall exchange rate pass-through in the economy. Figure 8 illustrates the path of β and exchange rate pass-through as ϕ increases. The left panel shows that, in general, a higher trade credit share raises the values of β. Notably, when ϕ is relatively low, β is negative, indicating that a higher trade credit share contributes to a more complete exchange rate pass-through. During this period, the simulation result is consistent with our empirical findings. However, when the trade credit share reaches a certain level, the estimated β turns positive, reversing the effect of trade credit share on exchange rate pass-through elasticity. Consequently, the exchange rate pass-through path in the right panel exhibits an inverted U-shape, summarizing that as the average trade credit share in the economy rises from low to high, the pass-through of exchange rate shocks to export prices initially increases and then decreases.

Figure 8: ERPT Change with Trade Credit and Overall Level



Notes: The panel on the left shows the path of β with ϕ increasing. The panel on the right shows the exchange rate pass-through to importer price for each ϕ level. Both graphs are based on model simulation.

The inverted U-shaped relationship between exchange rate pass-through and trade credit share arises due to the behavior of the implicit trade credit premium. Initially, as the trade credit share increases, the implicit trade credit premium also rises, amplifying the exchange rate pass-through. This is because exporters are more reliant on external financing, which ties the cost of trade credit to movements in exchange rates. However, as the trade credit share continues to increase beyond a certain threshold, the implicit trade credit premium becomes overly sensitive to home currency depreciation. At this point, further increases in trade credit share drive up the cost of trade credit, weakening the link between exchange rate fluctuations and export prices, thereby causing a decline in the pass-through elasticity. Thus, while moderate levels of trade credit enhance the pass-through, excessively high trade credit shares lead to diminishing effects, resulting in an inverted U-shaped pattern.

6. Conclusion

This paper highlights the significant role that financial frictions, particularly trade credit, play in determining export pricing behavior and exchange rate pass-through. Our analysis demonstrates that exporters incorporate a trade credit premium into their pricing, leading to differences in how prices adjust to exchange rate fluctuations. Specifically, exporters that extend more trade credit exhibit a higher degree of exchange rate pass-through, as the implicit interest rate embedded in their export prices adjusts in response to currency movements.

A key mechanism underlying this relationship is the interaction between trade credit financing and exchange rate dynamics. Exporters often rely on bank loans to finance trade credit, and the cost of these loans is influenced by exchange rate movements. Banks take into account that currency depreciation generally benefits exporters by improving their competitiveness and lowering their default risk, which in turn reduces their financing costs. As a result, exporters that extend more trade credit internalize this effect and adjust their pricing accordingly. When the domestic currency depreciates, these firms lower their foreign currency prices, effectively passing on the depreciation benefit to their buyers. This effect is stronger for firms that issue a higher volume of trade credit, as their financing costs are more sensitive to exchange rate movements.

Overall, our findings contribute to the literature by illustrating how financial constraints and trade credit financing influence international price-setting. By showing that firms with greater trade credit utilization exhibit a more complete exchange rate pass-through, this paper provides new insights into the interaction between financial conditions and international trade pricing. These results have important implications for both policymakers and firms, emphasizing the need to account for financial structures when analyzing exchange rate movements and their impact on global trade.

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A. Appendix

A.1 Theoretical Appendix

A.1.1 Proof of Lemma 1

Let the liquidity shock F_{ik} be a random variable with cumulative distribution function (CDF) $G(F)$. The exporter's profit is given by

$$\pi_{ik} = p^*_{ik} e_{mk} q_{ik} - \tau_{mk} c_{ms} q_{ik} - r_{ik} b_{ik},$$

where p^*_{ik} is the foreign price, e_{mk} is the exchange rate, q_{ik} is quantity exported, $\tau_{mk} c_{ms}$ is the marginal cost in local currency, and $r_{ik} b_{ik}$ is the interest payment.

The probability of default occurs when the liquidity shock exceeds profits:

$$\lambda_{ik} = \Pr[F_{ik} > \pi_{ik}] = 1 - G(\pi_{ik}).$$

Taking the derivative with respect to π_{ik}, we obtain

$$\frac{\partial \lambda_{ik}}{\partial \pi_{ik}} = -G'(\pi_{ik}).$$

The exporter chooses p^*_{ik} to maximize expected profit:

$$\Pi_{ik} = (1 - \lambda_{ik})(\pi_{ik} - \bar{F}),$$

where $\bar{F}$ is the expected liquidity shock.

The first-order condition (FOC) for profit maximization with respect to p^*_{ik} is:

$$\frac{\partial \Pi_{ik}}{\partial p^*_{ik}} = -\frac{\partial \lambda_{ik}}{\partial p^*_{ik}}(\pi_{ik} - \bar{F}) + (1 - \lambda_{ik})\frac{\partial \pi_{ik}}{\partial p^*_{ik}} = 0.$$

Using the chain rule:

$$\frac{\partial \lambda_{ik}}{\partial p^*_{ik}} = \frac{\partial \lambda_{ik}}{\partial \pi_{ik}} \cdot \frac{\partial \pi_{ik}}{\partial p^*_{ik}} = -G'(\pi_{ik}) \cdot \frac{\partial \pi_{ik}}{\partial p^*_{ik}},$$

we substitute into the FOC:

$$G'(\pi_{ik})(\pi_{ik} - \bar{F}) \cdot \frac{\partial \pi_{ik}}{\partial p^*_{ik}} + (1 - \lambda_{ik})\frac{\partial \pi_{ik}}{\partial p^*_{ik}} = 0.$$

Factoring:

$$\left[G'(\pi_{ik})(\pi_{ik} - \bar{F}) + 1 - \lambda_{ik}\right] \cdot \frac{\partial \pi_{ik}}{\partial p^*_{ik}} = 0.$$

This condition implies two possibilities: $\frac{\partial \pi_{ik}}{\partial p^*_{ik}} = 0$ or $G'(\pi_{ik})(\pi_{ik} - \bar{F}) + 1 - \lambda_{ik} = 0$.

Suppose the second condition holds. Rearranging:

$$\pi_{ik} - \bar{F} = \frac{\lambda_{ik} - 1}{G'(\pi_{ik})}.$$

Since $0 < \lambda_{ik} < 1$ and $G'(\pi_{ik}) > 0$, the right-hand side is negative, implying:

$$\pi_{ik} - \bar{F} < 0.$$

Thus expected profit is negative:

$$\Pi_{ik} = (1 - \lambda_{ik})(\pi_{ik} - \bar{F}) < 0,$$

which contradicts the assumption that the exporter chooses to enter. Therefore, the only feasible solution is:

$$\frac{\partial \pi_{ik}}{\partial p^*_{ik}} = 0.$$

In this paper, we focus on exporting firms and don't discuss about the enter/exit behavior of firms. Therefore, $\bar{F}$ should be set at the level that ensures that once exporter maximizes variable profits π_{ik}, $\pi_{ik} - \bar{F} > 0$. With this assumption,

$$\max_{p^*_{ik}} (1 - \lambda_{ik})(\pi_{ik} - \bar{F}) \quad \Longrightarrow \quad \max_{p^*_{ik}} \pi_{ik}$$

To ensure that the F.O.C. result of maximizing Π_{ik} also maximizes π_{ik}, we check the second-order condition.

$$\frac{\partial^2 \Pi_{ik}}{\partial p^{*2}_{ik}} = [G(\pi_{ik}) + G'(\pi_{ik})(\pi_{ik} - \bar{F})]\frac{\partial^2 \pi_{ik}}{\partial p^{*2}_{ik}} + [G'(\pi_{ik}) + G''(\pi_{ik})(\pi_{ik} - \bar{F}) + G'(\pi_{ik})]\frac{\partial \pi_{ik}}{\partial p^*_{ik}}\frac{\partial \pi_{ik}}{\partial p^*_{ik}}$$

$$0 < G(\pi_{ik}) < 1 \quad and \quad G'(\pi_{ik}) > 0$$

With $\hat{p^*_{ik}} = \text{argmax}(\pi(p^*_{ik})) = e^{-1}_{mk}\frac{\varepsilon}{\varepsilon-1}\tau_{mk}c_{ms}\frac{1+r_{ik}}{1+r_{ik}(1-\phi_i)}$

$$\begin{aligned}
\frac{\partial^2\pi_{ik}}{\partial p^{*2}_{ik}}|_{p^*_{ik}=\hat{p^*_{ik}}} &= \frac{\partial}{\partial p^*_{ik}}\left[(1+r_{ik}(1-\phi_i))(1-\varepsilon)e_{mk}q_{ik} + (1+r_{ik})\tau_{mk}c_{ms}\varepsilon\frac{q_{ik}}{p^*_{ik}}\right] \\
&= (1+r_{ik}(1-\phi_i))(\varepsilon-1)e_{mk}\varepsilon\frac{q_{ik}}{p^*_{ik}} - (1+r_{ik})\tau_{mk}c_{ms}\varepsilon\frac{(\varepsilon+1)q_{ik}}{p^{*2}_{ik}} \\
&= \frac{\varepsilon q_{ik}}{p^*_{ik}}\left[e_{mk}(1+r_{ik}(1-\phi_i))(\varepsilon-1) - (1+r_{ik})\tau_{mk}c_{ms}(\varepsilon+1)\frac{1}{p^*_{ik}}\right] \\
&= \frac{\varepsilon q_{ik}}{p^*_{ik}}\left[e_{mk}(1+r_{ik}(1-\phi_i))(\varepsilon-1) - (1+r_{ik})\tau_{mk}c_{ms}(\varepsilon+1)e_{mk}\frac{\varepsilon-1}{\varepsilon}(\tau_{mk}c_{ms})^{-1}\frac{1+r_{ik}(1-\phi_i)}{1+r_{ik}}\right] \\
&= \frac{\varepsilon q_{ik}}{p^*_{ik}}\left[e_{mk}(1+r_{ik}(1-\phi_i))(\varepsilon-1) - (\varepsilon+1)e_{mk}\frac{\varepsilon-1}{\varepsilon}(1+r_{ik}(1-\phi_i))\right] \\
&= \frac{\varepsilon e_{mk}q_{ik}}{p^*_{ik}}(1+r_{ik}(1-\phi_i))(\varepsilon-1)(-\frac{1}{\varepsilon}) < 0
\end{aligned}$$

Thus,

$$\frac{\partial^2\Pi_{ik}}{\partial p^{*2}_{ik}}|_{p^*_{ik}=\hat{p^*_{ik}}} = [\underbrace{G(\pi_{ik})}_{>0} + \underbrace{G'(\pi_{ik})}_{>0}\underbrace{(\pi_{ik}-\bar{F})}_{>0}]\underbrace{\frac{\partial^2\pi_{ik}}{\partial p^{*2}_{ik}}}_{<0} + [G'(\pi_{ik}) + G''(\pi_{ik})(\pi_{ik}-\bar{F}) + G'(\pi_{ik})]\underbrace{\frac{\partial\pi_{ik}}{\partial p^*_{ik}}}_{=0}\frac{\partial\pi_{ik}}{\partial p^*_{ik}} < 0$$

Therefore, the optimal export price $\hat{p^*_{ik}}$ maximizing Π_{ik} also maximizes π_{ik}. □

A.1.2 Proof of Proposition 4.1: Trade Credit Premium in Export Price

Keeping other things constant,

$$\frac{\partial p^*_{ik}}{\partial\phi_i} = -\frac{1+r_{ik}}{[1+(1-\phi_i)r_{ik}]^2}(-r_{ik}) = \frac{(1+r_{ik})r_{ik}}{[1+(1-\phi_i)r_{ik}]^2} > 0$$

$$\frac{\partial p^*_{ik}}{\partial r_{ik}} = \frac{1+(1-\phi_i)r_{ik} - (1-\phi_i)(1+r_{ik})}{[1+(1-\phi_i)r_{ik}]^2} = \frac{\phi_i}{[1+(1-\phi_i)r_{ik}]^2} > 0$$

As a result, p^*_{ik} increases with ϕ_i and r_{ik}. □

A.1.3 Solve Equilibrium Firm-Level Interest Rate r_{ik}

Plug equation (13) in equation (8), we have the quantity produced

$$q_{ik} = \gamma_{ik}\frac{p^{*-\varepsilon}_{ik}\theta_{ks}Y_k}{P^{1-\varepsilon}_{ks}} = \gamma_{ik}\frac{\left(e^{-1}_{mk}\frac{\varepsilon}{\varepsilon-1}\tau_{mk}c_{ms}\frac{1+r_{ik}}{1+r_{ik}(1-\phi_i)}\right)^{-\varepsilon}\theta_{ks}Y_k}{P^{1-\varepsilon}_{ks}} = \gamma_{ik}e^{\varepsilon}_{mk}\left(\frac{\varepsilon}{\varepsilon-1}\tau_{mk}c_{ms}\right)^{-\varepsilon}\frac{\theta_{ks}Y_k}{P^{1-\varepsilon}_{ks}}\left(\frac{1+r_{ik}}{1+r_{ik}(1-\phi_i)}\right)^{-\varepsilon}$$

The profits after paying the interest π_{ik} are

$$\pi_{ik} = \frac{1}{\varepsilon - 1}\tau_{mk}c_{ms}(1+r_{ik})\gamma_{ik}e_{mk}^{\varepsilon}\left(\frac{\varepsilon}{\varepsilon-1}\tau_{mk}c_{ms}\right)^{-\varepsilon}\frac{\theta_{ks}Y_k}{P_{ks}^{1-\varepsilon}}\left(\frac{1+r_{ik}}{1+r_{ik}(1-\phi_i)}\right)^{-\varepsilon}$$

The the default probability is

$$\begin{aligned}\lambda_{ik} &= 1 - \frac{\pi_{ik}}{F^H} = \frac{r_{ik}-r_f}{1+r_{ik}} \\ &= 1 - \frac{1}{F^H}\frac{1}{\varepsilon-1}\tau_{mk}c_{ms}(1+r_{ik})\gamma_{ik}e_{mk}^{\varepsilon}\left(\frac{\varepsilon}{\varepsilon-1}\tau_{mk}c_{ms}\right)^{-\varepsilon}\frac{\theta_{ks}Y_k}{P_{ks}^{1-\varepsilon}}\left(\frac{1+r_{ik}}{1+r_{ik}(1-\phi_i)}\right)^{-\varepsilon}\end{aligned}$$

Solve for r_{ik}

$$\frac{r_{ik}-r_f}{1+r_{ik}} = 1 - \frac{1}{F^H}\frac{1}{\varepsilon-1}\tau_{mk}c_{ms}(1+r_{ik})\gamma_{ik}e_{mk}^{\varepsilon}\left(\frac{\varepsilon}{\varepsilon-1}\tau_{mk}c_{ms}\right)^{-\varepsilon}\frac{\theta_{ks}Y_k}{P_{ks}^{1-\varepsilon}}\left(\frac{1+r_{ik}}{1+r_{ik}(1-\phi_i)}\right)^{-\varepsilon}$$

$$r_{ik}-r_f = 1 + r_{ik} - \frac{1}{F^H}\frac{1}{\varepsilon-1}\tau_{mk}c_{ms}(1+r_{ik})^2\gamma_{ik}e_{mk}^{\varepsilon}\left(\frac{\varepsilon}{\varepsilon-1}\tau_{mk}c_{ms}\right)^{-\varepsilon}\frac{\theta_{ks}Y_k}{P_{ks}^{1-\varepsilon}}\left(\frac{1+r_{ik}}{1+r_{ik}(1-\phi_i)}\right)^{-\varepsilon}$$

$$\frac{1}{F^H}\frac{1}{\varepsilon-1}\tau_{mk}c_{ms}(1+r_{ik})^2\gamma_{ik}e_{mk}^{\varepsilon}\left(\frac{\varepsilon}{\varepsilon-1}\tau_{mk}c_{ms}\right)^{-\varepsilon}\frac{\theta_{ks}Y_k}{P_{ks}^{1-\varepsilon}}\left(\frac{1+r_{ik}}{1+r_{ik}(1-\phi_i)}\right)^{-\varepsilon} = 1 + r_f$$

$$(1+r_{ik})^2\left(\frac{1+r_{ik}}{1+r_{ik}(1-\phi_i)}\right)^{-\varepsilon} = \frac{1+r_f}{\gamma_{ik}}F^H(\varepsilon-1)\left(\frac{\varepsilon}{\varepsilon-1}\tau_{mk}c_{ms}\right)^{\varepsilon}\left(\frac{\theta_{ks}Y_k}{P_{ks}^{1-\varepsilon}}\right)^{-1}(\tau_{mk}c_{ms})^{-1}e_{mk}^{-\varepsilon}$$

Let $\xi_{ik} = \frac{1+r_f}{\gamma_{ik}}F^H(\varepsilon-1)\left(\frac{\varepsilon}{\varepsilon-1}\tau_{mk}c_{ms}\right)^{\varepsilon}\left(\frac{\theta_{ks}Y_k}{P_{ks}^{1-\varepsilon}}\right)^{-1}(\tau_{mk}c_{ms})^{-1}$, we solve the equation below for equilibrium r_{ik}.

$$(1+r_{ik})^2\left(\frac{1+r_{ik}}{1+r_{ik}(1-\phi_i)}\right)^{-\varepsilon} = \xi_{ik}e_{mk}^{-\varepsilon}$$

As r_{ik} is small, we first-order approximate of r_{ik} around $\bar{r} = 0$.

$$f(r_{ik}) = (1+r_{ik})^2\left(\frac{1+r_{ik}}{1+r_{ik}(1-\phi_i)}\right)^{-\varepsilon}$$

$$
\begin{aligned}
f'(r_{ik}) &= 2(1+r_{ik})\left(\frac{1+r_{ik}}{1+r_{ik}(1-\phi_i)}\right)^{-\varepsilon} - \varepsilon(1+r_{ik})^2\left(\frac{1+r_{ik}}{1+r_{ik}(1-\phi_i)}\right)^{-\varepsilon-1}\frac{1+r_{ik}(1-\phi_i)-(1-\phi_i)(1+r_{ik})}{(1+r_{ik}(1-\phi_i))^2} \\
&= 2(1+r_{ik})\left(\frac{1+r_{ik}}{1+r_{ik}(1-\phi_i)}\right)^{-\varepsilon} - \varepsilon\phi_i\left(\frac{1+r_{ik}}{1+r_{ik}(1-\phi_i)}\right)^{-\varepsilon+1} \\
&= [2(1+r_{ik}(1-\phi_i)) - \varepsilon\phi_i]\left(\frac{1+r_{ik}}{1+r_{ik}(1-\phi_i)}\right)^{-\varepsilon+1}
\end{aligned}
$$

Then we have

$$
f(r_{ik}) = f(0) + f'(0)r_{ik} = 1 + (2-\varepsilon\phi_i)r_{ik}
$$

Solve for r_{ik}

$$
1 + (2-\varepsilon\phi_i)r_{ik} = \xi_{ik}e_{mk}^{-\varepsilon}
$$

$$
r_{ik} = \frac{\xi_{ik}e_{mk}^{-\varepsilon} - 1}{2-\varepsilon\phi_i}
$$

A.1.4 Proof of Proposition 4.2: Dynamics of Equilibrium r_{ik}

When $2-\varepsilon\phi_i > 0$, $\varepsilon < \frac{2}{\phi_i}$

$$
\frac{\partial r_{ik}}{\partial e_{mk}} = \frac{-\varepsilon\xi_{ik}e_{mk}^{-\varepsilon-1}}{2-\varepsilon\phi_i} < 0
$$

$$
\frac{\partial r_{ik}}{\partial \phi_i} = \left(\xi_{ik}e_{mk}^{-\varepsilon} - 1\right)\frac{\varepsilon}{(2-\varepsilon\phi_i)^2} > 0
$$

Therefore, as Chinese RMB depreciates, equilibrium r_{ik} decreases. If an exporter extends more trade credit to buyers, the r_{ik} she receives is higher. □

A.1.5 Proof of Proposition 4.3: Exchange Rate Pass-through Changes with Trade Credit

$$
p^* = e^{-1}\frac{\varepsilon}{\varepsilon-1}\tau c\frac{1+r}{1+r\phi}
$$

The ERPT is

$$
\begin{aligned}
\frac{\partial \log p^*}{\partial \log e} &= -1 + \frac{\partial \log(1+r)}{\partial \log e} - \frac{\partial \log\big(1+r\phi\big)}{\partial \log e} \\
&= -1 + \frac{1}{1+r}\frac{\partial r}{\partial \log e} - \frac{\phi}{1+r\phi}\frac{\partial r}{\partial \log e} \\
&= -1 + \frac{1-\phi}{(1+r)(1+r\phi)} \underbrace{\frac{\partial r}{\partial \log e}}_{<0}
\end{aligned}
$$

How does ERPT change with ϕ?

$$
\begin{aligned}
\frac{\partial}{\partial \phi}\frac{\partial \log p^*}{\partial \log e} &= \frac{\partial}{\partial \phi}\frac{\partial \log(1+r)}{\partial \log e} - \frac{\partial}{\partial \phi}\frac{\partial \log\big(1+r\phi\big)}{\partial \log e} \\
&= \frac{\partial}{\partial \phi}\Big(\frac{1-\phi}{(1+r)(1+r\phi)}\Big)e\frac{\partial r}{\partial e} + \frac{1-\phi}{(1+r)(1+r\phi)}e\frac{\partial}{\partial \phi}\Big(\frac{\partial r}{\partial e}\Big) \\
&= \frac{-(1+r)(1+r\phi) - (1-\phi)[\frac{\partial r}{\partial \phi}(1+r\phi) + (1+r)(\phi\frac{\partial r}{\partial \phi} + r)]}{(1+r)^2(1+r\phi)^2}e\frac{\partial r}{\partial e} \\
&+ \frac{1-\phi}{(1+r)(1+r\phi)}e\frac{\partial}{\partial \phi}\Big(\frac{\partial r}{\partial e}\Big)
\end{aligned}
$$

Let

$$
r = (\xi e^{-\varepsilon} - 1)\frac{1}{2-\varepsilon(1-\phi)}
$$

where $\xi = \frac{1}{\gamma}F^H(\varepsilon-1)(\frac{\varepsilon}{\varepsilon-1}\tau c)^{\varepsilon}(\frac{\theta Y}{P^{1-\varepsilon}})^{-1}(\tau c)^{-1}$

$$
\frac{\partial r}{\partial e} = \frac{1}{2-\varepsilon(1-\phi)}(-\varepsilon)\xi e^{-\varepsilon-1} < 0
$$

$$
\frac{\partial}{\partial \phi}\frac{\partial r}{\partial e} = (-\varepsilon)\xi e^{-\varepsilon-1}\frac{-\varepsilon}{(2-\varepsilon(1-\phi))^2} = \varepsilon\xi e^{-\varepsilon-1}\frac{\varepsilon}{(2-\varepsilon(1-\phi))^2} > 0
$$

$$
\begin{aligned}
\frac{\partial r}{\partial \phi} &= (\xi e^{-\varepsilon} - 1)\frac{-\varepsilon}{(2-\varepsilon(1-\phi))^2} < 0 \\
&= -\frac{\varepsilon r}{2-\varepsilon(1-\phi)}
\end{aligned}
$$

Then

$$
\begin{aligned}
\frac{\partial}{\partial \phi}\frac{\partial \log p^*}{\partial \log e} &= \frac{\partial}{\partial \phi}\frac{\partial \log(1+r)}{\partial \log e} - \frac{\partial}{\partial \phi}\frac{\partial \log\left(1+r\phi\right)}{\partial \log e} \\
&= \frac{\partial}{\partial \phi}(\frac{1-\phi}{(1+r)(1+r\phi)})e\frac{\partial r}{\partial e} + \frac{1-\phi}{(1+r)(1+r\phi)}e\frac{\partial}{\partial \phi}(\frac{\partial r}{\partial e}) \\
&= \frac{-(1+r)(1+r\phi)-(1-\phi)[\frac{\partial r}{\partial \phi}(1+r\phi)+(1+r)(\phi\frac{\partial r}{\partial \phi}+r)]}{(1+r)^2(1+r\phi)^2}e\underbrace{\frac{\partial r}{\partial e}}_{<0} \\
&+ \frac{1-\phi}{(1+r)(1+r\phi)}e\underbrace{\frac{\partial}{\partial \phi}(\frac{\partial r}{\partial e})}_{>0}
\end{aligned}
$$

$$
\begin{aligned}
&\frac{\partial r}{\partial \phi}(1+r\phi)+(1+r)(\phi\frac{\partial r}{\partial \phi}+r) \\
&= (1+2r\phi+\phi)\frac{\partial r}{\partial \phi}+(1+r)r \\
&= -(1+2r\phi+\phi)\frac{\varepsilon r}{2-\varepsilon(1-\phi)}+(1+r)r
\end{aligned}
$$

$$
\frac{2-\varepsilon+\varepsilon\phi+2r(1-\varepsilon)+2\varepsilon r\phi}{2+2r\phi-\varepsilon+\varepsilon\phi}
$$

$$
(1+r)^{1-\varepsilon}(1+r\phi)^{\varepsilon} < \xi
$$

A.1.6 Log Linearization and First-Order Approximation of Exchange Rate Pass-through

We begin with the optimal export prices equation (21)

$$
p^*_{ik} = e^{-1}_{mk}\frac{\varepsilon}{\varepsilon-1}\tau_{mk}c_{ms}\frac{1+D_{ik}-\varepsilon\phi_i}{2-\varepsilon\phi_i+(1-\phi_i)(D_{ik}-1)}
$$

where $D_{ik} = \xi_{ik}e^{-\varepsilon}_{mk}$ is the demand shifter. Take log on the right hand side, we have

$$
h(e_{mk}) = -\log e_{mk} + \log\left(\frac{\varepsilon}{\varepsilon-1}\right) + \log(\tau_{mk}c_{ms}) + \log\left(1+\xi_{ik}e^{-\varepsilon}_{mk}-\varepsilon\phi_i\right) - \log[2-\varepsilon\phi_i+(1-\phi_i)(\xi_{ik}e^{-\varepsilon}_{mk}-1)]
$$

Define $x = \log e_{mk}$, then $e^{-\varepsilon}_{mk} = exp(-x\varepsilon)$. Plug in we have

$$
h(x) = -x + \log\left(\frac{\varepsilon}{\varepsilon-1}\right) + \log(\tau_{mk}c_{ms}) + \log\left(1+\xi_{ik}e^{-x\varepsilon}-\varepsilon\phi\right) - \log[2-\varepsilon\phi+(1-\phi)(\xi_{ik}e^{-x\varepsilon}-1)]
$$

First-order approximate on $\log e_{mk}$ around $\log \bar{e}$. The result is

$$
\begin{aligned}
h(x) \approx & -\bar{x} + \log\left(\frac{\varepsilon}{\varepsilon-1}\right) + \log(\tau_{mk}c_{ms}) + \log\left(1+\xi_{ik}e^{-\bar{x}\varepsilon} - \varepsilon\phi_i\right) - \log[2-\varepsilon\phi_i + (1-\phi_i)(\xi_{ik}e^{-\bar{x}\varepsilon} - 1)] \\
& + \left[-1 + \frac{-\varepsilon\xi_{ik}e^{-\bar{x}\varepsilon}}{1+\xi_{ik}e^{-\bar{x}\varepsilon} - \varepsilon\phi_i} - \frac{-(1-\phi_i)\varepsilon\xi_{ik}e^{-\bar{x}\varepsilon}}{2-\varepsilon\phi_i + (1-\phi_i)(\xi_{ik}e^{-\bar{x}\varepsilon} - 1)}\right](x-\bar{x})
\end{aligned}
$$

Therefore, the result is

$$
\begin{aligned}
\log p^*_{ik} \approx & -\log\bar{e} + \log\left(\frac{\varepsilon}{\varepsilon-1}\right) + \log(\tau_{mk}c_{ms}) + \log\left(1+\xi_{ik}\bar{e}^{-\varepsilon} - \varepsilon\phi_i\right) - \log[2-\varepsilon\phi_i + (1-\phi_i)(\xi_{ik}\bar{e}^{-\varepsilon} - 1)] \\
& + \left[-1 + \frac{-\varepsilon\xi_{ik}\bar{e}^{-\varepsilon}}{1+\xi_{ik}\bar{e}^{-\varepsilon} - \varepsilon\phi_i} - \frac{-(1-\phi_i)\varepsilon\xi_{ik}\bar{e}^{-\varepsilon}}{2-\varepsilon\phi_i + (1-\phi_i)(\xi_{ik}\bar{e}^{-\varepsilon} - 1)}\right](\log e_{mk} - \log\bar{e})
\end{aligned}
$$

Take derivative with respect to $\log e_{mk}$, we have

$$
\begin{aligned}
\frac{\partial \log p^*_{ik}}{\partial \log e_{mk}} &= -1 - \frac{\varepsilon\xi_{ik}\bar{e}^{-\varepsilon}}{1+\xi_{ik}\bar{e}^{-\varepsilon} - \varepsilon\phi_i} + \frac{(1-\phi_i)\varepsilon\xi_{ik}\bar{e}^{-\varepsilon}}{2-\varepsilon\phi_i + (1-\phi_i)(\xi_{ik}\bar{e}^{-\varepsilon} - 1)} \\
&= -1 - \frac{\varepsilon\bar{D}}{1+\bar{D} - \varepsilon\phi_i} + \frac{(1-\phi_i)\varepsilon\bar{D}}{2-\varepsilon\phi_i + (1-\phi_i)(\bar{D}-1)}
\end{aligned}
$$

First-order approximation on ϕ_i around $\bar{\phi}$, we have

$$
\begin{aligned}
\frac{\partial \log p^*_{ik}}{\partial \log e_{mk}} &= -1 - \frac{\varepsilon\bar{D}}{1+\bar{D} - \varepsilon\bar{\phi}} + \frac{(1-\bar{\phi})\varepsilon\bar{D}}{2-\varepsilon\bar{\phi} + (1-\bar{\phi})(\bar{D}-1)} \\
&\quad + \left[-\frac{\varepsilon^2\bar{D}}{(1+\bar{D}-\varepsilon\bar{\phi})^2} + \frac{-\varepsilon\bar{D}[2-\varepsilon\bar{\phi} + (1-\bar{\phi})(\bar{D}-1)] - (1-\bar{\phi})\varepsilon\bar{D}(-\varepsilon - \bar{D} + 1)}{[2-\varepsilon\bar{\phi} + (1-\bar{\phi})(\bar{D}-1)]^2}\right](\phi_i - \bar{\phi}) \\
&= -1 + g(\bar{\phi}) + g'(\bar{\phi})(\phi_i - \bar{\phi}) \\
&= [-1 + g(\bar{\phi}) - g'(\bar{\phi})\bar{\phi}] + g'(\bar{\phi})\phi_i
\end{aligned}
$$

where

$$
g(\bar{\phi}) = -\frac{\varepsilon\bar{D}}{1+\bar{D}-\varepsilon\bar{\phi}} + \frac{(1-\bar{\phi})\varepsilon\bar{D}}{2-\varepsilon\bar{\phi} + (1-\bar{\phi})(\bar{D}-1)}
$$

$$
g'(\bar{\phi}) = -\frac{\varepsilon^2\bar{D}}{(1+\bar{D}-\varepsilon\bar{\phi})^2} + \frac{-\varepsilon\bar{D}(2-\varepsilon)}{[2-\varepsilon\bar{\phi} + (1-\bar{\phi})(\bar{D}-1)]^2}
$$

Thus, we have the first-order linear form of exchange rate pass-through with respect to trade credit share ϕ_i. □

A.2 Empirical Appendix

A.2.1 ER general information between RMB and the rest of the world. ER regime.

Relation with US Dollar: From 1994 to 2005 China implemented a fixed exchange rate pegged to the US dollar. In July 2005 China announced a reform to its exchange rate making it more flexible, adopting a managed flotation using as an anchor a basket of currencies that wasn't specified. However, for some years, the weight of the other currencies was tiny and the peg with the US dollar continued but allowing some fluctuation band that was announced before the start of the trading day. The ER RMB/USD was allowed to fluctuate in a daily band of 0.3% and up to 1.5% against the other market currencies: Euro, HKD, and the Japanese Yen. During the following years, the band was adjusted and allowed different daily variations. On September 2005 the trading band for non-US dollar currencies was widened to 3%. For the RMB/USD, the band was modified in May 2007 and followed the same tendency to widen previously applied to the other currencies, increasing the flotation band to 0.5%. Then in April 2012, it was widened to 1% and finally, the band was set at 2% by March 2014.

A.2.2 Summary Statistics by export characteristics

	(1)	(2)	(3)	(4)	(5)	(6)
	All firms	Exporters	Importers	Small	Mid	Large
Active banking debt	0.998	0.998	0.998	0.996	0.998	0.999
Debt over sales	0.486	0.446	0.536	0.458	0.478	0.517
Receivables over sales	0.184	0.142		0.168	0.166	0.167
Receivables over debt	1.428	0.842		1.395	1.189	0.913
Payables over sales	0.186		0.178	0.196	0.192	0.186
Payables over debt	0.444		0.381	0.469	0.437	0.415
Interest rate	0.028	0.041	0.030	0.036	0.033	0.028
Interest cost	4810.471	1797.884	9068.799	623.445	1140.108	6916.366

Notes: (1) contains summary statistics for the firms for we observe both export and imports operations during the period, (2) for the firms for which we only observe export operations during the period, (3) contains summary statistics for the firms for which we only observe import operations. (4), (5), & (6) contains the mean of each variable by firm's sizes

A.2.3 Full Summary Statistics

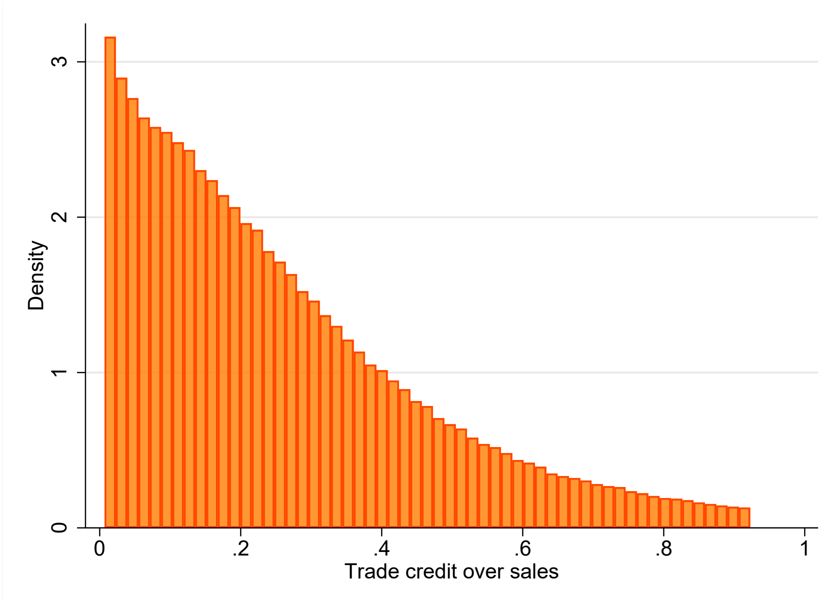
Table 12: Table 2: Summary Statistics by Firm Size Quartile

Variable	Mean	S.D.
Panel A. Full Sample		
Receivables (RMB '000)	23,395.9	202,669.3
Payables (RMB '000)	26,572.2	242,946.5
Debt (RMB '000)	89,147.6	682,769.5
Receivables/Sales	0.167	0.199
Payables/Sales	0.161	0.218
Interest Rate[a]	0.0316	1.3309
Interest Cost (RMB '000)	1,510.2	14,904.0
Panel B. By Firm Size Quartile (based on employment)		
Quartile 1 (0–25%)		
Receivables (RMB '000)	3,926.2	23,300.3
Payables (RMB '000)	3,574.1	10,733.4
Debt (RMB '000)	12,412.5	96,323.9
Receivables/Sales	0.167	0.207
Payables/Sales	0.153	0.220
Interest Rate	0.0269	0.7517
Interest Cost (RMB '000)	180.8	1,407.2
Quartile 2 (25–50%)		
Receivables (RMB '000)	7,265.0	28,391.1
Payables (RMB '000)	6,995.7	31,878.3
Debt (RMB '000)	22,333.6	61,658.6
Receivables/Sales	0.168	0.201
Payables/Sales	0.161	0.223
Interest Rate	0.0281	0.3869
Interest Cost (RMB '000)	390.1	1,583.6
Quartile 3 (50–75%)		
Receivables (RMB '000)	12,520.1	31,871.4
Payables (RMB '000)	12,163.0	34,307.5
Debt (RMB '000)	40,946.5	126,164.7
Receivables/Sales	0.164	0.197
Payables/Sales	0.160	0.220
Interest Rate	0.0459	2.5025
Interest Cost (RMB '000)	752.2	2,562.8
Quartile 4 (75–100%)		
Receivables (RMB '000)	69,985.2	399,058.6
Payables (RMB '000)	88,571.7	493,233.4
Debt (RMB '000)	281,347.0	1,337,465.0
Receivables/Sales	0.169	0.189
Payables/Sales	0.172	0.207
Interest Rate	0.0252	0.2740
Interest Cost (RMB '000)	4,725.7	29,408.2

Notes: Monetary variables are in thousands of RMB. Ratios are truncated at 2. *(a)* Interest rate is interest expenses divided by total debt. Firm-size quartiles are defined by employment: Quartile 1 (0–25%) denotes the smallest firms and Quartile 4 (75–100%) the largest. Receivables denote the value of trade credit extended by exporters; payables denote supplier credit received; debt refers to total bank borrowing. Ratios are truncated at 2 to limit outliers. *(a)* Interest rate is defined as interest expenses divided by total debt. The full sample includes all firm–year observations with non-missing employment.

A.2.4 Trade Credit Distribution

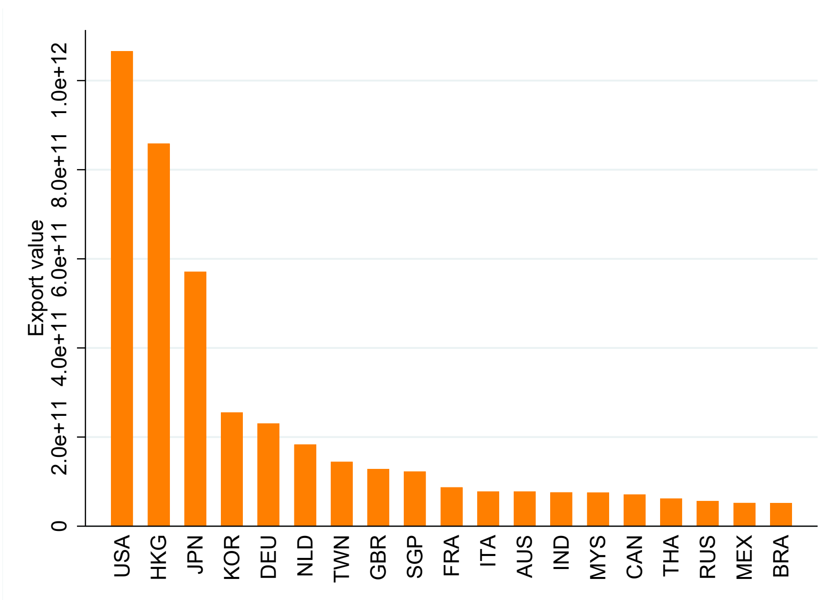
Figure 9: Distribution of trade credit over sales



Notes: Distribution of trade credit (sum of payables and receivables) over sales. The data have been winsorized at the 5% level

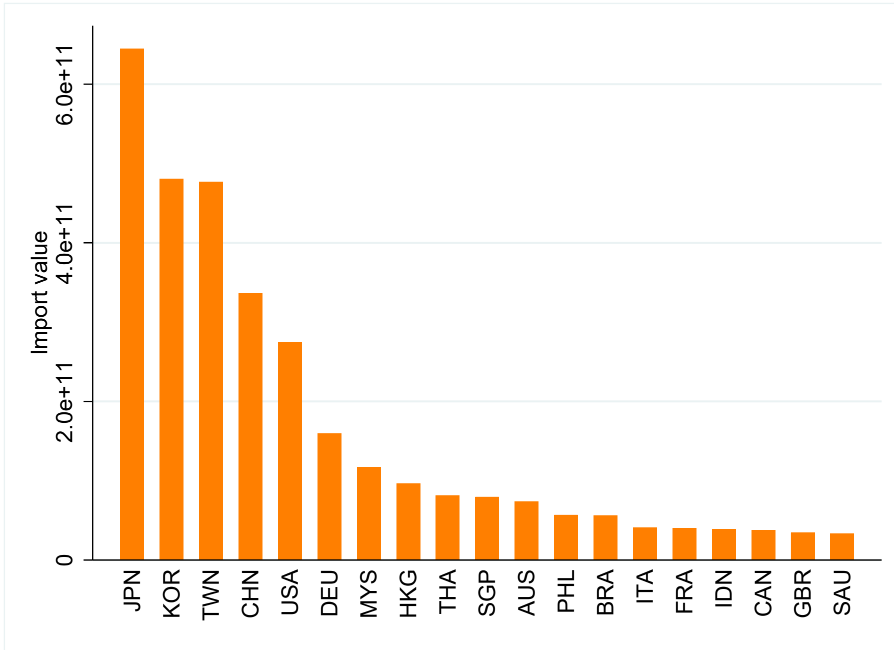
A.2.5 Top Export Destinations and Exported Products

Figure 10: Total export values by destination economy



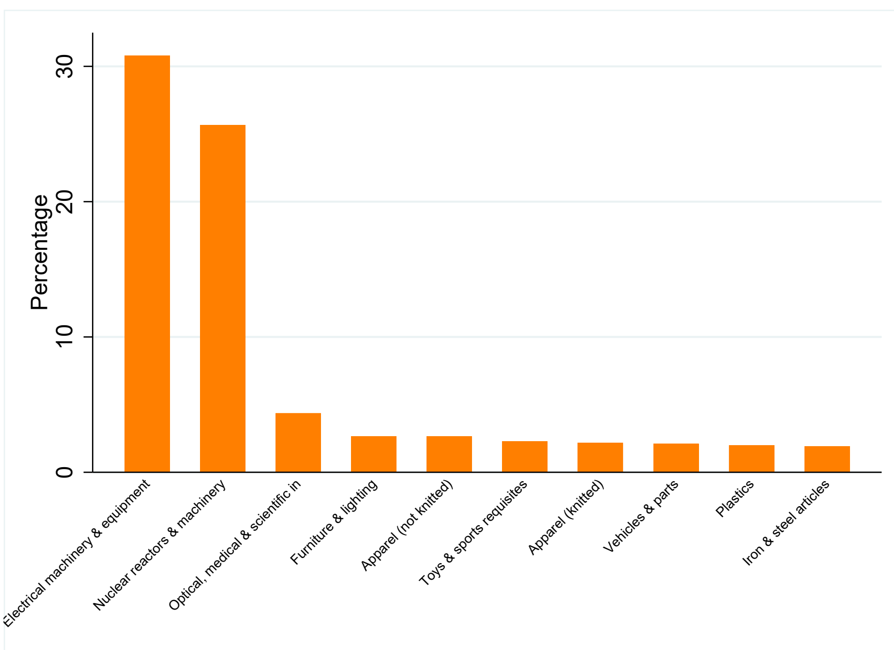
Notes: Total export values of the top 20 destination countries. Values are in RMB.

Figure 11: Total import values by origin economy



Notes: Total import values of the top 20 origin countries. Values are in RMB.

Figure 12: Top 10 HS2 categories by share of total export value



Notes: The graph displays the percentage contribution of the top 10 HS2 categories to the total export value. Each bar represents the share of total exports attributed to the respective HS2 category.

A.2.6 Robustness

- Robustness Check with Bank Access

In Table 13, columns 1–2 use a 5 km radius, columns 3–4 a 15 km radius, and columns 5–6 a 30 km radius to define the relevant banking access. The estimates of impact of trade credit share on exchange rate pass-through remain robust. The coefficient on $\Delta e_{k,t} \times \log(1 + \text{bank}_{i,t})$ is negative and significant, indicating that exporters located in areas with more bank branches experience a smaller price response to exchange rate shocks, i.e. a more complete pass-through. This result supports the interpretation that local financial development, as proxied by the density of nearby banks, alleviates exporters' financing constraints and dampens the sensitivity of producer-currency prices to currency movements.

Table 13: Exchange Rate Pass-Through with Trade Credit and Bank Access

Dependent Variable:	(1)	(2)	(3)	(4)	(5)	(6)
$\Delta p_{i,j,k,t}$	**5 km radius**		**15 km radius**		**30 km radius**	
$\Delta e_{k,t}$	0.0952***	0.156***	0.110***	0.172***	0.130***	0.194***
	(0.0242)	(0.0497)	(0.0286)	(0.0513)	(0.0426)	(0.0601)
$\phi_{i,0}$	-0.103***	-0.103***	-0.103***	-0.103***	-0.103***	-0.103***
	(0.0117)	(0.0117)	(0.0117)	(0.0117)	(0.0117)	(0.0117)
$\Delta e_{k,t} \times \phi_{i,0}$	-0.189***	-0.195***	-0.191***	-0.197***	-0.191***	-0.197***
	(0.0528)	(0.0535)	(0.0530)	(0.0536)	(0.0529)	(0.0535)
$\log(1 + \text{bank}_{i,t})$	0.000722	0.000711	0.000492	0.000457	0.00344	0.00340
	(0.00116)	(0.00116)	(0.00183)	(0.00183)	(0.00268)	(0.00268)
$\Delta e_{k,t} \times \log(1 + \text{bank}_{i,t})$	-0.00974**	-0.00914*	-0.00915*	-0.00874*	-0.0111	-0.0109
	(0.00464)	(0.00470)	(0.00503)	(0.00506)	(0.00726)	(0.00725)
$n_{i,t}$	-0.00598***	-0.00621***	-0.00597***	-0.00621***	-0.00596***	-0.00620***
	(0.00189)	(0.00185)	(0.00189)	(0.00185)	(0.00189)	(0.00185)
$\Delta e_{k,t} \times n_{i,t}$		-0.00978		-0.0100		-0.0101
		(0.00634)		(0.00633)		(0.00631)
Fixed Effects:						
$\varphi_{j,k} + \varphi_i + \varphi_t$	Yes	Yes	Yes	Yes	Yes	Yes
N	1,644,295	1,644,295	1,644,295	1,644,295	1,644,295	1,644,295
R^2	0.150	0.150	0.150	0.150	0.150	0.150

Note: Columns 1–2 use a 5 km radius; 3–4 a 15 km radius; 5–6 a 30 km radius. Standard errors are clustered at the country–time level. * Significant at 10 percent level. ** Significant at 5 percent level. *** Significant at 1 percent level.

- Robustness Check with Export Share

Table 14: Distribution of Export Share (ES)

Export Share (ES)	**Frequency**	**%**	**Cumulative %**
$0 < ES \leq 0.1$	5,028,751	64.31	64.31
$0.1 < ES \leq 0.2$	2,443,563	31.25	95.56
$0.2 < ES \leq 0.3$	145,317	1.86	97.42
$0.3 < ES \leq 0.4$	78,261	1.00	98.42
$ES > 0.4$	123,830	1.58	100.00
Total	7,819,722	100.00	

Note: Export share (ES) is defined as the ratio of firm exports to total sales, restricted to $[0, 1]$. The table reports the number and share of firm–year observations by export share bracket.

Table 15: Exchange Rate Pass-Through with Trade Credit and Export Share

Dependent Variable: $\Delta p_{i,j,k,t}$	(1)	(2)	(3)
$\Delta e_{k,t}$	0.0728	0.109**	0.111**
	(0.0442)	(0.0466)	(0.0467)
$\phi_{i,0}$		-0.115***	-0.0962***
		(0.0123)	(0.0131)
$\Delta e_{k,t} \times \phi_{i,0}$		-0.209***	-0.226***
		(0.0532)	(0.0679)
$\text{ExportShare}_{i,t}$	0.0544***	0.0806***	0.111***
	(0.0172)	(0.0177)	(0.0215)
$\Delta e_{k,t} \times \text{ExportShare}_{i,t}$	0.199**	0.223**	0.204*
	(0.0976)	(0.0987)	(0.121)
$\phi_{i,0} \times \text{ExportShare}_{i,t}$			-0.151***
			(0.0505)
$\Delta e_{k,t} \times \phi_{i,0} \times \text{ExportShare}_{i,t}$			0.153
			(0.377)
Fixed Effects:			
$\varphi_{j,k} + \varphi_i + \varphi_t$	Yes	Yes	Yes
Employment controls	Yes	Yes	Yes
N	1,644,295	1,644,295	1,644,295
R^2	0.150	0.150	0.150

Note: Export share is defined as exports over total sales, restricted to $[0, 1]$. Employment controls include the log of employment and its interaction with the exchange rate. All regressions include product–destination ($\varphi_{j,k}$), firm (φ_i), and time (φ_t) fixed effects. Standard errors are clustered at the country–time level.
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Columns 1–3 introduce interactions between the exchange rate, firms' trade credit dependence, and their export share. The positive and significant coefficient on the interaction between $\Delta e_{k,t}$ and the export share indicates that exporters with greater foreign market exposure exhibit stronger ERPT, consistent with their higher sensitivity to exchange rate fluctuations. The results remain robust when controlling for firm-level employment and fixed effects.

- Alternative Import Intensities

Table 16: Distribution of Import Intensity (II)

Import–intensity	**Firm–year $II_{i,t}$ (%)**	**Firm average II_i (%)**
$II = 0$	28.54	39.94
$0 < II \leq 0.1$	65.99	55.52
$0.1 < II \leq 0.2$	3.97	3.17
$0.2 < II \leq 0.3$	0.64	0.60
$0.3 < II \leq 0.4$	0.33	0.30
$II > 0.4$	0.53	0.46
Mean	0.026	0.020
Median	0.003	0.000

Table 17: ERPT with Trade Credit and Import Intensity

Dependent Variable: $\Delta p_{i,j,k,t}$	(1)	(2)	(3)	(4)
$\Delta e_{k,t}$	0.0578**	0.133***	0.0546**	0.133***
	(0.0224)	(0.0510)	(0.0224)	(0.0506)
$\phi_{i,0}$	-0.104***	-0.104***	-0.104***	-0.104***
	(0.0120)	(0.0120)	(0.0120)	(0.0120)
$\Delta e_{k,t} \times \phi_{i,0}$	-0.207***	-0.215***	-0.208***	-0.216***
	(0.0531)	(0.0539)	(0.0528)	(0.0536)
$\Delta e_{k,t} \times ImportIntensity_{i,t}$	0.290*	0.304*		
	(0.175)	(0.177)		
$\Delta e_{k,t} \times ImportIntensity_{i}$			0.425*	0.446*
			(0.245)	(0.246)
$n_{i,t}$	-0.00596***	-0.00624***	-0.00589***	-0.00619***
	(0.00189)	(0.00185)	(0.00190)	(0.00185)
$\Delta e_{k,t} \times n_{i,t}$		-0.0119*		-0.0125*
		(0.00649)		(0.00657)
Fixed Effects:				
$\varphi_{j,k} + \varphi_i + \varphi_t$	Yes	Yes	Yes	Yes
$\Delta e_{k,t} \times MarketShare_{i,k,h,t}$	Yes	Yes	Yes	Yes
N	1,612,961	1,612,961	1,612,961	1,612,961
R^2	0.149	0.149	0.149	0.149

Notes: Standard errors are clustered at country-time level and reported in parenthesis. Products are at 8-digit HS code level. Fixed effects: $\varphi_{j,k} + \varphi_i + \varphi_t$ is the combination of product-destination, firm and time fixed effects. Import intensity definitions: Columns (1)–(2) use the firm–year measure; columns (3)–(4) use the firm average.
* Significant at 10 percent level. ** Significant at 5 percent level. *** Significant at 1 percent level.

- ERPT with Predicted Trade Credit

Table 18: ERPT with Predicted Trade Credit (Peterse & Rajan controls)

Dependent Variable: $\Delta p_{i,j,k,t}$	(1)	(2)	(3)	(4)	(5)	(6)
$\Delta e_{k,t}$	0.0500***	0.100***	0.106***		0.0854***	0.139***
	(0.0111)	(0.0157)	(0.0160)		(0.0229)	(0.0513)
$\hat{\phi}_{i,t}$		0.0513***	0.0246	0.0325*	0.0000592	0.000260
		(0.0182)	(0.0182)	(0.0191)	(0.0180)	(0.0180)
$\Delta e_{k,t} \times \hat{\phi}_{i,t}$		-0.302***	-0.251***	-0.272***	-0.260***	-0.259***
		(0.0604)	(0.0519)	(0.0603)	(0.0626)	(0.0621)
$n_{i,t}$					-0.000769	-0.000976
					(0.00187)	(0.00183)
$\Delta e_{k,t} \times n_{i,t}$						-0.00845
						(0.00625)
Fixed Effects:						
$\varphi_{j,k} + \varphi_i + \varphi_t$	Yes	Yes	No	No	Yes	Yes
$\varphi_{j,t} + \varphi_i + \varphi_k$	No	No	Yes	No	No	No
$\varphi_{j,k,t} + \varphi_i$	No	No	No	Yes	No	No
N	2,368,425	2,363,257	2,424,897	2,155,101	1,643,699	1,643,699
R^2	0.119	0.119	0.0901	0.208	0.149	0.149

Note: Standard errors in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. SE clustered at country×period. $\hat{\phi}_{i,t}$ is the fitted value of receivables.

Table 19: ERPT with Predicted Trade Credit (Love controls)

Dependent Variable: $\Delta p_{i,j,k,t}$	(1)	(2)	(3)	(4)	(5)	(6)
$\Delta e_{k,t}$	0.0500***	0.0993***	0.105***		0.0838***	0.137***
	(0.0111)	(0.0157)	(0.0161)		(0.0229)	(0.0514)
$\hat{\phi}_{i,t}$		0.0419**	0.0143	0.0239	-0.0153	-0.0151
		(0.0177)	(0.0173)	(0.0184)	(0.0166)	(0.0166)
$\Delta e_{k,t} \times \hat{\phi}_{i,t}$		-0.299***	-0.245***	-0.265***	-0.251***	-0.250***
		(0.0614)	(0.0523)	(0.0606)	(0.0628)	(0.0623)
$n_{i,t}$					-0.000655	-0.000861
					(0.00186)	(0.00182)
$\Delta e_{k,t} \times n_{i,t}$						-0.00845
						(0.00625)
Fixed Effects:						
$\varphi_{j,k} + \varphi_i + \varphi_t$	Yes	Yes	No	No	Yes	Yes
$\varphi_{j,t} + \varphi_i + \varphi_k$	No	No	Yes	No	No	No
$\varphi_{j,k,t} + \varphi_i$	No	No	No	Yes	No	No
N	2,368,425	2,360,210	2,421,860	2,152,187	1,643,689	1,643,689
R^2	0.119	0.119	0.0901	0.208	0.149	0.149

Note: Standard errors in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. SE clustered at country×period. $\hat{\phi}_{i,t}$ is the fitted value from the Love-style prediction model (`yhat_love`).

- Alternative Measures of Trade Credit Intensity

Table 20: Robustness With Alternative Measures of Trade Credit Share

Dependent Variable:	(1)	(2)	(3)	(4)
$p_{i,j,k,t}$	Time-varying	Lagged Time-varying	First-year	Mean
$\triangle e_{k,t}$	0.0796***	0.0807***	0.0937***	0.0907***
	(0.0134)	(0.0159)	(0.0141)	(0.0154)
ϕ_i	0.0103**	-0.00509	0.00781**	0.00571
	(0.00429)	(0.00571)	(0.00332)	(0.00376)
$\triangle e_{k,t} \times \phi_i$	-0.192***	-0.235***	-0.229***	-0.218***
	(0.0454)	(0.0476)	(0.0465)	(0.0549)
Fixed Effects:				
$\varphi_{j,k} + \varphi_i + \varphi_t$	Yes	Yes	No	No
$\varphi_{j,k} + \varphi_t$	No	No	Yes	Yes
N	2356766	1777240	2353309	2376396
R^2	0.119	0.138	0.0791	0.0787

Notes: This table reports the results of specification in table 3 column 2 by different measures of ϕ_i and fixed effects. Standard errors are clustered at country-time level and reported in parenthesis. Products are at 8-digit HS code level. Fixed effects: $\varphi_{j,k} + \varphi_i + \varphi_t$ is the combination of product-destination, firm and time fixed effects; $\varphi_{j,k} + \varphi_t$ is the combination of product-destination and time fixed effects. * Significant at 10 percent level.** Significant at 5 percent level. *** Significant at 1 percent level.

- Alternative Data Samples

Column 1 and 2 in Table 21 present results for the subsamples from 2006 to 2011, which exclude the fixed exchange rate regime, and from 2000 to 2007, which exclude the post-global financial crisis period. The coefficient on the interaction term between trade credit share and exchange rate shocks, though slightly reduced in magnitude, remains statistically significant and negative. Columns 3 and 4 of Table 21 show results for the subsample excluding exports to the U.S. prior to 2006—during which time the Chinese RMB was pegged to the U.S. dollar—and for the subsample of the top 20 largest export destinations by value. Compared to the baseline results in Table 3, the interaction term coefficient remains strongly significant and consistent. In summary, the choice of subsamples has minimal impact on our empirical results, indicating the robustness of our findings.

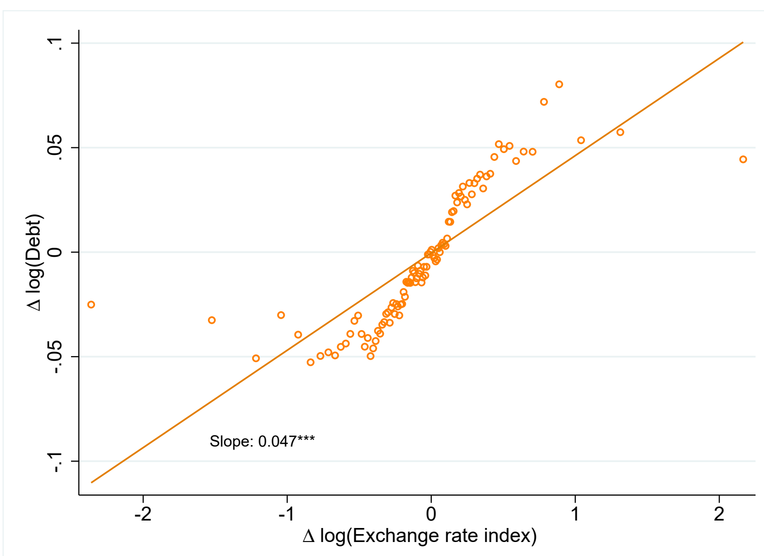
Table 21: Robustness With Alternative Samples

Dependent Variable: $\triangle p_{i,j,k,t}$	2006-2011 (1)	2000-2007 (2)	w/out US (3)	Top 20 (4)
$\triangle e_{k,t}$	0.0578***	0.0644***	0.0722***	0.114***
	(0.0218)	(0.0159)	(0.0127)	(0.0165)
$\phi_{i,0}$	-0.0539***	-0.109***	-0.0683***	-0.0752***
	(0.0138)	(0.0122)	(0.00896)	(0.00975)
$\triangle e_{k,t} \times \phi_{i,0}$	-0.135*	-0.147***	-0.200***	-0.220***
	(0.0781)	(0.0506)	(0.0405)	(0.0564)
Fixed Effects:				
$\varphi_{j,k} + \varphi_i + \varphi_t$	Yes	Yes	Yes	Yes
N	1411588	1383170	2271157	1808657
R^2	0.169	0.101	0.123	0.105

Notes: This table reports the results of specification in table 3 column 2 using different data samples. Standard errors are clustered at country-time level and reported in parenthesis. Products are at 8-digit HS code level. Fixed effects: $\varphi_{j,k} + \varphi_i + \varphi_t$ is the combination of product-destination, firm and time fixed effects.
* Significant at 10 percent level.** Significant at 5 percent level. *** Significant at 1 percent level.

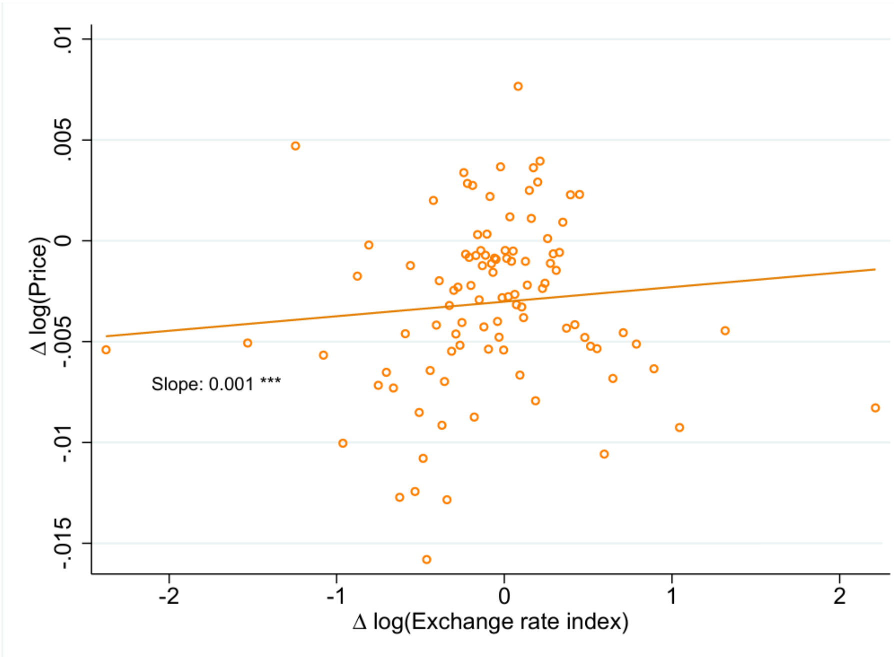
A.2.7 Other checks

Figure 13: Firm level relationship between changes in debt and exchange rate changes



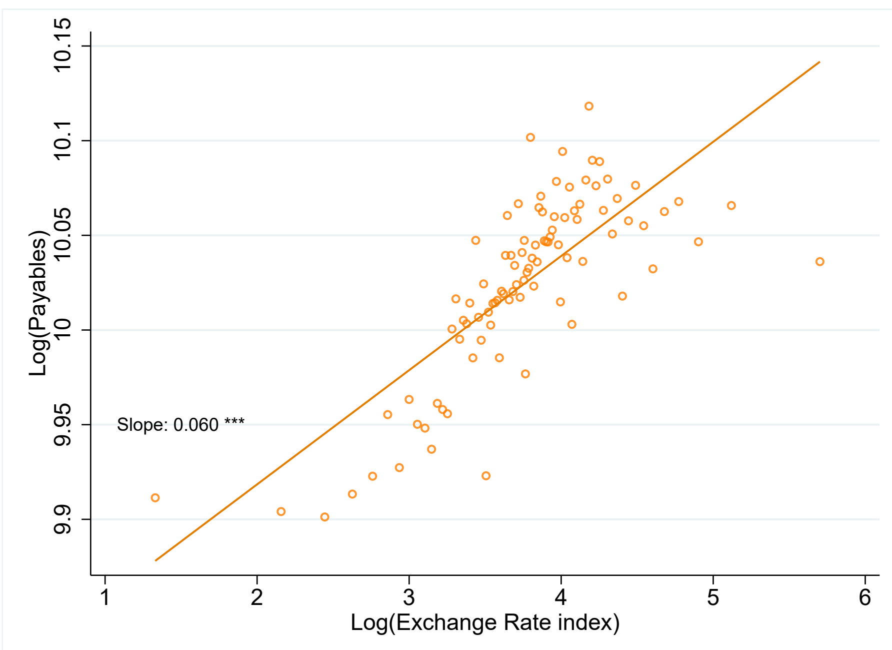
Note: Bin scatter and regression fit line of change in debt and ER changes. The exchange rate index was computed by weighting each country's exchange rate according to the firm's total exports to that country in a given year. Controlled by Product-Destination-Year.

Figure 14: Firm level relationship between changes in prices and exchange rate changes



Note: Bin scatter and regression fit line of change in prices and ER changes. The exchange rate index was computed by weighting each country's exchange rate according to the firm's total exports to that country in a given year. Controlled by Product-Destination-Year.

Figure 15: Relationship between exchange rate index and payables



Note: Bin scatter and regression fit line of payables and exchange rate index. The regression includes time and firm controls. The exchange rate index was computed at the firm level by weighting each country's exchange rate according to the firm's total exports to that country.

PUBLICATIONS

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