EXCHANGE RATE SHOCKS TO WORKING CAPITAL, FINANCING FRICTIONS AND REAL FRAGILITY*

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Abstract

We examine how exchange rate shocks propagate to firm outcomes and amplify through working capital and financing frictions. Guided by a model with cash-in-advance constraints on production and external borrowing constraints based on pledgeable income, our analysis exploits firm-specific seasonality and foreign exchange surprises for empirical identification. Using an extensive array of administrative datasets from Türkiye (2010-2024), we find that currency depreciations arriving in main quarters trigger significantly larger contractions in purchases, sales, and production than depreciations in non-main quarters. Bank credit also tightens, with sharper reductions in short-term loans than long-term loans. These effects are strongest for SMEs, highly leveraged, and import-dependent firms, while large firms expand borrowing in line with a flight-to-quality. Construction and services with long cash conversion cycles are particularly exposed. Our results establish a novel source of fragility in production due to working capital and financing frictions: depreciation-induced increases in input costs force cuts in purchases, reduce sales and pledgeable income, and tighten short-term external finance, deepening real economic contractions.

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1 Introduction

Exchange rate shocks pose significant financing challenges for firms, particularly in emerging markets and developing economies. Seminal works emphasize the role of financing frictions, showing how deteriorating net worth (Bernanke and Gertler, 1989) due to currency mismatches (Krugman, 1999; Céspedes et al., 2004) and declining asset values (Kiyotaki and Moore, 1997) can constrain long-term investment and employment. While much of the literature focuses on shocks to net worth and financial accelerator effects, a more immediate but less explored concern for many firms is the availability of financing for short-term working capital, as exchange rate shocks affect operational input costs and working capital needs.

In this paper, we provide evidence on how exchange rate shocks that raise working capital requirements affect firm operations due to financing frictions. Our empirical setting is Türkiye, a large and open G20 economy with broad production capabilities across many industries. We combine a comprehensive array of administrative datasets and exploit firm-specific seasonality in working capital needs and its interaction with exchange rate fluctuations to identify a novel channel for the amplification of exchange rate shocks. Together with a rich set of time fixed effects, our identification strategy rules out a wide range of alternative explanations, including uncertainty and other macroeconomic factors that typically accompany exchange rate shocks.

We interpret our findings through the lens of a model with cash-in-advance constraints on production. Such constraints involving working capital are standard in the macro literature, tracing their origins to Clower (1967). In addition, the model features borrowing constraints based on cash flows as in Lian and Ma (2021). When an exchange rate shock raises input costs and forces constrained firms to cut their purchases, the initial adjustment reduces both cash flows and borrowing capacity, creating a feedback loop that amplifies the contraction. The model's amplification mechanism strengthens during periods of high economic activity and working capital needs because of limited internal funds and net worth, offering a natural empirical strategy to use firm-specific seasonality and its interaction with exchange rate shocks for identification.

Our estimates regarding the amplification of exchange rate shocks through cash-in-advance working capital constraints are economically significant. When a moderately-sized one-standard deviation exchange rate depreciation coincides with a firm's *main quarter*, defined as its quarter of peak seasonal profitability, real activity contracts more sharply than a similar depreciation during a non-main quarter: purchases fall more by approximately 4.0%, sales by 5.8%, volume by 4.4%, and employment by 0.6%. Working capital components also contract more sharply: trade payables decline more by approximately 2.6%, receivables by 3.5%, and inventories by 4.5%. In addition, bank borrowing contracts with a marked maturity component: total credit declines more by around 3.7%, driven primarily by short-term credit (down by 4.0%) compared to long-term credit (down by 2.3%), consistent with difficulties in rolling over short-term finance.

We find economically significant patterns of heterogeneity in our estimates. Consistent with the role played by financing frictions, SMEs and highly leveraged firms experience the largest contractions, while large firms see increases in credit, indicative of a "flight-to-quality" effect. Import-intensive and non-exporting firms are particularly vulnerable, while exporters appear shielded, as predicted by borrowing constraints based on pledgeable income. In addition, we find that contractions are more pronounced in construction and services, where cash conversion cycles tend to be longer. All of these cross-sectional patterns support the importance of cash-in-advance constraints and financing frictions in explaining amplified firm-level responses to exchange rate shocks. When currency depreciates and input prices rise, either directly for imported inputs or indirectly for domestically produced inputs, cash-in-advance constraints tighten and force firms to cut back on purchases, resulting in a decline in production, sales and pledgeable income, which in turn tightens external finance and forces further cuts.

Several papers link large currency depreciations to firm-level investment in emerging markets. In particular, Aguiar (2005) studies Mexican firms in the aftermath of the 1994 peso crisis. Exporting firms outperform nonexporting firms in terms of sales and profits, as expected with a real depreciation. However, exporting firms do not increase investment due to their foreign currency liabilities and weakened balance sheets, consistent with Bernanke and Gertler (1989) type of

balance-sheet effects. In a similar vein, investigating the role of financial constraints, Desai et al. (2008) compare affiliates of multinational firms and local firms in emerging markets in response to large depreciation episodes. While local firms experience sharp reductions in investment, affiliates of multinational firms increase investment with foreign parent funding, using internal capital markets to overcome local financing frictions and take advantage of opportunities created by currency depreciations. By contrast, our work focuses on the effects of exchange rate movements on short-term productive capacity due to working capital and financing frictions. Our main contribution is to establish working capital financing as a source of real fragility for firms in emerging markets beyond standard net-worth effects arising from currency mismatches or declining asset values.

Recent works formalize how pledgeable income, rather than collateral alone, limits borrowing capacity (Lian and Ma, 2021) and affects the financing of working capital (Almeida et al., 2024). Our analysis builds on this approach to study the fragility created by exchange rate shocks, an important source of risk for firms in emerging markets. Using an extensive array of administrative datasets, we trace the transmission of exchange rate shocks to firm operations, working capital accounts, and bank credit by maturity, and study the heterogeneity of these effects by financial constraints.

The rest of the paper is organized as follows. Section 2 outlines the framework guiding our empirical analysis. Section 3 describes the linked administrative datasets, details the construction of orthogonalized FX surprises, and provides macro context. Section 4 defines the profitability-based *main quarter*, documents its validity for empirical identification, and lays out the baseline specification. Section 5 presents the main findings: (i) baseline semi-elasticitie for real activity; (ii) the working-capital transmission on payables, receivables, and inventories; (iii) bank-credit responses by maturity; and (iv) heterogeneous effects by firm size, leverage, trade exposure, and sector. Section 6 concludes the paper.

2 Model

Our empirical tests are motivated by recent research that emphasizes the role of cash-flow-based borrowing constraints (Lian and Ma, 2021). In this subsection, we outline the ingredients of such a model of borrowing constraints to illustrate the real effects of exchange rate shocks on financially constrained firms. Intuitively, exchange rate shocks raise input costs and force constrained firms to cut their purchases. This in turn lowers both cash flows and borrowing capacity, creating a feedback loop that amplifies the contraction. Almeida et al. (2024) provide a comprehensive treatment of financial amplification and real effects. Our analysis below contains the essential points.

Suppose that a firm purchases m_t units of input at a per-unit price of p_t at the beginning of period t. During the period, the firm adds value to the purchased inputs and generates sales $y_t = A_{it} m_t^{\beta}$. In this formulation of sales y_t, A_{it} is a productivity parameter, $0 < \beta < 1$, and i denotes the state, which can be high H or low L to incorporate seasonality, with $A_{Ht} > A_{Lt}$. Customers pay the firm at the end of period t.

Note the difference in the timing of cash flows from the perspective of the firm: paying for purchases at the beginning of period t, adding value and generating sales during period t, and receiving payment from customers at the end of period t. In effect, the firm needs financing for its investment in working capital $p_t m_t$.

Further suppose that the firm is financially constrained. The financing for the investment in working capital comes from internal net worth w_t and external finance, capped at $\overline{B_t}$. So, $p_t m_t = w_t + \overline{B_t}$, that is investment equals financing. $\overline{B_t}$ is based on pledgeable cash flow y_t, consistent with evidence in Lian and Ma (2021). A simple linear formulation is $\overline{B_t} = \theta y_t$ with $0 < \theta < 1$.

Without loss of generality, $\overline{B_t}$ can have an additional component based on collateral value $p_t m_t$, which is omitted for simplicity. When included, such a component has a neutral effect in the firm's response to input price shocks derived below.

The model's testable predictions flow from the financially constrained firm's budget constraint,

$$p_t m_t = w_t + \theta A_{it} m_t^{\beta}.$$

Deriving the constrained firm's response to a shock to the input price p_t (from some steady-state input price p) by taking the partial derivative of the budget constraint with respect to p_t,

$$m_t + p_t \frac{\partial m_t}{\partial p_t} = \beta\theta A_{it} m_t^{\beta-1} \frac{\partial m_t}{\partial p_t}.$$

Substituting in $\frac{\overline{B_t}}{m_t}$ for $\theta A_{it} m_t^{\beta-1}$ and collecting terms,

$$\frac{\partial m_t}{\partial p_t} p_t \left[1 - \beta \frac{\overline{B_t}}{p_t m_t}\right] = -m_t.$$

Finally, rearranging the expression to obtain the testable elasticity $\eta_t \equiv \frac{\partial m_t}{\partial p_t} \frac{p_t}{m_t}$ in response to an input price shock,

$$\eta_t = -\frac{1}{1-\beta \frac{\overline{B_t}}{p_t m_t}} < 0.$$

Testable elasticities η_t regarding real variables such as purchases, employment and sales are negative and driven by leverage in the financing of working capital, $\frac{\overline{B_t}}{p_t m_t}$. An increase in the input price p_t reduces the quantity of inputs m_t through the budget constraint. This decline in inputs then lowers pledgeable cash flows y_t that support external finance $\overline{B_t}$. The result is a financial amplification of the initial input price shock.

In our empirical setting, exchange rate shocks serve to produce input price shocks. Also note that given $A_{Ht} > A_{Lt}$, there is more pledgable cash flow in the high state than in the low state and therefore $m_{Ht} > m_{Lt}$. This naturally leads to greater leverage in the high state than in the low state and state-dependent elasticities $\eta_{Ht} < \eta_{Lt} < 0$, forming the basis of our focus on seasonality for empirical identification.

3 Firm Level Data and Foreign Exchange Surprises

This study leverages a comprehensive set of administrative databases provided to the Central Bank of the Republic of Türkiye (CBRT) by various government agencies. The analysis draws

on six primary data sources: (1) quarterly income statements from the Revenue Administration; (2) annual balance sheet and income statement filings submitted by firms to the Revenue Administration; (3) quarterly business-to-business (B2B) transaction data on firm-level sales and purchases from the Revenue Administration; (4) quarterly firm-level employment records from the Social Security Institution (SSI); (5) quarterly customs data on firm-level imports and exports from the Ministry of Trade; and (6) quarterly credit flow data from the Banking Regulation and Supervision Agency (BRSA). These datasets are merged into a unified firm-level panel using unique firm identifiers, ensuring internal consistency and avoiding duplication across sources. The resulting dataset, spanning from 2010:Q1 to 2024:Q4, offers a rich and granular view of how foreign exchange shocks affect firms' working capital dynamics and real economic decisions.

3.1 Firm Level Data

We begin our analysis by utilizing annual balance sheet and income statement data covering all non-financial private-sector firms operating under Türkiye's balance-sheet accounting framework. These data span the 2009–2023 period and are compiled in accordance with the Tax Procedure Law. Incorporated firms—primarily limited liability and joint stock companies—are legally required to submit complete financial statements under the corporate income tax regime. Unincorporated enterprises, such as sole proprietorships, are included conditional on exceeding specific regulatory thresholds.[1] In addition to annual filings, the Revenue Administration supplies quarterly income statements for firms applying the balance-sheet principle, enabling us to observe intra-year profitability dynamics and identify the "main quarter" of firm activity.

Second, we incorporate quarterly customs records on firm-level imports and exports provided by the Ministry of Trade. These data offer detailed firm-level information on cross-border goods transactions, disaggregated by trade direction, destination, and product category. This allows for a comprehensive analysis of firms' integration into international markets and the sectoral com-

[1] As of 2023, firms are required to adopt the balance-sheet method if they meet any of the following criteria: annual purchases above 890,000 TL; annual sales above 1,270,000 TL; annual gross business revenue above 440,000 TL; or if five times the sum of business revenue and annual sales exceeds 890,000 TL.

position of their trade flows.

Third, to capture firm-to-firm domestic trade linkages, we use monthly transaction-level invoice data compiled by the Revenue Administration. This dataset includes all business-to-business (B2B) transactions exceeding 5,000 TL in value.[2] The data record the monetary value and direction of transactions in local currency, thus offering granular insight into the structure and evolution of Türkiye's formal inter-firm network. In contrast to static financial statements, these high-frequency transaction records allow us to trace changes in firm relationships over time—identifying both upstream suppliers and downstream buyers. We compute monthly aggregates of firms' sales and purchases, as well as the number of unique trading partners. To mitigate data quality issues, we exclude transaction values that exceed the supplier firm's reported annual net sales, which likely indicate reporting errors.[3]

Fourth, we utilize monthly firm-level employment data from the Social Security Institution (SSI), which provide matched employer-employee records for all firms under the balance-sheet reporting framework. These administrative records report the number of registered employees on a monthly basis, along with annual aggregates. This allows us to monitor firm size, labor dynamics, and employment growth over time.[4]

Fifth, we integrate monthly firm-bank level credit flow data provided by the BRSA and made accessible to the CBRT. These data capture all new credit disbursements to firms, detailing the lending institution, currency denomination, and maturity structure of each loan. We restrict the analysis to cash-performing loans denominated in Turkish Lira, excluding non-performing exposures and non-cash instruments such as letters of guarantee or credit. This restriction enables us to focus on actual borrowing behavior and domestic financial conditions, which are central to our study of credit dynamics.

Finally, to ensure data consistency and mitigate the influence of anomalies, we apply several

[2] As of 2024, this threshold corresponded to approximately 140 US dollars.

[3] To ensure accuracy, transactions are dropped if their value exceeds the supplier's annual net sales.

[4] The dataset includes employees formally hired under service contracts, in accordance with Article 4/a of the Social Security Law No. 5510, and excludes self-employed individuals.

filters across datasets. Specifically, we exclude firm-year observations exhibiting implausible values—such as negative employment, assets, or net sales—to retain only economically active firms. To address concerns about outliers, we winsorize all firm-level variables at the 2.5% level on an annual basis. These data-cleaning procedures ensure the reliability of our empirical analysis.

By integrating these seven administrative datasets, we construct a uniquely rich and high-frequency view of Turkish firms' real, financial, and external behavior. Taken together, they enable a detailed and multidimensional analysis of how firm-level outcomes—particularly responses to foreign exchange shocks—are shaped by credit access, trade exposure, and market interactions over time.

Descriptive moments, presented in Tables A1–A3, provide further insights into the dataset's structure. Larger firms and exporters operate at greater scale, exhibit thicker working-capital positions, and typically carry lower leverage. In contrast, highly-leveraged firms tend to be smaller and less profitable. Sectoral differences (Table A3) are also notable: firms in the industrial sector tend to be the most working-capital-intensive, service-sector firms typically carry higher leverage, and firms in the construction sector exhibit relatively high inventories and investment rates, consistent with longer cash-conversion cycles.

3.2 Foreign Exchange Surprise Construction and Orthogonalization

We construct FX surprises using financial analysts' expectations from the CBRT Survey of Market Participants (SMP).[5] In order to formalize the construction of FX surprises, consider the nominal USD/TRY exchange rate in month t, denoted $y_t^{fx} \equiv \ln(\text{USD/TRY}_t)$. Let the corresponding log FX forecast submitted prior to the announcement or data release be denoted by $\mathbb{E}[y_t^{fx} \mid I_{t-\Delta^-}]$. Then

[5] Our approach follows the "innovations" logic widely used for monetary policy and inflation surprises—compare realizations to a real-time forecast and interpret the residual as unanticipated news; see Pericoli and Veronese (2015), Gruss et al. (2020), Tillmann (2023), and Checo et al. (2024). The SMP provides time-stamped submissions and high-frequency forecast snapshots.

the FX surprise is defined as:

$$\text{FXSurprise}_t = y_t^{fx} - \mathbb{E}[y_t^{fx} \mid I_{t-\Delta^-}] \tag{1}$$

where the actual exchange rate is compared to the market participants' forecast immediately prior to the event.

To isolate the genuinely unexpected component of exchange rate movements, we follow an orthogonalization procedure similar to Bauer and Swanson (2023). Under the full-information rational expectations (FIRE) hypothesis, forecast errors should not be systematically related to publicly available information (Coibion and Gorodnichenko, 2015). Thus, we regress the raw FX surprise on a comprehensive set of contemporaneous macro-financial indicators:

$$\text{FXSurprise}_t = \alpha + \beta \cdot news_t + \varepsilon_t \tag{2}$$

where $news_t$ includes recent changes in key forward-looking variables, real activity indicators, inflation trends, monetary policy expectations, and financial market conditions—all measured as changes from one month prior to the most recent data point available before the event. Specifically, the vector includes changes in: the one-month-ahead expected policy rate, inflation expectations (one-year and two-year ahead), industrial production growth, GDP growth expectations, unemployment rate, equity market indices, and capital inflows (when available). This set of controls captures the primary economic signals that may influence exchange rate expectations.

By regressing the forecast error on this rich information set, we filter out predictable components of exchange rate movements arising from known macroeconomic dynamics or market trends. This procedure addresses two primary identification concerns: (i) endogenous movements in exchange rates that reflect central bank behavior or macro fundamentals, and (ii) systematic forecast errors linked to observable variables. The residuals from this regression represent

the orthogonalized FX surprises:

$$\text{FXSurprise}_t^{\perp} = \varepsilon_t \tag{3}$$

This approach ensures that the FX surprise measure captures unexpected and exogenous shifts in the exchange rate, free from anticipation effects or systematic market responses. Figure 1 plots two monthly FX-surprise measures (aggregated to calendar quarters): an expectations-based surprise using SMP end-of-month forecasts and a forward-based surprise using the 1-month USD/TRY forward from the month's open to close.[6] Positive values indicate unexpected TRY depreciation. The two series co-move closely and are centered near zero; the forward-based measure is more volatile and displays sharper spikes, while the survey-based measure is smoother yet mirrors the same episodes—notably the pronounced positive surprises in late-2021/2022 and the marked negative in 2018. The close alignment supports the interpretation that both measures capture unanticipated currency movements, with the forward series providing a high-frequency upper bound and the SMP-based residual a conservative benchmark.

With these surprise measures in hand, Figure 2 situates them in the macro–financial environment we study: recurrent and sizable depreciations coincide with surges in CPI inflation and sharp revisions in firms' 12-month expectations. Two features are salient for our analysis. First, major depreciation episodes—most visibly in 2018 and again in 2021–2022—are accompanied by sharp increases in firms' inflation expectations and, with a short lag, in realized CPI. The 2021–2022 surge shows the clearest pattern: as the exchange rate's y-o-y change climbs into double and then triple digits, expectations jump almost one-for-one and CPI follows, consistent with rapid pass-through operating through imported input costs and pricing. Second, outside stress episodes, expectations and CPI co-move at lower levels, while the exchange-rate series remains the most volatile. This descriptive evidence supports our mechanism: FX shocks are a first-order driver of inflation dynamics and of firms' beliefs about future inflation, motivating our use of orthogonalized FX surprises and the focus on periods (main quarters) when working-capital pres-

[6] We first aggregate the series to the quarterly frequency by summing the monthly surprises within each calendar quarter.

sures make pass-through particularly sharp.

4 Identification Method and Estimation

Our empirical strategy exploits firm-level seasonality in financial performance to estimate the amplification effects of FX shocks through working capital constraints. Specifically, we examine whether firms exhibit stronger responses to FX shocks when these shocks coincide with their internally determined periods of heightened liquidity needs—referred to as their *main quarter*. We define the main quarter as the fiscal quarter in which a firm's short-term financial pressures and profitability are typically most concentrated, based on historical data.

4.1 Defining the Main Quarter

To identify each firm's main quarter, we use historical data on operating profits, a measure of firm profitability that captures revenues net of operational costs and is less affected by financing or one-time accounting items. Following the methodology of Chang et al. (2017) and Almeida et al. (2024), we classify the main quarter based on profitability seasonality observed over the previous five calendar years (20 quarters). For each firm, we rank these 20 quarters according to their operating profits. Since each calendar quarter (Q1–Q4) appears five times in this 20-quarter window, we calculate the average rank for each quarter. The quarter with the lowest average rank—that is, the quarter that most frequently appears among the most profitable—is designated as the firm's main quarter.

Using the average rank rather than raw profit levels mitigates the influence of outlier quarters with temporarily high or low profitability. To validate this classification, we regress firm-level operating profits on the main quarter indicator, controlling for industry-quarter and calendar-quarter fixed effects. We find that firms' main quarters are strongly associated with predictable intra-year profit variation, with estimated coefficients amounting to 40–60% of the average quarterly operating profit. Moreover, we verify that main quarters are well distributed across the cal-

endar year, ruling out seasonality driven by aggregate factors like year-end accounting or tax considerations.

Figure B2 documents pronounced within-year seasonality in activity and financing across sectors. Each panel reports, for 2015–2024, the share of total sales, purchases, total credit, and cash flow accounted for by each calendar quarter, alongside the share of firms whose profitability-based *main quarter* falls in that quarter. Two regularities emerge. First, Q4 concentrates a disproportionate share of operating scale and liquidity in all sectors—most starkly in Construction (cash flow and total credit peak around Q4), but also in Industry and Services—while Q1 is comparatively weak. Total credit tracks purchases and sales closely, consistent with short-maturity finance funding peak-season operations. Second, the distribution of main quarters aligns with these seasonal peaks: a plurality of firms designate Q4 as their main quarter in Industry, Construction, and Services, with smaller but systematic masses in Q2–Q3. Taken together, the correspondence between seasonal peaks and the distribution of main quarters validates our profitability-based classification as a timing device for periods of high working-capital intensity. It also underpins our identification strategy: because firms reach their peaks in different calendar quarters, we can saturate calendar-time fixed effects to absorb aggregate seasonality while preserving within-firm state variation.

4.2 Baseline Specification and Estimation

With the main quarter identified, we estimate the impact of FX shocks using the following specification:

$$\begin{aligned} y_{it} = \beta_0 + \beta_1 \text{Main Quarter}_{it} + \beta_2 (\text{MainQuarter}_{it} \times FXSurprises_t) \\ + \Gamma X_{it-1} + \alpha_i + \delta_{st} + \phi_{pt} + \varepsilon_{it} \end{aligned} \tag{4}$$

where y_{it} is the outcome variable for firm i in quarter t. We study three categories of firm outcomes: (i) working capital components—trade credits, trade debts, and inventories; (ii) real activ-

ity measures—sales, input purchases, employment, and production volume; and (iii) borrowing behavior— credit usage and FX market transactions. The variable MainQuarter_{it} is an indicator equal to one if quarter t coincides with firm i's main quarter. $FXSurprises_t$ captures exogenous fluctuations in exchange rates, constructed to reflect surprise components orthogonal to predictable macroeconomic dynamics. The interaction term $\text{MainQuarter}_{it} \times FXSurprises_t$ captures the differential sensitivity of firms to FX shocks during periods of elevated short-term financing needs—i.e., the working capital credit multiplier. The vector X_{it-1} includes lagged firm-level control variables such as total assets (firm size), leverage, profit margin, export intensity, and firm age. These covariates help account for observable heterogeneity in financial and operational characteristics that may independently affect firm outcomes.

We include several layers of fixed effects to control for unobserved confounding variation. First, α_i denotes firm fixed effects, which absorb all time-invariant unobserved heterogeneity across firms, such as managerial ability or long-run risk preferences. Second, δ_{st} denotes sector-by-time fixed effects, which account for shocks or trends that are common to all firms in the same industry at a given point in time—such as input cost changes, sector-specific regulations, or global demand fluctuations. Third, ϕ_{pt} represents province-by-time fixed effects, which absorb time-varying regional shocks including localized policy interventions, natural disasters, infrastructure disruptions, or labor market frictions.

This specification allows us to compare a treated firm i, which is hit by an FX shock during its main quarter, with a control firm j, exposed to the same shock but outside its main quarter. The key identifying assumption is that these firms are otherwise similar and differ only in the timing of the shock relative to their internal financial cycles. Because the occurrence of the FX shock is common to both, the variation in outcomes can be attributed to differential timing vis-à-vis working capital needs.

4.3 Identification Assumptions

Our identification strategy relies on the assumption that the timing of economic shocks relative to a firm's main quarter is effectively exogenous. Specifically, we assume that shocks occur with constant probability over time and that the likelihood of a shock coinciding with a firm's main quarter is unrelated to firm-specific characteristics or strategic timing behavior. This assumption is plausible in our context because we focus on recurring shocks that are largely unpredictable and cannot be anticipated based on information available prior to their realization. As discussed in the main text, such shocks ensure that the assignment of firms into treatment (shock in main quarter) and control (shock outside main quarter) is quasi-random.

To empirically validate this assumption, we estimate a probit model predicting the likelihood that a firm is exposed to an economic shock during its main quarter. The model includes lagged firm characteristics such as total assets (firm size), leverage, profit margin, firm age, net sales, export status, and fixed effects for industry and province to account for structural differences across sectors and regions. The results, presented in Figure B1, show that the predicted probabilities of being shocked in the main quarter versus being shocked outside the main quarter are virtually identical across firms and exhibit no systematic relationship with observable firm characteristics. These findings suggest that the timing of shocks relative to firms' main quarters is not driven by firm-specific factors, reinforcing our assumption that treatment assignment is plausibly exogenous.

Additionally, to further assess the validity of our identification strategy, we examine whether observable firm characteristics predict the likelihood of receiving treatment—defined as being shocked during the firm's main quarter. Specifically, we estimate an assignment into treatment regression, in which a treatment indicator (equal to one if a firm is shocked in its main quarter) is regressed on a rich set of firm-level covariates. These include firm size (log of total assets), leverage (debt-to-asset ratio), profit margin (net income-to-sales), firm age, export status, as well as sector and province fixed effects. The results, presented in Table B1, show that none of the

firm characteristics are statistically significantly correlated with treatment status. Moreover, the constant term remains stable across specifications, clustering around 0.50, which reflects the expected share of firms being shocked in their main quarter under quasi-random assignment. Importantly, this proportion remains unchanged even after conditioning on firm observables, providing further support for the plausibility of our identification strategy.

5 Impact of Exchange Rate Shocks

5.1 Main Quarters

We begin by estimating the differential impact of exchange-rate shocks during firms' main quarters. [7] In a standard cash-flow–based borrowing-constraint models, leverage amplifies the real effects of cost shocks: when an exchange-rate surprise raises input costs for import-exposed firms, constrained buyers are forced to cut back on input purchases, the ensuing decline in operating cash flow reduces pledgeable income, tightens external financing, and feeds back into further input cuts. Amplification of this sort is predicted to be especially strong in main quarters when firms handle higher business volumes with greater leverage, as net worth is relatively fixed in the short run (Bernanke and Gertler, 1989; Kiyotaki and Moore, 1997; Almeida et al., 2024; Lian and Ma, 2021).

Table 1 shows that these predictions line up tightly with the data. Interpreting log coefficients as semi-elasticities, a one–standard-deviation (SD) FX shock in a main quarter reduces purchases by 4.0%, sales by 5.8%, and total volume by 4.4%. Employment, a slow-moving margin with adjustment costs, still declines by 0.6%, roughly one-ninth the size of the sales effect. These effects are estimated with high precision on an administrative panel with about 19 million firm-quarter observations. Importantly, the non-interacted main-quarter coefficients are large and positive

[7] For ease of interpretation, we standardize exchange rate shocks to have zero mean and unit standard deviation. In addition, we log-transform firm-level outcome variables using the natural logarithm, so that estimated coefficients can be interpreted as percentage changes.

(e.g., sales +53.0%), validating that our profitability-based classification captures periods of genuinely high operating intensity rather than noise.

The balance-sheet responses in Table 2 reveal the proximate working-capital channel. In main quarters, a one-SD FX shock contracts trade debt by 2.6%, trade credit by 3.5% , and inventories by 4.5%. These patterns are exactly what a cash-flow mechanism implies: firms cut inputs and draw down inventories; payables and receivables shrink with the cycle in sales and production (Almeida et al., 2004; Lian and Ma, 2021). The macro-trade literature similarly emphasizes that currency movements transmit through imported-input costs and supply-chain financing (Burstein and Gopinath, 2014).

Bank credit adjusts in the same direction, with a clear maturity gradient (Table 3). Total credit declines by 3.7%, driven by short-term credit (−4.0%) rather than long-term credit (−2.3%). That short-dated credit is more elastic than long-dated credit is a hallmark of working-capital finance: lines tied to inventories and receivables reprice and resize quickly when near-term cash-flow risk rises, whereas long-term borrowing attached to investment adjusts more slowly . Evidence on exchange-rate exposures and trade finance points to the same mechanism in emerging markets, where depreciations and funding tightness propagate through input financing and inventory management (Bruno et al., 2018).

Overall, we find robust evidence that exchange rate shocks exert disproportionately large and adverse effects during main quarters when firms are most susceptible. These findings are broadly consistent with the financial amplification mechanism generated by models in which firms face cash-flow-based borrowing constraints: rising input prices reduce constrained input purchases, which in turn diminishes pledgeable cash flows that support external finance in the first place.

5.2 Financing Frictions

We now examine the role of financing frictions in amplifying the real effects of exchange rate shocks. In standard models of borrowing constraints, it is the interaction of leverage with binding

borrowing constraints that generates amplification. We test the role of both leverage and binding borrowing constraints using two proxies. The first proxy is a size-based measure of borrowing constraints, namely an indicator variable distinguishing between small and medium-sized enterprises (SMEs) and large firms. Empirically, firm size is a strong predictor of financial constraints, with smaller firms more likely to be financially constrained than larger firms (Hadlock and Pierce, 2010). The second proxy is a direct measure of firm leverage, which we use to sort firms into high- and low-leverage groups. An important caveat is that leverage is endogenously chosen by firms. Nevertheless, firm leverage features prominently in theories of financial amplification and has been widely used in the empirical literature.

5.2.1 Real Activity Channel

Panel A of Table 4 presents results comparing SMEs and large firms, while Panel B presents results comparing high- and low-leverage firms. Testing the role of binding borrowing constraints in Panel A, SMEs appear to be more susceptible to exchange rate shocks during main quarters than large firms. For SMEs, a one-standard deviation exchange rate shock in the main quarter respectively reduces purchases, sales and volume by 4.1 percent, 5.8 percent and 4.4 percent more than an equivalent shock in a non-main quarter. These effects stand in contrast to those for large firms whose purchases, sales and volume respectively increase by 0.8 percent, 0.7 percent and 0.6 percent. These differences between SMEs and large firms are statistically significant at conventional levels and provide support for the important role of binding borrowing constraints in amplifying the effect of exchange rate shocks. As for employment, the estimated effects are small as expected. For SMEs, a one-standard deviation exchange rate shocks reduces employment by 0.6 percent more than an equivalent shock in a non-main quarter, compared to a small and positive but statistically insignificant estimate for large firms. This suggests large firms may have access to alternative financing or operational buffers that allow them to weather—or even benefit from—the shock, while SMEs face binding constraints. We will further examine the strong performance of large firms compared to SMEs later in the paper.

In Panel B of Table 4, leverage sharply amplifies the real impact of main-quarter FX shocks. Among high-leverage firms, purchases, sales, and volume contract by 5.0%, 6.6%, and 5.4%, compared with 3.1%, 4.9%, and 3.5% for low-leverage firms. Precision is high and the differences are economically and statistically meaningful.[8] The leverage gradient is consistent with collateral/pledgeability mechanisms and debt-overhang effects: when the currency depreciates in a firm's peak liquidity window, the domestic value of FX liabilities and imported inputs rises, net worth and pledgeable income fall, and external finance tightens—so high-leverage firms curtail orders and production more aggressively than otherwise similar low-leverage firms (Kiyotaki and Moore, 1997; Almeida et al., 2004; Ottonello and Winberry, 2020).

The results presented in Tables 5–6 document substantial heterogeneity in firms' balance sheet adjustments to exchange rate shocks, contingent on the alignment of these shocks with firm-specific periods of elevated liquidity demand—termed the main quarter. Across all specifications, we find that the adverse effects of FX shocks are significantly amplified when they occur during a firm's main quarter, suggesting that short-term financial frictions intensify firms' vulnerability to external shocks. This amplification effect operates through the working capital channel: when firms experience a liquidity shock during periods of internally predictable financing strain, their capacity to buffer the shock is substantially reduced.

Together, these findings provide strong support for a working capital amplification mechanism: FX shocks lead to sharp reductions in real firm activity when they coincide with periods of high internal liquidity needs, particularly for financially constrained, import-dependent, or operationally rigid firms. By exploiting intra-year firm-level seasonality, the analysis isolates timing-specific vulnerabilities that deepen the real effects of financial shocks.

[8]The formal heterogeneity tests in Appendix D using the triple-interaction specification in Eq. D1 confirm that the high-leverage subgroup has a significantly larger main-quarter multiplier for real outcomes—see Table D1.

5.2.2 Working Capital Channel

We now trace how FX shocks that arrive in the *main quarter* translate into balance-sheet adjustments—trade debt (accounts payable), trade credit (accounts receivable), and inventories. Across all splits, firms compress both sides of the trade-credit chain and run down stocks when liquidity needs peak, consistent with a cash-preserving working-capital mechanism (Almeida et al., 2004; Bruno et al., 2018; Dao and Liu, 2017; Alfaro et al., 2021).

As shown in Table 7, Panel A, when an FX shock coincides with the firm's main quarter, SMEs contract trade payables by 2.7%, trade receivables by 3.5%, and inventories by 4.5%. Large firms show effectively no adjustment in payables/receivables (coefficients are small and statistically weak), but still reduce inventories by 2.0%. These estimates imply that inventory drawdowns are roughly twice as large for SMEs, with an order-of-magnitude larger compression on trade-credit margins, consistent with tighter short-term financing and weaker ability to roll supplier credit among smaller firms. In Table 7, Panel B, high-leverage firms exhibit uniformly stronger retrenchment than low-leverage firms—payables fall by 3.3% versus 2.1%, receivables by 3.9% versus 2.9%, and inventories by 4.8% versus 1.9% (all differences economically large and precisely estimated). The leverage gradient is in line with collateral/pledgeability mechanisms in which a depreciation raises the domestic value of FX-linked obligations and imported inputs, erodes net worth and pledgeable income, and tightens external finance precisely when liquidity needs peak (Almeida et al., 2004; Bruno et al., 2018). These findings are consistent with the theoretical predictions of Almeida et al. (2004), who emphasize the importance of internal liquidity in determining firms' sensitivity to financial shocks, and with empirical evidence from Ottonello and Winberry (2020), Durante et al. (2022) and Cloyne et al. (2023) who document that firms with tighter financing constraints exhibit more pronounced responses to macroeconomic disturbances.

Moreover, the heterogeneity by trade exposure documented in Table 8 further supports the amplification mechanism through working capital constraints. Panel A of Table 8 shows that non-exporters exhibit sizable contractions in working-capital components following FX shocks: trade

payables decline by 2.9%, trade receivables by 3.9%, and inventories by 4.5%. By contrast, exporters show no statistically significant adjustment in payables or receivables, while inventories decrease by 2.5%. The inventory response for exporters is therefore approximately 55% smaller in absolute terms than for non-exporters. This differential is consistent with exporters' partial hedging through foreign-currency revenues and superior access to trade-finance instruments that stabilize the payables/receivables margins, even as the depreciation-induced repricing of inputs necessitates inventory drawdowns. This differential is also consistent with exporters' pricing-to-market behavior: firms with market power adjust markups in response to exchange-rate movements, dampening pass-through and buffering working-capital margins (Krugman, 1987; Knetter, 1989; Atkeson and Burstein, 2008; Berman et al., 2012; Amiti et al., 2014). In addition, firms characterized by high import intensity exhibit notably larger reductions in trade credit and inventory holdings relative to their counterparts with lower exposure to international markets. Specifically, inventories decline by approximately 4.9 percent among high-import-intensity firms when FX shocks occur during their main quarters. These results underscore the greater vulnerability of internationally integrated firms to currency fluctuations, which simultaneously intensify financing constraints and raise the costs of imported inputs. This interpretation aligns with the findings of Bruno et al. (2018), who document that exchange rate depreciations reduce firms' capacity to finance imported inputs via tightening working capital conditions. Similarly, Demir et al. (2024) provide empirical evidence that currency-related supply-side shocks adversely affect inventory management and supply-chain stability, particularly for firms that are financially constrained and reliant on imported intermediate inputs. Additionally, the pronounced impact on exporting firms is consistent with the literature emphasizing balance sheet effects arising from currency mismatches, as exporters frequently hold FX-denominated assets and liabilities, thereby amplifying the real impact of exchange rate fluctuations (Salomao and Varela, 2021; Novy and Taylor, 2020).

Sectoral heterogeneity documented in Table 9 highlights that the amplification effects of FX shocks differ considerably across industries. Specifically, firms operating in the service and con-

struction sectors—industries characterized by higher working-capital intensity and limited flexibility in adjusting inputs and production processes—display particularly pronounced vulnerabilities. Construction firms exhibit notably stronger reactions, experiencing contractions in trade credit and inventories by approximately 6.0 and 6.5 percent, respectively, when exchange rate shocks coincide with their main quarter. These sector-specific patterns align with prior research emphasizing how differences in input rigidity, contractual structures, and working capital management affect industry-level sensitivity to financial shocks. For instance, Alfaro et al. (2021) provide empirical evidence that industries with longer production horizons and high financing needs, such as construction, exhibit heightened sensitivity to liquidity shocks. Complementing this, Dao and Liu (2017) develop a formal "working capital channel" model and find empirically that labor-intensive, external-finance-dependent industries — like construction and services — exhibit heightened sensitivity to liquidity shocks. Collectively, these findings suggest that sector-specific financial structures and production rigidities play a crucial role in determining the magnitude of firm-level adjustments to FX shocks.

Taken together, these results establish a tight working-capital transmission of exchange-rate shocks: depreciations trigger immediate contractions in payables and receivables and sizable inventory decumulation, with the largest adjustments concentrated among financially constrained firms (SMEs, high-leverage) and internationally exposed firms (especially import-intensive), and in sectors with long cash-conversion cycles and heavy upfront financing needs (construction, services). The cross-group gradients align closely with collateral/pledgeability and input-cost mechanisms Formal triple-interaction tests in Appendix D corroborate that these gaps are statistically significant across margins (Tables D2–D3). In tandem with the real-activity evidence, the balance-sheet responses point to a common mechanism: when short-term finance is tight and imported inputs reprice, firms preserve cash by compressing trade credit and running down stocks, and real activity weakens accordingly.

5.3 Bank Credit Channel

Across Tables 10–12, FX shocks overturn the usual seasonal expansion of bank borrowing in liquidity-intensive quarters (baseline total credit rises by about 6.7%) and instead generate a broad contraction (average total credit falls by roughly 3.7%). In Table 10, Panel A, SMEs cut total (-3.7%), short-term (-4.0%), and long-term credit (-2.3%), while large firms expand borrowing across maturities (total +2.3%, short-term +2.7%, long-term +4.0%). This pattern is consistent with "flight-to-quality" and relationship reallocation: when banks' risk capacity tightens, they tilt lending toward larger, better-collateralized borrowers, while smaller clients face curtailed supply (Gertler and Gilchrist, 1994; Kashyap and Stein, 2000; Khwaja and Mian, 2008; Chodorow-Reich, 2014; Ivashina and Scharfstein, 2010). Panel B shows a strong balance-sheet gradient: high-leverage firms reduce total, short-term, and long-term credit by 4.2%, 4.4%, and 2.1%, respectively, versus 2.6%, 2.8%, and 1.4% for low-leverage firms. The larger cutbacks for highly levered firms are in line with the financial-accelerator/balance-sheet channel: depreciations erode net worth and pledgeable income, tightening covenants and loan supply precisely when rollover needs peak (Bernanke and Gertler, 1995; Almeida et al., 2004; Jiménez et al., 2014). In contrast, large and less leveraged firms display milder or even positive credit responses, reflecting their superior ability to diversify funding sources and access alternative financing options (Ottonello and Winberry, 2020; Jeenas, 2023; Gnewuch and Zhang, 2025).

Table 11 further explores how trade exposure influences firm credit allocation following FX shocks. Panel A indicates stronger credit contractions for non-exporters (total −3.9%, short-term −4.2%, long-term −2.4%) than for exporters (total −1.1%, short-term −0.09%, long-term n.s.). FX-denominated revenues and access to trade-finance instruments likely buffer exporters' loan supply and maturity structure (Manova, 2013; Paravisini et al., 2015; Amiti and Weinstein, 2018); moreover, exporters' currency exposure and pricing-to-market can damp pass-through to cash flows (Berman et al., 2012). In Panel B, high import-intensive firms face uniformly larger declines than non-importers across total (-4.1% vs. -3.9%), short-term (-4.2% vs. -4.7%), and long-term

credit (-2.4% vs. -1.9%). This is consistent with imported-input repricing and FX-mismatch tightening collateral constraints, as well as with global dollar funding channels that transmit depreciations to tighter domestic loan supply (Bruno and Shin, 2015; Amiti et al., 2014). These results indicate that import-intensive firms, reliant on foreign currency credit lines to finance imported inputs, encounter amplified liquidity stress when exchange rate depreciation elevates input costs and tightens credit conditions.

Sectoral heterogeneity is addressed in Table 12, which reveals pronounced sector-specific responses. Construction firms, which typically rely heavily on working capital financing and operate under longer project timelines, suffer the largest contractions in credit allocation: total credit decreases by 4.7 percent, short-term credit by 5.7 percent, and long-term credit by 2.9 percent following FX shocks in their main quarters. Firms in the service and industrial sectors also exhibit significant, though somewhat smaller, credit contractions. These findings are consistent with the view that sector-specific characteristics—such as production rigidity, limited input flexibility, and dependence on external financing—play a critical role in shaping the extent of vulnerability to financial shocks. In particular, the construction sector's pronounced sensitivity reflects a combination of inflexible input contracts, limited collateral flexibility, and high dependence on interest-rate-sensitive borrowing. Rising borrowing costs—whether from monetary tightening or FX-induced credit stress—have been shown to significantly dampen construction activity by tightening mortgage and project financing, a pattern documented by Iacoviello and Neri (2010), Bouakez et al. (2011), and Singh et al. (2022).[9] In addition, the systematically larger response on the short-term margin (vs. long-term) across panels is consistent with rollover risk and maturity shortening under tighter intermediary risk capacity (Diamond, 1991; Brunnermeier and Oehmke, 2013).

Collectively, these results underscore a robust credit-channel amplification mechanism, whereby FX shocks disproportionately impair credit allocation to financially constrained firms, firms with

[9]Construction's outsized response accords with long cash-conversion cycles, milestone payments, and heavy reliance on collateralized bank funding; shocks to collateral values and bank health therefore propagate strongly to credit volumes (Gan, 2007; Chaney et al., 2012; Rajan and Zingales, 1998; Raddatz, 2006).

high import dependency, and those operating in sectors characterized by rigid production processes and elevated liquidity needs.[10] By leveraging within-firm variation in financial vulnerability linked to internal liquidity cycles, these findings provide nuanced insights into the heterogeneous transmission of exchange rate shocks to firm-level credit dynamics.

Robustness. Replacing the survey-based shocks in the main specification with 1-month high frequency forward-rate surprises (aggregated to quarters) yields the same qualitative elasticities and patterns. In both sets of results, depreciation surprises during a firm's main quarter are followed by declines in real activity (Table 1 vs. Table C1), contractions in payables / receivables / inventories (Table 2 vs. Table C5), and lower bank credit across maturities (Table 3 vs. Table C9). The cross-sectional ordering is also unchanged: SMEs and high-leverage firms are most affected; exporters are relatively insulated while import-intensive firms are more exposed (cf. Tables 4, 7, 10 with C2, C6, C10); by sector, Construction remains the most sensitive, followed by Services, with Industry least affected (cf. Tables 6, 9, 12 with C4, C8, C12). A minor nuance persists across measures: import-intensive firms show some substitution toward short-term credit even as total and long-term credit tighten (Table C11). Because both shocks are orthogonalized to observables and standardized, the close alignment across tables indicates that our findings do not hinge on the particular construction of FX surprises.

6 Conclusion

In this paper, we provide new evidence on how exchange rate depreciations result in real economic contractions at the firm level through working capital and financing frictions. Focusing on short-term operational constraints rather than traditional balance-sheet channels, we show that exchange rate shocks that raise input costs can generate immediate and amplified effects on purchases, sales, and employment when firms face binding cash-in-advance constraints on

[10] Formal triple-interaction tests in Appendix D (Table D3) confirm that these cross-group gaps are statistically significant, reinforcing a mechanism in which FX shocks weaken borrower and intermediary balance sheets and contract bank credit exactly when firms most need external funding.

production and external borrowing constraints based on pledgeable income.

Our empirical strategy leverages firm-specific seasonality in working capital needs and its interaction with exogenous exchange rate surprises. This approach allows us to isolate a novel amplification mechanism: depreciations that arrive during periods of peak operational intensity, when firms' working capital requirements are highest, lead to disproportionately large contractions in real activity.

We document substantial heterogeneity that aligns with the presence of financing frictions. SMEs, highly leveraged firms, and import-dependent firms experience the strongest contractions, while large firms benefit from a flight-to-quality in credit markets. Evidence on sectoral differences further support the mechanism, with construction and services industries characterized by longer cash conversion cycles exhibiting greater sensitivity to exchange rate shocks. These patterns are consistent with a framework in which higher input costs force cuts in purchases and reduce pledgeable income, tightening borrowing constraints and triggering a feedback loop between real activity and external finance.

Our findings contribute to the literature by identifying working capital financing as a significant and previously underexplored source of fragility in emerging markets where exchange rate shocks are more frequent and larger in magnitude than developed markets. While prior research has emphasized net worth effects and long-term investment responses, we show that short-term operational constraints can play an equally important role in shaping firms' responses to exchange rate shocks.

These results carry important policy implications. Stabilizing access to short-term financing, particularly during periods of currency volatility, may help mitigate the amplification of shocks and support firm resilience. Policies aimed at easing working capital constraints, such as targeted credit lines, trade finance support, or mechanisms that sustain the flow of short-term liquidity, could be especially valuable for financially constrained firms and sectors with high working capital needs.

Overall, our analysis underscores that the real effects of exchange rate shocks extend beyond

balance-sheet exposures and operate through the day-to-day financing of production. Understanding and addressing these vulnerabilities is crucial for designing policies that enhance macroeconomic stability and firm-level resilience in emerging market economies.

Table 1: Exchange Rate Shocks and Firm-Level Real Outcomes During Main Quarters

	(1) Purchases	(2) Sales	(3) Volume	(4) Employment
Main Quarter × FX Shock	-0.040***	-0.058***	-0.044***	-0.006***
	(0.001)	(0.001)	(0.001)	(0.000)
Main Quarter	0.102***	0.530***	0.278***	0.011***
	(0.002)	(0.002)	(0.002)	(0.000)
Firm FE	✓	✓	✓	✓
Sector × Quarter FE	✓	✓	✓	✓
Province × Quarter FE	✓	✓	✓	✓
Year FE	✓	✓	✓	✓
Firm Controls	✓	✓	✓	✓
Observations	19,036,735	19,036,735	19,036,735	19,036,735
R-squared	0.656	0.647	0.659	0.834
Mean Dep. Var.	11.11	10.87	12.49	1.975

Notes: This table reports coefficients from panel regressions estimating the effect of exchange rate shocks on firm-level outcomes using quarterly data from 2015 to 2024. The key coefficient of interest is the effect of exchange rate shocks in the firm's main quarter. Firm-level outcomes, reported at the top of each column, are the natural logarithm of purchases, sales, volume and employment. Exchange rate shocks are unexpected changes in exchange rates, orthogonalized to contemporaneous macro-financial indicators and standardized to have a zero mean and unit standard deviation. The main quarter is determined at the firm level as the quarter of peak profitability, based on a ranking of quarters over the previous five calendar years. All specifications include firm fixed effects, as well as sector-by-year-quarter, province-by-year-quarter, and year fixed effects, together with total assets, leverage, profitability, export intensity and firm age as firm-level controls. Standard errors are clustered at the firm level. ***, **, and * indicate that the coefficient estimate is significant at the 1%, 5%, and 10% levels, respectively.

Table 2: Exchange Rate Shocks and Working Capital During Main Quarters

	(1) Trade Debt	(2) Trade Credit	(3) Inventory
Main Quarter × FX Shock	-0.026***	-0.035***	-0.045***
	(0.001)	(0.001)	(0.001)
Main Quarter	0.097***	0.363***	0.052***
	(0.001)	(0.002)	(0.001)
Firm FE	✓	✓	✓
Sector × Quarter FE	✓	✓	✓
Province × Quarter FE	✓	✓	✓
Year FE	✓	✓	✓
Firm Controls	✓	✓	✓
Observations	17,960,725	17,960,725	16,969,444
R-squared	0.673	0.702	0.697
Mean Dep. Var.	8.741	8.367	10.06

Notes: This table reports coefficients from panel regressions estimating the effect of exchange rate shocks on firm-level outcomes using quarterly data from 2015 to 2024. The key coefficient of interest is the effect of exchange rate shocks in the firm's main quarter. Firm-level outcomes, reported at the top of each column, are the natural logarithm of trade debt, trade credit, and inventory. Exchange rate shocks are unexpected changes in exchange rates, orthogonalized to contemporaneous macro-financial indicators and standardized to have a zero mean and unit standard deviation. The main quarter is determined at the firm level as the quarter of peak profitability, based on a ranking of quarters over the previous five calendar years. All specifications include firm fixed effects, as well as sector-by-year-quarter, province-by-year-quarter, and year fixed effects, together with total assets, leverage, profitability, export intensity and firm age as firm-level controls. Standard errors are clustered at the firm level. ***, **, and * indicate that the coefficient estimate is significant at the 1%, 5%, and 10% levels, respectively.

Table 3: Exchange Rate Shocks and Credit Use During Main Quarters

	(1) Total Credit	(2) Short-term Credit	(3) Long-term Credit
Main Quarter × FX Shock	-0.037***	-0.040***	-0.023***
	(0.001)	(0.001)	(0.001)
Main Quarter	0.067***	0.069***	0.036***
	(0.001)	(0.001)	(0.001)
Firm FE	✓	✓	✓
Sector × Quarter FE	✓	✓	✓
Province × Quarter FE	✓	✓	✓
Year FE	✓	✓	✓
Firm Controls	✓	✓	✓
Observations	19,036,735	19,036,735	19,036,735
R-squared	0.733	0.715	0.650
Mean Dep. Var.	8.352	7.320	5.302

Notes: This table reports coefficients from panel regressions estimating the effect of exchange rate shocks on firm-level credit using quarterly data from 2015 to 2024. Outcomes are the natural logarithms of total credit, short-term credit, and long-term credit. The key coefficient is the interaction of FX shocks with the firm's main-quarter indicator. FX shocks are unexpected changes in exchange rates, orthogonalized to contemporaneous macro–financial indicators and standardized to have zero mean and unit variance. The main quarter is defined at the firm level as the quarter of peak profitability based on the prior five years. All specifications include firm fixed effects, sector-by-year-quarter, province-by-year-quarter, and year fixed effects, plus controls for assets, leverage, profitability, export intensity, and firm age. Standard errors are clustered at the firm level. ***, **, * denote $p < 0.01$, $p < 0.05$, and $p < 0.1$, respectively.

Table 4: Exchange Rate Shocks During Main Quarters and Financing Frictions: Real Activity

	Purchases		Sales		Volume		Employment	
	SMEs	Large	SMEs	Large	SMEs	Large	SMEs	Large
Panel A: SMEs vs. Large Firms								
Main Quarter × FX Shock	-0.041***	0.008**	-0.058***	0.007*	-0.044***	0.006**	-0.006***	0.001
	(0.001)	(0.004)	(0.001)	(0.004)	(0.001)	(0.003)	(0.001)	(0.002)
Observations	18,846,279	190,340	18,846,279	190,340	18,846,279	190,340	18,846,279	190,340
R-squared	0.652	0.808	0.644	0.689	0.654	0.771	0.819	0.484
Mean Dep. Var.	11.05	16.39	10.80	17.05	12.44	17.63	1.940	5.436
Panel B: High- vs. Low-Leverage Firms								
	Purchases		Sales		Volume		Employment	
	High Leverage	Low Leverage	High Leverage	Low Leverage	High Leverage	Low Leverage	High Leverage	Low Leverage
Main Quarter × FX Shock	-0.050***	-0.031***	-0.066***	-0.049***	-0.054***	-0.035***	-0.005***	-0.007***
	(0.002)	(0.001)	(0.003)	(0.002)	(0.002)	(0.001)	(0.002)	(0.001)
Observations	4,738,050	14,276,893	4,738,050	14,276,893	4,738,050	14,276,893	4,738,050	14,276,893
R-squared	0.679	0.668	0.665	0.659	0.679	0.672	0.834	0.852
Mean Dep. Var.	9.780	11.55	9.261	11.40	11.15	12.95	1.756	2.049
Firm FE	✓	✓	✓	✓	✓	✓	✓	✓
Sector × Quarter FE	✓	✓	✓	✓	✓	✓	✓	✓
Province × Quarter FE	✓	✓	✓	✓	✓	✓	✓	✓
Year FE	✓	✓	✓	✓	✓	✓	✓	✓
Firm Controls	✓	✓	✓	✓	✓	✓	✓	✓

Notes: This table reports coefficients from panel regressions estimating the effect of exchange rate shocks on firm-level outcomes using quarterly data from 2015 to 2024. The key coefficient of interest is the effect of exchange rate shocks in the firm's main quarter. The regressions are estimated separately for subsamples of firms formed on the basis of financing frictions. The proxy for financing frictions is a size-based firm category (small and medium-sized enterprises versus large firms) in Panel A and leverage (high versus low) in Panel B. All other variables are defined in previous tables. All specifications include firm fixed effects, as well as sector-by-year-quarter, province-by-year-quarter, and year fixed effects, together with total assets, leverage, profitability, export intensity and firm age as firm-level controls. Standard errors are clustered at the firm level. ***, **, and * indicate that the coefficient estimate is significant at the 1%, 5%, and 10% levels, respectively.

Table 5: Exchange Rate Shocks During Main Quarters and Trade Orientation: Real Activity

	Purchases		Sales		Volume		Employment	
Panel A: Exporters vs. Non-Exporters								
	Non-exporters	Exporters	Non-exporters	Exporters	Non-exporters	Exporters	Non-exporters	Exporters
Main Quarter × FX Shock	-0.046***	0.003	-0.066***	0.009***	-0.049***	0.007***	-0.006***	0.002
	(0.001)	(0.002)	(0.002)	(0.002)	(0.001)	(0.002)	(0.001)	(0.002)
Observations	16,046,644	2,984,044	16,046,644	2,984,044	16,046,644	2,984,044	16,046,644	2,984,044
R-squared	0.642	0.711	0.630	0.640	0.643	0.713	0.811	0.932
Mean Dep. Var.	10.61	13.78	10.23	14.29	12.02	15.04	1.879	2.493
Panel B: Importers vs. Non-Importers								
	Purchases		Sales		Volume		Employment	
	Non-importers	Importers	Non-importers	Importers	Non-importers	Importers	Non-importers	Importers
Main Quarter × FX Shock	-0.043***	-0.049*	-0.062***	-0.070***	-0.046***	-0.052	-0.006***	-0.002**
	(0.001)	(0.002)	(0.001)	(0.003)	(0.001)	(0.002)	(0.000)	(0.001)
Observations	17,114,787	1,918,790	17,114,787	1,918,790	17,114,787	1,918,790	17,114,787	1,918,790
R-squared	0.644	0.758	0.631	0.720	0.643	0.798	0.809	0.945
Mean Dep. Var.	10.78	13.98	10.44	14.69	12.18	15.35	1.888	2.754
Firm FE	✓	✓	✓	✓	✓	✓	✓	✓
Sector × Quarter FE	✓	✓	✓	✓	✓	✓	✓	✓
Province × Quarter FE	✓	✓	✓	✓	✓	✓	✓	✓
Year FE	✓	✓	✓	✓	✓	✓	✓	✓
Firm Controls	✓	✓	✓	✓	✓	✓	✓	✓

Notes: This table reports coefficients from panel regressions estimating the effect of exchange rate shocks on firm-level outcomes using quarterly data from 2015 to 2024. The key coefficient of interest is the effect of exchange rate shocks in the firm's main quarter. In Panel A, a firm is classified as an *exporter* if its export share (exports/total sales) in year t exceeds 10%; otherwise it is a non-exporter. In Panel B, a firm is classified as an *importer* if its import intensity—imports divided by cost of goods sold (COGS)—falls in the top quartile (i.e., ≥75th percentile) of the sector-by-year distribution; firms below this threshold are non-importers. All other variables are defined in previous tables. All specifications include firm fixed effects, as well as sector-by-year-quarter, province-by-year-quarter, and year fixed effects, together with total assets, leverage, profitability, export intensity and firm age as firm-level controls. Standard errors are clustered at the firm level. ***, **, and * indicate that the coefficient estimate is significant at the 1%, 5%, and 10% levels, respectively.

Table 6: Exchange Rate Shocks During Main Quarters and Sectoral Differences: Real Activity

	(1) Purchases	(2) Sales	(3) Volume	(4) Employment
Panel A: Industry Sector				
Main Quarter × FX Shock	-0.034***	-0.043***	-0.036***	-0.006***
	(0.003)	(0.003)	(0.002)	(0.000)
Observations	3,991,569	3,991,569	3,991,569	3,991,569
R-squared	0.681	0.656	0.687	0.891
Mean Dep. Var.	12.24	12.47	13.52	2.349
Panel B: Service Sector				
Main Quarter × FX Shock	-0.036***	-0.053***	-0.040***	-0.005***
	(0.002)	(0.002)	(0.001)	(0.000)
Observations	12,294,000	12,294,000	12,294,000	12,294,000
R-squared	0.667	0.665	0.670	0.839
Mean Dep. Var.	10.84	10.62	12.29	1.853
Panel C: Construction Sector				
Main Quarter × FX Shock	-0.062***	-0.103***	-0.070***	-0.007***
	(0.004)	(0.004)	(0.003)	(0.001)
Observations	2,551,550	2,551,550	2,551,550	2,551,550
R-squared	0.560	0.530	0.563	0.674
Mean Dep. Var.	10.64	9.607	11.91	1.999
Firm FE	✓	✓	✓	✓
Sector × Quarter FE	✓	✓	✓	✓
Province × Quarter FE	✓	✓	✓	✓
Year FE	✓	✓	✓	✓
Firm Controls	✓	✓	✓	✓

Notes: This table reports coefficients from panel regressions estimating the effect of exchange rate shocks on firm-level outcomes using quarterly data from 2015 to 2024. All other variables are defined in previous tables. All specifications include firm fixed effects, as well as sector-by-year-quarter, province-by-year-quarter, and year fixed effects, together with total assets, leverage, profitability, export intensity and firm age as firm-level controls. Standard errors are clustered at the firm level. ***, **, and * indicate that the coefficient estimate is significant at the 1%, 5%, and 10% levels, respectively.

Table 7: Exchange Rate Shocks During Main Quarters and Financing Frictions: Working Capital Channel

Panel A: SMEs vs. Large Firms						
	Trade Debt		Trade Credit		Inventory	
	SMEs	Large	SMEs	Large	SMEs	Large
Main Quarter × FX Shock	-0.027***	0.003	-0.035***	-0.004	-0.045***	-0.020**
	(0.001)	(0.005)	(0.001)	(0.005)	(0.001)	(0.008)
Observations	17,770,651	189,956	17,770,651	189,956	16,780,402	188,927
R-squared	0.669	0.878	0.698	0.769	0.693	0.873
Mean Dep. Var.	8.685	13.97	8.296	15.03	10.00	14.92
Panel B: High- vs. Low-Leverage Firms						
	Trade Debt		Trade Credit		Inventory	
	High Leverage	Low Leverage	High Leverage	Low Leverage	High Leverage	Low Leverage
Main Quarter × FX Shock	-0.033***	-0.021***	-0.039***	-0.029***	-0.048***	-0.019***
	(0.002)	(0.001)	(0.002)	(0.001)	(0.002)	(0.001)
Observations	4,252,763	13,692,252	4,252,763	13,692,252	3,932,945	13,022,105
R-squared	0.715	0.698	0.733	0.723	0.762	0.716
Mean Dep. Var.	8.326	8.873	7.104	8.764	9.433	10.25
Firm FE	✓	✓	✓	✓	✓	✓
Sector × Quarter FE	✓	✓	✓	✓	✓	✓
Province × Quarter FE	✓	✓	✓	✓	✓	✓
Year FE	✓	✓	✓	✓	✓	✓
Firm Controls	✓	✓	✓	✓	✓	✓

Notes: This table reports coefficients from panel regressions estimating the effect of exchange rate shocks on firm-level outcomes using quarterly data from 2015 to 2024. The key coefficient of interest is the effect of exchange rate shocks in the firm's main quarter. The regressions are estimated separately for subsamples of firms formed on the basis of financing frictions. The proxy for financing frictions is a size-based firm category (small and medium-sized enterprises versus large firms) in Panel A and leverage (high versus low) in Panel B. All other variables are defined in previous tables. All specifications include firm fixed effects, as well as sector-by-year-quarter, province-by-year-quarter, and year fixed effects, together with total assets, leverage, profitability, export intensity and firm age as firm-level controls. Standard errors are clustered at the firm level. ***, **, and * indicate that the coefficient estimate is significant at the 1%, 5%, and 10% levels, respectively.

Table 8: Exchange Rate Shocks During Main Quarters and Trade Orientation: Working Capital Channel

	Trade Debt		Trade Credit		Inventory	
Panel A: Exporters vs. Non-Exporters						
	Non-exporters	Exporters	Non-exporters	Exporters	Non-exporters	Exporters
Main Quarter × FX Shock	-0.029***	-0.001	-0.039***	-0.003	-0.045***	-0.025***
	(0.001)	(0.002)	(0.001)	(0.002)	(0.001)	(0.002)
Observations	15,021,884	2,933,734	15,021,884	2,933,734	14,092,557	2,872,118
R-squared	0.660	0.749	0.685	0.723	0.693	0.775
Mean Dep. Var.	8.224	11.39	7.666	11.96	9.650	12.08
Panel B: Importers vs. Non-Importers						
	Trade Debt		Trade Credit		Inventory	
	Non-importers	Importers	Non-importers	Importers	Non-importers	Importers
Main Quarter × FX Shock	-0.028***	-0.039***	-0.037***	-0.041***	-0.043***	-0.049***
	(0.001)	(0.003)	(0.001)	(0.003)	(0.001)	(0.003)
Observations	16,042,384	1,915,507	16,042,384	1,915,507	15,047,811	1,918,790
R-squared	0.662	0.767	0.684	0.753	0.689	0.743
Mean Dep. Var.	8.388	11.70	7.851	12.69	9.637	13.37
Firm FE	✓	✓	✓	✓	✓	✓
Sector × Quarter FE	✓	✓	✓	✓	✓	✓
Province × Quarter FE	✓	✓	✓	✓	✓	✓
Year FE	✓	✓	✓	✓	✓	✓
Firm Controls	✓	✓	✓	✓	✓	✓

Notes: This table reports coefficients from panel regressions estimating the effect of exchange rate shocks on firm-level outcomes using quarterly data from 2015 to 2024. The key coefficient of interest is the effect of exchange rate shocks in the firm's main quarter. In Panel A, a firm is classified as an *exporter* if its export share (exports/total sales) in year t exceeds 10%; otherwise it is a non-exporter. In Panel B, a firm is classified as an *importer* if its import intensity—imports divided by cost of goods sold (COGS)—falls in the top quartile (i.e., ≥75th percentile) of the sector-by-year distribution; firms below this threshold are non-importers. All other variables are defined in previous tables. All specifications include firm fixed effects, as well as sector-by-year-quarter, province-by-year-quarter, and year fixed effects, together with total assets, leverage, profitability, export intensity and firm age as firm-level controls. Standard errors are clustered at the firm level. ***, **, and * indicate that the coefficient estimate is significant at the 1%, 5%, and 10% levels, respectively.

Table 9: Exchange Rate Shocks During Main Quarters and Sectoral Differences: Working Capital Channel

	(1) Trade Debt	(2) Trade Credit	(3) Inventory
Panel A: Industry Sector			
Main Quarter × FX Shock	-0.017***	-0.022***	-0.048***
	(0.003)	(0.003)	(0.003)
Observations	3,825,143	3,825,143	3,741,405
R-squared	0.673	0.687	0.656
Mean Dep. Var.	10.28	10.44	11.75
Panel B: Service Sector			
Main Quarter × FX Shock	-0.024***	-0.034***	-0.038***
	(0.001)	(0.002)	(0.002)
Observations	11,730,235	11,730,235	11,015,138
R-squared	0.686	0.717	0.731
Mean Dep. Var.	8.225	7.843	9.573
Panel C: Construction Sector			
Main Quarter × FX Shock	-0.046***	-0.060***	-0.065***
	(0.004)	(0.004)	(0.005)
Observations	2,228,836	2,228,836	2,048,720
R-squared	0.566	0.584	0.525
Mean Dep. Var.	8.812	7.625	9.540
Firm FE	✓	✓	✓
Sector × Quarter FE	✓	✓	✓
Province × Quarter FE	✓	✓	✓
Year FE	✓	✓	✓
Firm Controls	✓	✓	✓

Notes: This table reports coefficients from panel regressions estimating the effect of exchange rate shocks on firm-level outcomes using quarterly data from 2015 to 2024. All other variables are defined in previous tables. All specifications include firm fixed effects, as well as sector-by-year-quarter, province-by-year-quarter, and year fixed effects, together with total assets, leverage, profitability, export intensity and firm age as firm-level controls. Standard errors are clustered at the firm level. ***, **, and * indicate that the coefficient estimate is significant at the 1%, 5%, and 10% levels, respectively.

Table 10: Exchange Rate Shocks During Main Quarters and Financing Frictions: Bank Credit Channel

Panel A: SMEs vs. Large Firms						
	Total Credit		Short-term Credit		Long-term Credit	
	SMEs	Large	SMEs	Large	SMEs	Large
Main Quarter × FX Shock	-0.037***	0.023**	-0.040***	0.027**	-0.023***	0.041**
	(0.001)	(0.011)	(0.001)	(0.012)	(0.001)	(0.016)
Observations	18,846,279	190,340	18,846,279	190,340	18,846,279	190,340
R-squared	0.732	0.775	0.714	0.741	0.649	0.704
Mean Dep. Var.	8.304	13.06	7.276	11.74	5.258	9.724
Panel B: High- vs. Low-Leverage Firms						
	Total Credit		Short-term Credit		Long-term Credit	
	High Leverage	Low Leverage	High Leverage	Low Leverage	High Leverage	Low Leverage
Main Quarter × FX Shock	-0.042***	-0.026***	-0.044***	-0.028***	-0.021***	-0.014***
	(0.002)	(0.001)	(0.002)	(0.001)	(0.002)	(0.002)
Observations	4,738,050	14,276,893	4,738,050	14,276,893	4,738,050	14,276,893
R-squared	0.783	0.742	0.761	0.725	0.730	0.660
Mean Dep. Var.	6.665	8.918	5.762	7.843	3.925	5.765
Firm FE	✓	✓	✓	✓	✓	✓
Sector × Quarter FE	✓	✓	✓	✓	✓	✓
Province × Quarter FE	✓	✓	✓	✓	✓	✓
Year FE	✓	✓	✓	✓	✓	✓
Firm Controls	✓	✓	✓	✓	✓	✓

Notes: This table reports coefficients from panel regressions estimating the effect of exchange rate shocks on firm-level outcomes using quarterly data from 2015 to 2024. The key coefficient of interest is the effect of exchange rate shocks in the firm's main quarter. The regressions are estimated separately for subsamples of firms formed on the basis of financing frictions. The proxy for financing frictions is a size-based firm category (small and medium-sized enterprises versus large firms) in Panel A and leverage (high versus low) in Panel B. All other variables are defined in previous tables. All specifications include firm fixed effects, as well as sector-by-year-quarter, province-by-year-quarter, and year fixed effects, together with total assets, leverage, profitability, export intensity and firm age as firm-level controls. Standard errors are clustered at the firm level. ***, **, and * indicate that the coefficient estimate is significant at the 1%, 5%, and 10% levels, respectively.

Table 11: Exchange Rate Shocks During Main Quarters and Trade Orientation: Bank Credit Channel

Panel A: Exporters vs. Non-Exporters						
	Total Credit		Short-term Credit		Long-term Credit	
	Non-exporters	Exporters	Non-exporters	Exporters	Non-exporters	Exporters
Main Quarter × FX Shock	-0.039***	-0.011***	-0.043***	-0.009***	-0.023***	-0.001
	(0.001)	(0.003)	(0.001)	(0.003)	(0.001)	(0.003)
Observations	16,046,644	2,984,044	16,046,644	2,984,044	16,046,644	2,984,044
R-squared	0.734	0.788	0.715	0.769	0.654	0.727
Mean Dep. Var.	7.999	10.26	6.976	9.179	5.021	6.822
Panel B: Importers vs. Non-Importers						
	Total Credit		Short-term Credit		Long-term Credit	
	Non-importers	Importers	Non-importers	Importers	Non-importers	Importers
Main Quarter × FX Shock	-0.039***	-0.041***	-0.042***	-0.047***	-0.024***	-0.019***
	(0.001)	(0.004)	(0.001)	(0.004)	(0.001)	(0.005)
Observations	17,114,787	1,918,790	17,114,787	1,918,790	17,114,787	1,918,790
R-squared	0.730	0.773	0.712	0.750	0.649	0.702
Mean Dep. Var.	8.034	11.19	7.018	10.02	5.034	7.704
Firm FE	✓	✓	✓	✓	✓	✓
Sector × Quarter FE	✓	✓	✓	✓	✓	✓
Province × Quarter FE	✓	✓	✓	✓	✓	✓
Year FE	✓	✓	✓	✓	✓	✓
Firm Controls	✓	✓	✓	✓	✓	✓

Notes: This table reports coefficients from panel regressions estimating the effect of exchange rate shocks on firm-level outcomes using quarterly data from 2015 to 2024. The key coefficient of interest is the effect of exchange rate shocks in the firm's main quarter. In Panel A, a firm is classified as an *exporter* if its export share (exports/total sales) in year t exceeds 10%; otherwise it is a non-exporter. In Panel B, a firm is classified as an *importer* if its import intensity—imports divided by cost of goods sold (COGS)—falls in the top quartile (i.e., ≥75th percentile) of the sector-by-year distribution; firms below this threshold are non-importers. All other variables are defined in previous tables. All specifications include firm fixed effects, as well as sector-by-year-quarter, province-by-year-quarter, and year fixed effects, together with total assets, leverage, profitability, export intensity and firm age as firm-level controls. Standard errors are clustered at the firm level. ***, **, and * indicate that the coefficient estimate is significant at the 1%, 5%, and 10% levels, respectively.

Table 12: Exchange Rate Shocks During Main Quarters and Sectoral Differences: Bank Credit Channel

	(1) Total Credit	(2) Short-term Credit	(3) Long-term Credit
Panel A: Industry Sector			
Main Quarter × FX Shock	-0.035***	-0.034***	-0.023***
	(0.003)	(0.003)	(0.003)
Observations	3,991,569	3,991,569	3,991,569
R-squared	0.732	0.714	0.660
Mean Dep. Var.	9.055	7.960	5.982
Panel B: Service Sector			
Main Quarter × FX Shock	-0.038***	-0.039***	-0.027***
	(0.001)	(0.001)	(0.002)
Observations	12,294,000	12,294,000	12,294,000
R-squared	0.742	0.727	0.652
Mean Dep. Var.	8.140	7.124	5.112
Panel C: Construction Sector			
Main Quarter × FX Shock	-0.047***	-0.057***	-0.029***
	(0.003)	(0.003)	(0.003)
Observations	2,551,550	2,551,550	2,551,550
R-squared	0.702	0.674	0.628
Mean Dep. Var.	8.218	7.276	5.020
Firm FE	✓	✓	✓
Sector × Quarter FE	✓	✓	✓
Province × Quarter FE	✓	✓	✓
Year FE	✓	✓	✓
Firm Controls	✓	✓	✓

Notes: This table reports coefficients from panel regressions estimating the effect of exchange rate shocks on firm-level outcomes using quarterly data from 2015 to 2024. All other variables are defined in previous tables. All specifications include firm fixed effects, as well as sector-by-year-quarter, province-by-year-quarter, and year fixed effects, together with total assets, leverage, profitability, export intensity and firm age as firm-level controls. Standard errors are clustered at the firm level. ***, **, and * indicate that the coefficient estimate is significant at the 1%, 5%, and 10% levels, respectively.

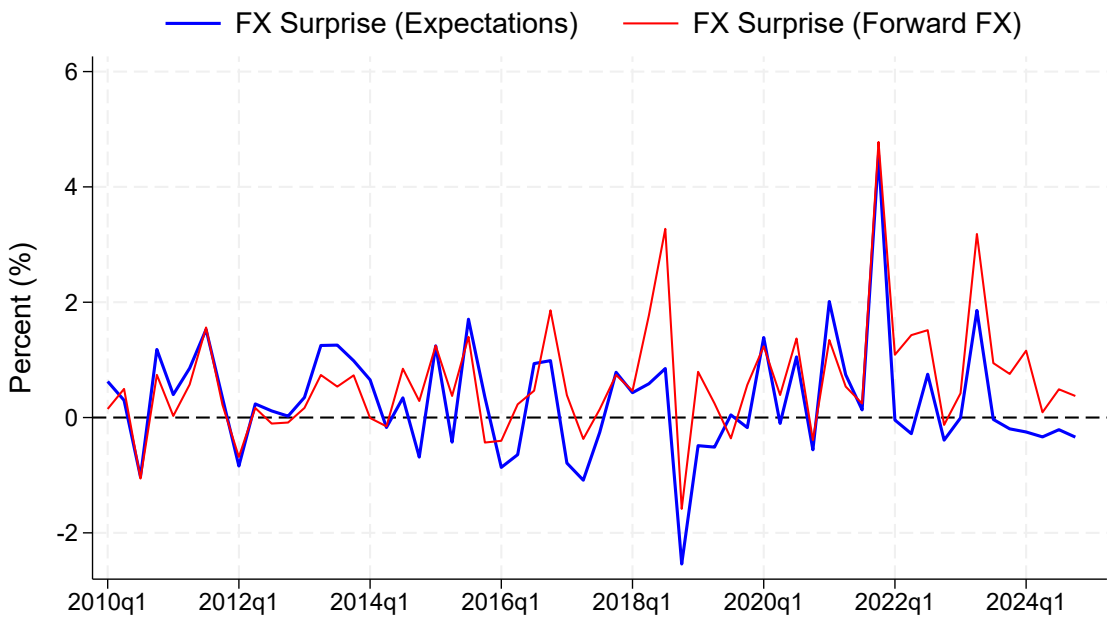


Figure 1: Time Series of FX Surprises

Notes: Both series are constructed at the *monthly* frequency and then aggregated to *calendar quarters* for each quarter. The blue line (*Expectations*) is the expectations-based FX surprise, computed as the difference between the log real exchange rate in month t and the Survey of Market Participants' expected end-of-month log exchange rate: $s_t^{\text{exp}} = \ln \text{RER}_t - \mathbb{E}_t[\ln \text{ER}_{t,\text{end}}]$. The red line (*Forward FX*) is the forward-based surprise, given by the monthly log change in the 1-month USD/TRY forward rate between the month's opening and closing: $s_t^{\text{fwd}} = \ln F_{t,\text{close}} - \ln F_{t,\text{open}}$. Positive values indicate unexpected TRY depreciation.

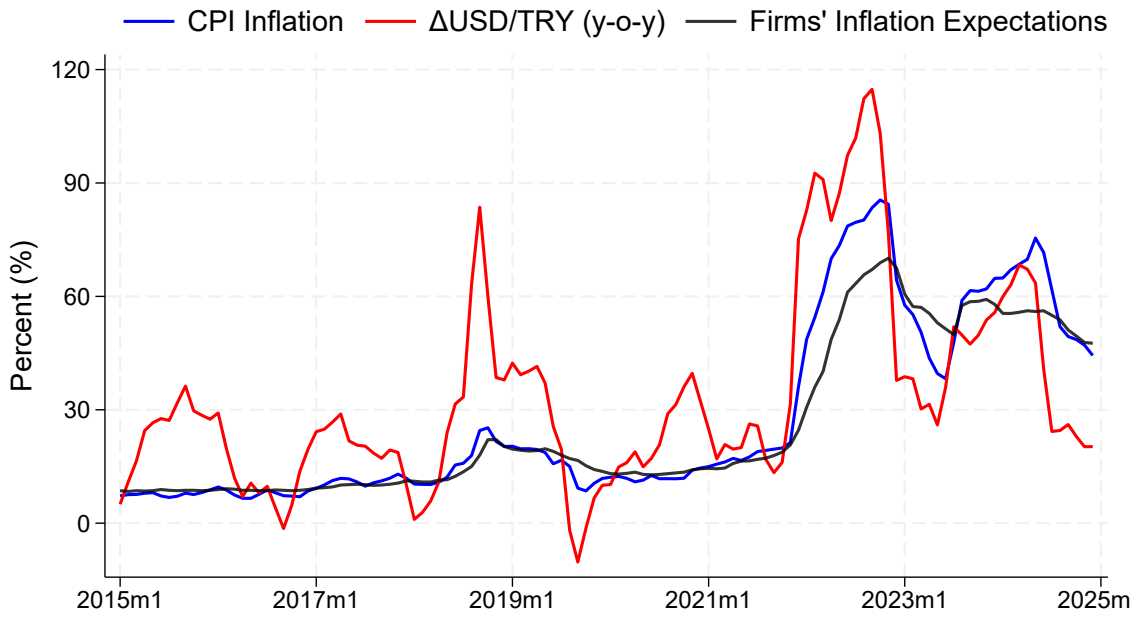


Figure 2: Inflation, exchange rate depreciation, and firms' inflation expectations

Notes: The figure plots monthly CPI inflation (year-over-year, percent), the year-over-year change in the nominal USD/TRY exchange rate (percent; positive values denote TRY depreciation), and firms' 12-month-ahead inflation expectations (cross-sectional mean) from the CBRT Bussiness Tendency Survey. All series are monthly and expressed in percent.

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Appendix - A - Descriptive Statistics

Table A1: Descriptive statistics by firm group

	All sample		SME		Large		High leverage		Low leverage	
Variable	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD
Balance Sheet										
Net Sales	5.44	14.69	5.03	13.71	61.56	29.18	2.93	10.46	6.28	15.77
Total Assets	5.12	13.01	4.77	12.14	53.68	27.77	3.51	10.50	5.66	13.71
Capital	0.80	2.33	0.74	2.18	9.13	5.52	0.41	1.62	0.92	2.51
Net Profits	0.11	0.56	0.10	0.53	1.39	1.63	-0.08	0.30	0.18	0.61
Investment Rate	0.27	2.17	0.27	2.17	0.28	1.07	0.17	2.47	0.31	2.06
Exports	0.33	1.50	0.31	1.43	3.48	4.33	0.19	1.12	0.38	1.60
Leverage	0.89	1.12	0.91	1.13	0.68	0.43	1.99	1.78	0.55	0.31
Trade Debts	1.14	3.03	1.07	2.87	10.45	6.93	1.15	3.06	1.14	3.01
Trade Receivables	1.15	3.17	1.07	2.99	11.59	7.13	0.86	2.76	1.25	3.29
Inventories	1.17	3.03	1.11	2.89	9.74	7.39	0.82	2.45	1.28	3.20
Number of Employees	15.96	153.71	10.34	22.36	780.26	1607.06	10.34	105.42	17.83	166.68
Age	9.88	8.78	9.82	8.69	18.70	13.87	8.56	8.16	10.32	8.93

Notes: Entries report group-specific means and standard deviations (SD) of firm characteristics. "SME" denotes firms with fewer than 250 employees; firms with 250 or more employees are "Large." "High (Low) leverage" indicates firms in the top (bottom) quartile of the sector–year distribution of the leverage ratio, defined as total liabilities over total assets. Monetary variables (Net Sales, Total Assets, Capital, Net Profits, Exports, Trade Debts, Trade Receivables, Inventories) are nominal and reported in millions of TL. The *investment rate* is the log change in tangible fixed assets. *Number of employees* is end-of-period headcount; *Age* is years since incorporation. The sample includes firms with non-missing values for the displayed variables. Means and SDs are computed within each column group.

Table A2: Descriptive statistics: exporter status and import intensity

	Exporter		Non-exporter		High import intensity		Low import intensity	
Variable	Mean	SD	Mean	SD	Mean	SD	Mean	SD
Net Sales	64.79	26.46	7.13	15.14	29.70	17.43	9.18	19.91
Total Assets	13.24	21.29	3.86	10.64	6.80	16.65	4.47	11.23
Capital	1.96	3.74	0.62	1.97	1.05	2.93	0.70	2.05
Net Profits	0.43	0.97	0.06	0.44	0.16	0.70	0.10	0.49
Investment Rate	0.41	1.90	0.25	2.21	0.11	2.22	0.34	2.15
Exports	2.46	3.38	0.00	0.00	0.58	2.01	0.24	1.23
Leverage	0.71	0.55	0.94	1.19	1.08	1.54	0.84	0.91
Trade Debts	2.86	4.83	0.88	2.53	1.28	3.51	1.09	2.81
Trade Receivables	3.36	5.36	0.80	2.50	1.46	3.90	1.03	2.82
Inventories	2.78	4.90	0.92	2.54	1.38	3.66	1.09	2.75
Number of Employees	42.70	288.11	11.79	119.36	21.31	229.17	13.89	111.48
Age	11.40	9.93	9.65	8.56	10.19	9.49	9.76	8.48

Notes: Entries report group-specific means and standard deviations (SD) of firm characteristics. "Exporter" denotes firms that report exports of at least $5,000 (nominal USD) in at least one year of the sample; "Non-exporter" otherwise. "High (Low) import intensity" classifies firms in the top (bottom) quartile of the sector-year distribution of import intensity, defined as imports divided by cost of goods sold (COGS). Monetary variables (Net Sales, Total Assets, Capital, Net Profits, Exports, Trade Debts, Trade Receivables, Inventories) are nominal and reported in millions of TL. The *investment rate* is the log change in tangible fixed assets. *Number of employees* is end-of-period headcount; *Age* is years since incorporation. The sample includes firms with non-missing values for the displayed variables. Means and SDs are computed within each column group.

Table A3: Descriptive statistics by sector

	Industry		Service		Construction	
Variable	Mean	SD	Mean	SD	Mean	SD
Net Sales	28.30	22.25	13.41	16.94	4.66	18.91
Total Assets	8.03	16.96	4.23	11.50	5.26	12.83
Capital	1.44	3.24	0.62	1.98	0.69	2.15
Net Profits	0.21	0.73	0.10	0.51	0.07	0.46
Investment Rate	0.26	1.98	0.26	2.18	0.34	2.34
Exports	0.68	2.11	0.29	1.41	0.06	0.62
Leverage	0.81	0.87	0.95	1.22	0.84	0.97
Trade Debts	1.70	3.72	1.01	2.85	1.00	2.68
Trade Receivables	1.86	4.08	1.01	2.95	0.88	2.60
Inventories	1.82	3.91	0.95	2.67	1.28	3.09
Number of Employees	28.33	154.51	13.32	169.74	12.03	45.69
Age	11.10	9.90	9.68	8.48	9.26	8.29

Notes: Entries report group-specific means and standard deviations (SD) of firm characteristics. Monetary variables (Net Sales, Total Assets, Capital, Net Profits, Exports, Trade Debts, Trade Receivables, Inventories) are nominal and reported in millions of TL. The *investment rate* is the log change in tangible fixed assets. *Number of employees* is end-of-period headcount; *Age* is years since incorporation. The sample includes firms with non-missing values for the displayed variables. Means and SDs are computed within each column group.

Appendix - B - Exogeneity of the Main Quarter Indicator

To verify that the *main quarter* classification is not systematically related to firms' observable characteristics, we estimate linear probability models where the dependent variable equals one if a firm–period observation falls in the firm's main quarter and zero otherwise. Regressors include standard firm covariates—age, size (log employment), export share (exports over sales), profit margin (net profit over sales), and leverage (total debt over total assets)—together with sector and province fixed effects. The specifications and estimates are reported in Table B1.

Across all columns, none of the observable characteristics is statistically associated with the probability of being in the main quarter. Jointly, the covariates are also uninformative about the main-quarter status: the F-tests fail to reject the null that all non-constant regressors have zero coefficients, and the R^2 is near zero in every specification. The intercept is stable across columns and equals the unconditional share of observations that occur in a firm's main quarter, indicating that this average probability does not change when controlling for firm attributes and fixed effects. Taken together, these results imply that the main-quarter indicator is effectively orthogonal to observable characteristics at baseline. This supports our identifying assumption that comparisons based on the main-quarter dimension are not confounded by selection on observables, and it validates the use of the main-quarter interaction in the outcome regressions that follow.

As a complementary check, Figure B1 plots kernel densities of fitted probabilities from a probit of $\mathbf{1}\{\text{Main Quarter} = 1\}$ on the same covariates and fixed effects used in Table B1. The blue (Main Quarter = 1) and red (Main Quarter = 0) densities lie almost on top of each other and are tightly concentrated around a common mean (about one–third), with virtually no mass near 0 or 1. This close overlap indicates that observables have little power to discriminate main-quarter status and that common support is excellent. The pattern reinforces the LPM evidence: conditional on sector and province effects, selection into the main quarter is effectively orthogonal to observables, consistent with quasi-random timing within the year.

Table B1: Assignment into Treatment

	Dependent Variable: Main Quarter			
	(1)	(2)	(3)	(4)
Net Sales	0.0001	0.0001	-0.0002	-0.0002
	(0.0001)	(0.0001)	(0.0002)	(0.0002)
Employment	0.0002	0.0002	0.0001	0.0002
	(0.0003)	(0.0003)	(0.0004)	(0.0003)
Capital	0.0001	0.0001	0.0001	0.0001
	(0.0001)	(0.0001)	(0.0001)	(0.0001)
Export	0.0000	0.0000	0.0000	0.0000
	(0.0001)	(0.0001)	(0.0001)	(0.0001)
Inventory	0.0001	0.0001	0.0000	0.0002
	(0.0001)	(0.0001)	(0.0002)	(0.0002)
Profit Margin	0.0002	0.0003	0.0002	0.0003
	(0.0001)	(0.0002)	(0.0002)	(0.0003)
Age	-0.0002	-0.0002	-0.0002	-0.0003
	(0.0004)	(0.0004)	(0.0005)	(0.0004)
Firm FE		✓	✓	✓
Sector × Year FE			✓	✓
Province × Year FE				✓
R-squared	0.0357	0.0283	0.0397	0.0403
Observations	19,036,735	19,036,735	19,036,735	19,036,735
p-value (F-stat)	0.8460	0.7949	0.6156	0.6137

Notes: The table reports estimates from linear probability models in which the dependent variable equals one if a firm is observed in its *main quarter* and zero otherwise. Coefficients are reported with standard errors in parentheses (clustered at the firm level). Each column corresponds to a different specification, adding the fixed effects indicated at the bottom of the table. The p-value (F-statistic) reports the test that all non-constant regressors are jointly equal to zero. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

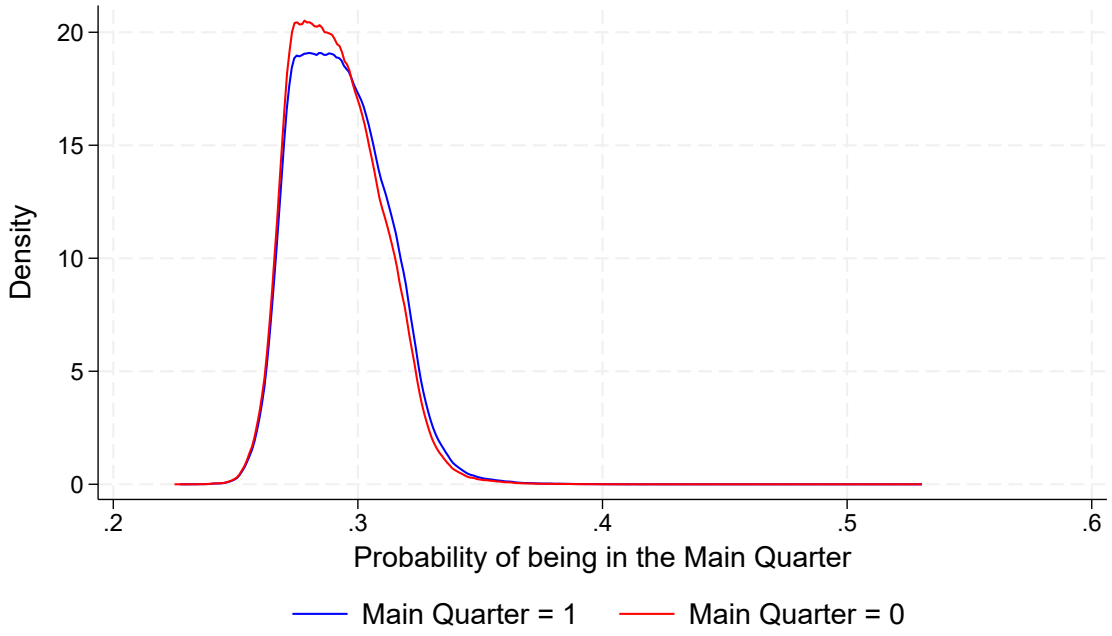
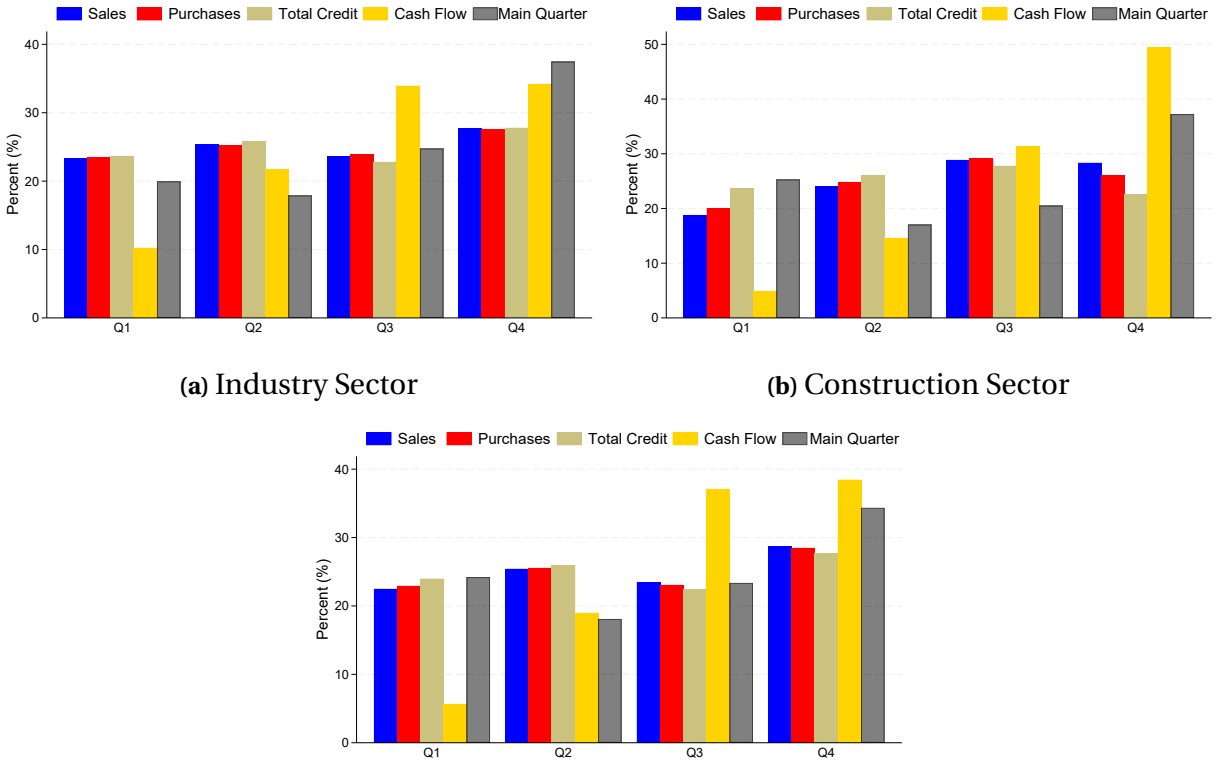


Figure B1: Predicted Probability of being in the Main Quarter

Notes: To assess whether being in the main quarter is as–good–as–random within the year, we estimate a probit where the dependent variable equals one if firm i in quarter t lies in its main quarter. Covariates are firm characteristics—log net sales, employment, net profit, age, leverage, total assets, and exports—along with sector and province fixed effects. We then compute propensity scores and plot their kernel densities separately for observations with Main Quarter = 1 and Main Quarter = 0. The near overlap and tight concentration of the two densities indicate that observables have little power to predict main-quarter timing, consistent with quasi-random assignment within quarters.



(a) Industry Sector

(b) Construction Sector

(c) Service Sector

Figure B2: Seasonal composition of outcomes by sector

Notes:Each panel—(a) Industry, (b) Construction, and (c) Services—shows the percentage of total 2015–2024 activity accounted for by each calendar quarter. Bars are reported for Sales, Purchases, Total Credit, and Cash Flow; within each variable–sector pair, the four quarterly bars sum to 100%. Following Chang et al. (2017), Almeida et al. (2024), we classify each firm's *main quarter* from profitability seasonality in a rolling five-year (20-quarter) window ending at $t-1$: rank operating profits 1 (high)–20 (low), compute each calendar quarter's average rank across its five occurrences, and assign the main quarter as the one with the lowest average rank. We require at least 16 observed quarters; ties break to the earliest calendar quarter.

Appendix - C - Robustness Check

Construction of Forward FX Surprises

We build a market-based measure of exchange–rate surprises from high-frequency movements in the *one-month USD/TRY forward rate*. The object is intended to capture news about the near-term path of the lira that arrives within a month. Let $F_{m,\text{open}}$ and $F_{m,\text{close}}$ denote, respectively, the mid-quotes of the 1-month USD/TRY forward on the first trading day's close and the last trading day's close of calendar month m. Rates are quoted in TRY per USD; thus positive returns indicate TRY depreciation. If an opening (closing) quote is missing, we carry forward (back) the nearest available close within the same month. The forward-based FX surprise is the log change within the month:

$$s_m^{\text{fwd}} = 100\left[\ln\left(F_{m,\text{close}}\right) - \ln\left(F_{m,\text{open}}\right)\right],$$

expressed in percent. Intuitively, s_m^{fwd} records news that shifts the near-term forward curve between the month's open and close. For quarterly analysis and figures, we aggregate monthly surprises by: $s_q^{\text{fwd}} = \sum_{m \in q} s_m^{\text{fwd}}$, where q indexes calendar quarters.

Using the forward-rate–based surprises yields results that mirror the baseline. At the aggregate level (Table C1), unexpected TRY depreciations during a firm's main quarter reduce purchases, sales, and physical volume, with a small but precisely estimated decline in employment. Heterogeneity is consistent with financing frictions: effects are materially larger for SMEs and high-leverage firms (Table C2), while exporters are largely insulated—indeed, their sales/volume coefficients turn modestly positive—whereas importers are more exposed (Table C3); sectorally, Construction is the most sensitive (Table C4). Working-capital accounts contract on impact (Table C5), with sharper cutbacks among high-leverage firms and non-exporters (Table C6, Table C7); sector patterns again show the largest declines in Construction (Table C8). Credit likewise falls across total, short-, and long-term buckets (Table C9), with stronger responses among financially constrained firms (Table C10); by trade orientation, exporters' contractions are milder, while

import-intensive firms tighten their credits (Table C11, Table C12). Overall, the forward-surprise specification confirms that the main-quarter real and financial slowdowns, and their heterogeneity, are not specific to any single shock measure.

Table C1: Exchange Rate Shocks and Firm-Level Real Outcomes During Main Quarters
(FX surprises: 1-month USD/TRY forward)

	(1) Purchases	(2) Sales	(3) Volume	(4) Employment
Main Quarter × FX Shock	-0.042***	-0.074***	-0.059***	-0.006***
	(0.001)	(0.002)	(0.001)	(0.000)
Main Quarter	0.129***	0.578***	0.317***	0.015***
	(0.002)	(0.002)	(0.002)	(0.000)
Firm FE	✓	✓	✓	✓
Sector × Quarter FE	✓	✓	✓	✓
Province × Quarter FE	✓	✓	✓	✓
Year FE	✓	✓	✓	✓
Firm Controls	✓	✓	✓	✓
Observations	19,036,735	19,036,735	19,036,735	19,036,735
R-squared	0.656	0.647	0.659	0.834
Mean Dep. Var.	11.11	10.87	12.49	1.975

Notes: This table reports coefficients from panel regressions estimating the effect of exchange rate shocks on firm-level outcomes using quarterly data from 2015 to 2024. The key coefficient of interest is the effect of exchange rate shocks in the firm's main quarter. Firm-level outcomes, reported at the top of each column, are the natural logarithm of purchases, sales, volume and employment. Exchange-rate shocks are measured as unexpected movements in the *1-month USD/TRY forward rate*, orthogonalized to contemporaneous macro-financial indicators and standardized to have mean zero and unit variance. The main quarter is determined at the firm level as the quarter of peak profitability, based on a ranking of quarters over the previous five calendar years. All specifications include firm fixed effects, as well as sector-by-year-quarter, province-by-year-quarter, and year fixed effects, together with total assets, leverage, profitability, export intensity and firm age as firm-level controls. Standard errors are clustered at the firm level. ***, **, and * indicate that the coefficient estimate is significant at the 1%, 5%, and 10% levels, respectively.

Table C2: Exchange Rate Shocks During Main Quarters and Financing Frictions: Real Activity
(FX surprises: 1-month USD/TRY forward)

Panel A: SMEs vs. Large Firms

	Purchases		Sales		Volume		Employment	
	SMEs	Large	SMEs	Large	SMEs	Large	SMEs	Large
Main Quarter × FX Shock	-0.043***	0.017***	-0.075***	0.028***	-0.060***	0.019***	-0.006***	0.002
	(0.001)	(0.005)	(0.002)	(0.005)	(0.001)	(0.004)	(0.002)	(0.002)
Observations	18,846,279	190,340	18,846,279	190,340	18,846,279	190,340	18,846,279	190,340
R-squared	0.652	0.808	0.644	0.689	0.655	0.771	0.819	0.484
Mean Dep. Var.	11.05	16.39	10.80	17.05	12.44	17.63	1.940	5.436

Panel B: High- vs. Low-Leverage Firms

	Purchases		Sales		Volume		Employment	
	High Leverage	Low Leverage	High Leverage	Low Leverage	High Leverage	Low Leverage	High Leverage	Low Leverage
Main Quarter × FX Shock	-0.051***	-0.035***	-0.074***	-0.051***	-0.068***	-0.054***	-0.006**	-0.003*
	(0.003)	(0.002)	(0.003)	(0.002)	(0.003)	(0.001)	(0.002)	(0.002)
Observations	4,738,050	14,276,893	4,738,050	14,276,893	4,738,050	14,276,893	4,738,050	14,276,893
R-squared	0.679	0.668	0.665	0.659	0.679	0.672	0.834	0.852
Mean Dep. Var.	9.780	11.55	9.261	11.40	11.15	12.95	1.756	2.049
Firm FE	✓	✓	✓	✓	✓	✓	✓	✓
Sector × Quarter FE	✓	✓	✓	✓	✓	✓	✓	✓
Province × Quarter FE	✓	✓	✓	✓	✓	✓	✓	✓
Year FE	✓	✓	✓	✓	✓	✓	✓	✓
Firm Controls	✓	✓	✓	✓	✓	✓	✓	✓

Notes: This table reports coefficients from panel regressions estimating the effect of exchange rate shocks on firm-level outcomes using quarterly data from 2015 to 2024. The key coefficient of interest is the effect of exchange rate shocks in the firm's main quarter. The regressions are estimated separately for subsamples of firms formed on the basis of financing frictions. The proxy for financing frictions is a size-based firm category (small and medium-sized enterprises versus large firms) in Panel A and leverage (high versus low) in Panel B. All other variables are defined in previous tables. All specifications include firm fixed effects, as well as sector-by-year-quarter, province-by-year-quarter, and year fixed effects, together with total assets, leverage, profitability, export intensity and firm age as firm-level controls. Standard errors are clustered at the firm level. ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively.

Table C3: Exchange Rate Shocks During Main Quarters and Trade Orientation: Real Activity
(FX surprises: 1-month USD/TRY forward)

	Purchases		Sales		Volume		Employment	
	Non-exporters	Exporters	Non-exporters	Exporters	Non-exporters	Exporters	Non-exporters	Exporters
Panel A: Exporters vs. Non-Exporters								
Main Quarter × FX Shock	-0.046***	0.021***	-0.080***	0.023***	-0.064***	0.027***	-0.005***	0.004
	(0.002)	(0.002)	(0.002)	(0.003)	(0.001)	(0.002)	(0.001)	(0.003)
Observations	16,046,644	2,984,044	16,046,644	2,984,044	16,046,644	2,984,044	16,046,644	2,984,044
R-squared	0.642	0.711	0.630	0.640	0.643	0.713	0.811	0.932
Mean Dep. Var.	10.61	13.78	10.23	14.29	12.02	15.04	1.879	2.493
Panel B: Importers vs. Non-Importers								
	Purchases		Sales		Volume		Employment	
	Non-importers	Importers	Non-importers	Importers	Non-importers	Importers	Non-importers	Importers
Main Quarter × FX Shock	-0.045***	-0.051***	-0.079***	-0.084***	-0.063***	-0.085***	-0.006***	-0.007***
	(0.001)	(0.003)	(0.002)	(0.003)	(0.001)	(0.002)	(0.001)	(0.001)
Observations	17,114,787	1,918,790	17,114,787	1,918,790	17,114,787	1,918,790	17,114,787	1,918,790
R-squared	0.644	0.758	0.631	0.720	0.643	0.798	0.809	0.945
Mean Dep. Var.	10.78	13.98	10.44	14.69	12.18	15.35	1.888	2.754
Firm FE	✓	✓	✓	✓	✓	✓	✓	✓
Sector × Quarter FE	✓	✓	✓	✓	✓	✓	✓	✓
Province × Quarter FE	✓	✓	✓	✓	✓	✓	✓	✓
Year FE	✓	✓	✓	✓	✓	✓	✓	✓
Firm Controls	✓	✓	✓	✓	✓	✓	✓	✓

Notes: A firm is an *exporter* if its export share (exports/total sales) in year t is $\geq 10\%$; otherwise it is a non-exporter. A firm is an *importer* if its import intensity (imports/COGS) lies in the top quartile of its sector×year distribution; otherwise it is a non-importer. Regressions follow the main specification with firm, sector×quarter, province×quarter, and year fixed effects, and include controls for lagged total assets, leverage, profitability, export intensity, and firm age. Standard errors clustered at the firm level. ***, **, and * denote significance at the 1%, 5%, and 10% levels, respectively.

Table C4: Exchange Rate Shocks During Main Quarters and Sectoral Differences: Real Activity
(FX surprises: 1-month USD/TRY forward)

	(1) Purchases	(2) Sales	(3) Volume	(4) Employment
Panel A: Industry Sector				
Main Quarter × FX Shock	-0.036***	-0.046***	-0.044***	-0.006***
	(0.003)	(0.003)	(0.003)	(0.001)
Observations	3,991,569	3,991,569	3,991,569	3,991,569
R-squared	0.681	0.656	0.687	0.891
Mean Dep. Var.	12.24	12.47	13.52	2.349
Panel B: Service Sector				
Main Quarter × FX Shock	-0.038***	-0.060***	-0.053***	-0.005***
	(0.002)	(0.002)	(0.002)	(0.001)
Observations	12,294,000	12,294,000	12,294,000	12,294,000
R-squared	0.667	0.665	0.670	0.839
Mean Dep. Var.	10.84	10.62	12.29	1.853
Panel C: Construction Sector				
Main Quarter × FX Shock	-0.063***	-0.159***	-0.102***	-0.008***
	(0.004)	(0.005)	(0.004)	(0.001)
Observations	2,551,550	2,551,550	2,551,550	2,551,550
R-squared	0.560	0.530	0.563	0.674
Mean Dep. Var.	10.64	9.607	11.91	1.999
Firm FE	✓	✓	✓	✓
Sector × Quarter FE	✓	✓	✓	✓
Province × Quarter FE	✓	✓	✓	✓
Year FE	✓	✓	✓	✓
Firm Controls	✓	✓	✓	✓

Notes: This table reports coefficients from panel regressions estimating the effect of exchange rate shocks on firm-level outcomes using quarterly data from 2015 to 2024. All specifications include firm fixed effects, sector-by-year-quarter, province-by-year-quarter, and year fixed effects, plus controls for lagged total assets, leverage, profitability, export intensity, and firm age. Standard errors are clustered at the firm level. ***, **, and * denote significance at the 1%, 5%, and 10% levels, respectively.

Table C5: Exchange Rate Shocks and Working Capital During Main Quarters
(FX surprises: 1-month USD/TRY forward)

	(1) Trade Debt	(2) Trade Credit	(3) Inventory
Main Quarter × FX Shock	-0.027***	-0.045***	-0.027***
	(0.001)	(0.001)	(0.001)
Main Quarter	0.115***	0.392***	0.070***
	(0.002)	(0.002)	(0.002)
Firm FE	✓	✓	✓
Sector × Quarter FE	✓	✓	✓
Province × Quarter FE	✓	✓	✓
Year FE	✓	✓	✓
Firm Controls	✓	✓	✓
Observations	17,960,725	17,960,725	16,969,444
R-squared	0.673	0.702	0.697
Mean Dep. Var.	8.741	8.367	10.06

Notes: This table reports coefficients from panel regressions estimating the effect of exchange rate shocks on firm-level outcomes using quarterly data from 2015 to 2024. The key coefficient of interest is the effect of exchange rate shocks in the firm's main quarter. Firm-level outcomes, reported at the top of each column, are the natural logarithm of trade debt, trade credit, and inventory. Exchange rate shocks are unexpected changes in exchange rates, orthogonalized to contemporaneous macro–financial indicators and standardized to have zero mean and unit variance. The main quarter is determined at the firm level as the quarter of peak profitability based on the prior five years. All specifications include firm fixed effects, sector-by-year-quarter, province-by-year-quarter, and year fixed effects, plus controls for assets, leverage, profitability, export intensity, and firm age. Standard errors are clustered at the firm level. ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively.

Table C6: Exchange Rate Shocks During Main Quarters and Financing Frictions: Working Capital Channel
(FX surprises: 1-month USD/TRY forward)

Panel A: SMEs vs. Large Firms						
	Trade Debt		Trade Credit		Inventory	
	SMEs	Large	SMEs	Large	SMEs	Large
Main Quarter × FX Shock	-0.027***	0.006	-0.046***	-0.009*	-0.027***	-0.011**
	(0.001)	(0.005)	(0.001)	(0.005)	(0.001)	(0.005)
Observations	17,770,651	189,956	17,770,651	189,956	16,780,402	188,927
R-squared	0.669	0.878	0.698	0.769	0.693	0.873
Mean Dep. Var.	8.685	13.97	8.296	15.03	10.00	14.92
Panel B: High- vs. Low-Leverage Firms						
	Trade Debt		Trade Credit		Inventory	
	High Leverage	Low Leverage	High Leverage	Low Leverage	High Leverage	Low Leverage
Main Quarter × FX Shock	-0.033***	-0.023***	-0.052***	-0.042***	-0.032**	-0.026***
	(0.003)	(0.002)	(0.003)	(0.002)	(0.002)	(0.002)
Observations	4,252,763	13,692,252	4,252,763	13,692,252	3,932,945	13,022,105
R-squared	0.715	0.698	0.733	0.723	0.762	0.716
Mean Dep. Var.	8.326	8.873	7.104	8.764	9.433	10.25
Firm FE	✓	✓	✓	✓	✓	✓
Sector × Quarter FE	✓	✓	✓	✓	✓	✓
Province × Quarter FE	✓	✓	✓	✓	✓	✓
Year FE	✓	✓	✓	✓	✓	✓
Firm Controls	✓	✓	✓	✓	✓	✓

Notes: This table reports coefficients from panel regressions estimating the effect of exchange rate shocks on firm-level outcomes using quarterly data from 2015 to 2024. The key coefficient of interest is the effect of exchange rate shocks in the firm's main quarter. The regressions are estimated separately for subsamples of firms formed on the basis of financing frictions. The proxy for financing frictions is a size-based firm category (small and medium-sized enterprises versus large firms) in Panel A and leverage (high versus low) in Panel B. All other variables are defined in previous tables. All specifications include firm fixed effects, as well as sector-by-year-quarter, province-by-year-quarter, and year fixed effects, together with total assets, leverage, profitability, export intensity and firm age as firm-level controls. Standard errors are clustered at the firm level. ***, **, and * indicate that the coefficient estimate is significant at the 1%, 5%, and 10% levels, respectively.

Table C7: Exchange Rate Shocks During Main Quarters and Trade Orientation: Working Capital Channel
(FX surprises: 1-month USD/TRY forward)

Panel A: Exporters vs. Non-Exporters						
	Trade Debt		Trade Credit		Inventory	
	Non-exporters	Exporters	Non-exporters	Exporters	Non-exporters	Exporters
Main Quarter × FX Shock	-0.029***	-0.003	-0.048***	-0.005	-0.026***	-0.011***
	(0.002)	(0.002)	(0.002)	(0.003)	(0.002)	(0.003)
Observations	15,021,884	2,933,734	15,021,884	2,933,734	14,092,557	2,872,118
R-squared	0.660	0.749	0.685	0.723	0.693	0.775
Mean Dep. Var.	8.224	11.39	7.666	11.96	9.650	12.08
Panel B: Importers vs. Non-Importers						
	Trade Debt		Trade Credit		Inventory	
	Non-importers	Importers	Non-importers	Importers	Non-importers	Importers
Main Quarter × FX Shock	-0.027***	-0.031***	-0.048***	-0.051***	-0.027***	-0.036**
	(0.001)	(0.003)	(0.002)	(0.003)	(0.001)	(0.003)
Observations	16,042,384	1,915,507	16,042,384	1,915,507	15,047,811	1,918,790
R-squared	0.662	0.767	0.684	0.753	0.689	0.743
Mean Dep. Var.	8.388	11.70	7.851	12.69	9.637	13.37
Firm FE	✓	✓	✓	✓	✓	✓
Sector × Quarter FE	✓	✓	✓	✓	✓	✓
Province × Quarter FE	✓	✓	✓	✓	✓	✓
Year FE	✓	✓	✓	✓	✓	✓
Firm Controls	✓	✓	✓	✓	✓	✓

Notes: This table reports coefficients from panel regressions estimating the effect of exchange rate shocks on firm-level outcomes using quarterly data from 2015 to 2024. The key coefficient of interest is the effect of exchange rate shocks in the firm's main quarter. In Panel A, a firm is classified as an *exporter* if its export share (exports/total sales) in year t exceeds 10%; otherwise it is a non-exporter. In Panel B, a firm is classified as an *importer* if its import intensity—imports divided by cost of goods sold (COGS)—falls in the top quartile (i.e., ≥75th percentile) of the sector-by-year distribution; firms below this threshold are non-importers. All other variables are defined in previous tables. All specifications include firm fixed effects, as well as sector-by-year-quarter, province-by-year-quarter, and year fixed effects, together with total assets, leverage, profitability, export intensity and firm age as firm-level controls. Standard errors are clustered at the firm level. ***, **, and * indicate that the coefficient estimate is significant at the 1%, 5%, and 10% levels, respectively.

Table C8: Exchange Rate Shocks During Main Quarters and Sectoral Differences: Working Capital Channel
(FX surprises: 1-month USD/TRY forward)

	(1) Trade Debt	(2) Trade Credit	(3) Inventory
Panel A: Industry Sector			
Main Quarter × FX Shock	-0.021***	-0.031***	-0.022***
	(0.003)	(0.003)	(0.003)
Observations	3,825,143	3,825,143	3,741,405
R-squared	0.673	0.687	0.656
Mean Dep. Var.	10.28	10.44	11.75
Panel B: Service Sector			
Main Quarter × FX Shock	-0.023***	-0.039***	-0.017***
	(0.002)	(0.002)	(0.002)
Observations	11,730,235	11,730,235	11,015,138
R-squared	0.686	0.717	0.731
Mean Dep. Var.	8.225	7.843	9.573
Panel C: Construction Sector			
Main Quarter × FX Shock	-0.048***	-0.092***	-0.070***
	(0.004)	(0.005)	(0.005)
Observations	2,228,836	2,228,836	2,048,720
R-squared	0.566	0.584	0.525
Mean Dep. Var.	8.812	7.625	9.540
Firm FE	✓	✓	✓
Sector × Quarter FE	✓	✓	✓
Province × Quarter FE	✓	✓	✓
Year FE	✓	✓	✓
Firm Controls	✓	✓	✓

Notes: This table reports coefficients from panel regressions estimating the effect of exchange rate shocks on firm-level outcomes using quarterly data from 2015 to 2024. All other variables are defined in previous tables. All specifications include firm fixed effects, as well as sector-by-year-quarter, province-by-year-quarter, and year fixed effects, together with total assets, leverage, profitability, export intensity and firm age as firm-level controls. Standard errors are clustered at the firm level. ***, **, and * indicate that the coefficient estimate is significant at the 1%, 5%, and 10% levels, respectively.

Table C9: Exchange Rate Shocks and Credit During Main Quarters
(FX surprises: 1-month USD/TRY forward)

	(1) Total Credit	(2) Short-term Credit	(3) Long-term Credit
Main Quarter × FX Shock	-0.029***	-0.032***	-0.022***
	(0.001)	(0.001)	(0.001)
Main Quarter	0.086***	0.090***	0.050***
	(0.002)	(0.002)	(0.002)
Firm FE	✓	✓	✓
Sector × Quarter FE	✓	✓	✓
Province × Quarter FE	✓	✓	✓
Year FE	✓	✓	✓
Firm Controls	✓	✓	✓
Observations	19,036,735	19,036,735	19,036,735
R-squared	0.733	0.715	0.650
Mean Dep. Var.	8.352	7.320	5.302

Notes: This table reports coefficients from panel regressions estimating the effect of exchange rate shocks on firm-level outcomes using quarterly data from 2015 to 2024. The key coefficient of interest is the effect of exchange rate shocks in the firm's main quarter. Firm-level outcomes, reported at the top of each column, are the natural logarithm of purchases, sales, volume and employment. Exchange rate shocks are unexpected changes in exchange rates, orthogonalized to contemporaneous macro-financial indicators and standardized to have a zero mean and unit standard deviation. The main quarter is determined at the firm level as the quarter of peak profitability, based on a ranking of quarters over the previous five calendar years. All specifications include firm fixed effects, as well as sector-by-year-quarter, province-by-year-quarter, and year fixed effects, together with total assets, leverage, profitability, export intensity and firm age as firm-level controls. Standard errors are clustered at the firm level. ***, **, and * indicate that the coefficient estimate is significant at the 1%, 5%, and 10% levels, respectively.

Table C10: Exchange Rate Shocks During Main Quarters and Financing Frictions: Bank Credit Channel
(FX surprises: 1-month USD/TRY forward)

Panel A: SMEs vs. Large Firms						
	Total Credit		Short-term Credit		Long-term Credit	
	SMEs	Large	SMEs	Large	SMEs	Large
Main Quarter × FX Shock	-0.029***	0.019*	-0.033***	0.027**	-0.022***	0.029*
	(0.001)	(0.012)	(0.001)	(0.014)	(0.001)	(0.018)
Observations	18,846,279	190,340	18,846,279	190,340	18,846,279	190,340
R-squared	0.732	0.775	0.714	0.741	0.649	0.704
Mean Dep. Var.	8.304	13.06	7.276	11.74	5.258	9.724
Panel B: High- vs. Low-Leverage Firms						
	Total Credit		Short-term Credit		Long-term Credit	
	High Leverage	Low Leverage	High Leverage	Low Leverage	High Leverage	Low Leverage
Main Quarter × FX Shock	-0.025***	-0.019***	-0.031***	-0.022***	-0.028***	-0.024***
	(0.002)	(0.001)	(0.002)	(0.002)	(0.002)	(0.002)
Observations	4,738,050	14,276,893	4,738,050	14,276,893	4,738,050	14,276,893
R-squared	0.783	0.742	0.761	0.725	0.730	0.660
Mean Dep. Var.	6.665	8.918	5.762	7.843	3.925	5.765
Firm FE	✓	✓	✓	✓	✓	✓
Sector × Quarter FE	✓	✓	✓	✓	✓	✓
Province × Quarter FE	✓	✓	✓	✓	✓	✓
Year FE	✓	✓	✓	✓	✓	✓
Firm Controls	✓	✓	✓	✓	✓	✓

Notes: This table reports coefficients from panel regressions estimating the effect of exchange rate shocks on firm-level outcomes using quarterly data from 2015 to 2024. The key coefficient of interest is the effect of exchange rate shocks in the firm's main quarter. The regressions are estimated separately for subsamples of firms formed on the basis of financing frictions. The proxy for financing frictions is a size-based firm category (small and medium-sized enterprises versus large firms) in Panel A and leverage (high versus low) in Panel B. All other variables are defined in previous tables. All specifications include firm fixed effects, as well as sector-by-year-quarter, province-by-year-quarter, and year fixed effects, together with total assets, leverage, profitability, export intensity and firm age as firm-level controls. Standard errors are clustered at the firm level. ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively.

Table C11: Exchange Rate Shocks During Main Quarters and Trade Orientation: Bank Credit Channel
(FX surprises: 1-month USD/TRY forward)

	Total Credit		Short-term Credit		Long-term Credit	
Panel A: Exporters vs. Non-Exporters						
	Non-exporters	Exporters	Non-exporters	Exporters	Non-exporters	Exporters
Main Quarter × FX Shock	-0.029***	-0.014***	-0.034***	-0.010***	-0.020***	-0.016***
	(0.001)	(0.003)	(0.001)	(0.003)	(0.001)	(0.004)
Observations	16,046,644	2,984,044	16,046,644	2,984,044	16,046,644	2,984,044
R-squared	0.734	0.788	0.715	0.769	0.654	0.727
Mean Dep. Var.	7.999	10.26	6.976	9.179	5.021	6.822
Panel B: Importers vs. Non-Importers						
	Total Credit		Short-term Credit		Long-term Credit	
	Non-importers	Importers	Non-importers	Importers	Non-importers	Importers
Main Quarter × FX Shock	-0.031***	-0.037***	-0.035***	-0.042***	-0.022***	-0.020***
	(0.001)	(0.004)	(0.001)	(0.004)	(0.001)	(0.006)
Observations	17,114,787	1,918,790	17,114,787	1,918,790	17,114,787	1,918,790
R-squared	0.730	0.773	0.712	0.750	0.649	0.702
Mean Dep. Var.	8.034	11.19	7.018	10.02	5.034	7.704
Firm FE	✓	✓	✓	✓	✓	✓
Sector × Quarter FE	✓	✓	✓	✓	✓	✓
Province × Quarter FE	✓	✓	✓	✓	✓	✓
Year FE	✓	✓	✓	✓	✓	✓
Firm Controls	✓	✓	✓	✓	✓	✓

Notes: This table reports coefficients from panel regressions estimating the effect of exchange rate shocks on firm-level outcomes using quarterly data from 2015 to 2024. The key coefficient of interest is the effect of exchange rate shocks in the firm's main quarter. In Panel A, a firm is classified as an *exporter* if its export share (exports/total sales) in year t exceeds 10%; otherwise it is a non-exporter. In Panel B, a firm is classified as an *importer* if its import intensity—imports divided by cost of goods sold (COGS)—falls in the top quartile (i.e., ≥75th percentile) of the sector-by-year distribution; firms below this threshold are non-importers. All specifications include firm fixed effects, sector-by-year-quarter, province-by-year-quarter, and year fixed effects, plus controls for assets, leverage, profitability, export intensity, and firm age. Standard errors clustered at the firm level. ***, **, and * denote significance at the 1%, 5%, and 10% levels, respectively.

Table C12: Exchange Rate Shocks During Main Quarters and Sectoral Differences: Bank Credit Channel
(FX surprises: 1-month USD/TRY forward)

	(1) Total Credit	(2) Short-term Credit	(3) Long-term Credit
Panel A: Industry Sector			
Main Quarter × FX Shock	-0.026***	-0.025***	-0.024***
	(0.003)	(0.003)	(0.003)
Observations	3,991,569	3,991,569	3,991,569
R-squared	0.732	0.714	0.660
Mean Dep. Var.	9.055	7.960	5.982
Panel B: Service Sector			
Main Quarter × FX Shock	-0.028***	-0.031***	-0.022***
	(0.001)	(0.001)	(0.002)
Observations	12,294,000	12,294,000	12,294,000
R-squared	0.742	0.727	0.652
Mean Dep. Var.	8.140	7.124	5.112
Panel C: Construction Sector			
Main Quarter × FX Shock	-0.034***	-0.044***	-0.027***
	(0.003)	(0.003)	(0.004)
Observations	2,551,550	2,551,550	2,551,550
R-squared	0.702	0.674	0.628
Mean Dep. Var.	8.218	7.276	5.020
Firm FE	✓	✓	✓
Sector × Quarter FE	✓	✓	✓
Province × Quarter FE	✓	✓	✓
Year FE	✓	✓	✓
Firm Controls	✓	✓	✓

Notes: This table reports coefficients from panel regressions estimating the effect of exchange rate shocks on firm-level outcomes using quarterly data from 2015 to 2023. All other variables are defined in previous tables. All specifications include firm fixed effects, as well as sector-by-year-quarter, province-by-year-quarter, and year fixed effects, together with total assets, leverage, profitability, export intensity and firm age as firm-level controls. Standard errors are clustered at the firm level. ***, **, and * indicate that the coefficient estimate is significant at the 1%, 5%, and 10% levels, respectively.

Appendix - D - Testing for Heterogeneous Treatment Effects

To assess whether the working–capital credit multiplier varies systematically across firms, we extend the baseline specification in Equation (4) to include a triple interaction between the main-quarter exposure, the FX surprise, and a subgroup indicator. While Equation (4) captures the average differential sensitivity to FX surprises during a firm's main quarter, that average may mask important heterogeneity by size, balance-sheet strength, and trade exposure. Tables 1–6 document subsample patterns of heterogeneity; here we formally test whether those cross-group differences are *statistically significant* using the triple-interaction specification below.

Specifically, for a given subgroup D_{it}, we estimate

$$\begin{aligned} y_{it} = \beta_0 + \beta_1 \,\text{MainQuarter}_{it} + \beta_2 \,(\text{MainQuarter}_{it} \times FXSurprises_t) \\ + \beta 3 \, D_{it} + \beta 4 \,(\text{MainQuarter}_{it} \times D_{it}) \\ + \beta_H \,(\text{MainQuarter}_{it} \times FXSurprises_t \times D_{it}) + \Gamma X_{i,t-1} + \alpha_i + \delta_{st} + \phi_{pt} + \varepsilon_{it} \end{aligned} \tag{D1}$$

where D_i is a binary indicator taking the value one for the subgroup of interest and zero otherwise. Because D_i is time-invariant and defined from pre-period data, its main effect is absorbed by the firm fixed effects α_i. The coefficient of interest, β_H, identifies the *difference* in the working–capital credit multiplier (the incremental sensitivity to $FXSurprises_t$ in the main quarter) for $D_i = 1$ relative to the reference group $D_i = 0$. In this parameterization, β_2 is the multiplier for the reference group, and $\beta_2 + \beta_H$ is the multiplier for the subgroup.

The indicator is defined separately for each comparison group as follows (percentiles are taken within NACE-2 sector × calendar year):

- **SME vs. large:** $D_{it} = 1$ for SMEs and 0 for large firms.
- **Leverage (high vs. low):** $D_{it} = 1$ for high-leverage firms (debt-to-asset ratio at or above the 75th percentile of their NACE-2 sector–year distribution), 0 otherwise.
- **Exporter status (thresholded):** $D_{it} = 1$ if Exports/Total Sales ≥ 10% in year t; 0 otherwise.

- **Import intensity (high vs. low):** $D_{it} = 1$ for high import-intensity firms (imports-to-COGS ratio at or above the 75th percentile of their NACE-2 sector–year distribution), 0 otherwise.

As in the main analysis, we examine (i) working-capital components (trade credits, trade debts, inventories), (ii) real activity (sales, input purchases, employment, production volume), and (iii) borrowing and FX-market behavior (credit usage and FX transactions). The sample spans the same quarterly panel and maintains the pre/post timeline used in the baseline. A statistically significant β_H (in absolute value) indicates that the subgroup $D_{it} = 1$ exhibits a *larger* working–capital credit multiplier relative to the baseline group—i.e., outcomes are more responsive to FX surprises in main-quarter periods. This is the primary object for our heterogeneity claims (e.g., whether SMEs, highly leveraged firms, exporters, or high import-intensity firms are more exposed when short-term financing needs peak).

Table D1: FX Shocks × Main Quarter × Subgroup: Effects on Real Outcomes

	(1) Purchases	(2) Sales	(3) Volume	(4) Employment
Panel A: SME vs. Large				
Main Quarter × FX Shock × SME	-0.044***	-0.066***	-0.052***	-0.008***
	(0.004)	(0.004)	(0.003)	(0.001)
R-squared	0.667	0.657	0.671	0.843
Panel B: High vs. Low Leverage				
Main Quarter × FX Shock × High Leverage	-0.021***	-0.018***	-0.020***	-0.002**
	(0.003)	(0.003)	(0.002)	(0.001)
R-squared	0.668	0.657	0.671	0.843
Panel C: Exporter vs. Non-exporter				
Main Quarter × FX Shock × Non-exporter	-0.050***	-0.072***	-0.051***	-0.007***
	(0.002)	(0.002)	(0.002)	(0.001)
R-squared	0.669	0.658	0.673	0.844
Panel D: Importer vs. Non-importer				
Main Quarter × FX Shock × Importer	-0.007**	-0.010***	-0.004**	0.003***
	(0.003)	(0.004)	(0.002)	(0.001)
R-squared	0.668	0.658	0.672	0.843
Firm FE	✓	✓	✓	✓
Sector x Quarter FE	✓	✓	✓	✓
Province x Quarter FE	✓	✓	✓	✓
Year FE	✓	✓	✓	✓
Firm Controls	✓	✓	✓	✓
Observations	19,036,735	19,036,735	19,036,735	19,036,735
Mean Dep. Var.	11.11	10.87	12.49	1.975

Notes: This table reports coefficients from panel regressions using quarterly firm data from 2015–2024. Outcomes (listed at the top of each column) are in natural logs. The firm's *main quarter* is defined as the quarter of peak profitability based on a rank of the previous five calendar years. The specification follows the triple–interaction model in Eq. (D1), interacting the main–quarter indicator with the FX surprise and a subgroup indicator D_{it}. Subgroups D_{it} are defined as indicated in the panel headers: (i) *SME vs. Large* ($D_{it} = 1$ for SMEs); (ii) *High vs. Low Leverage* ($D_{it} = 1$ if the debt-to-assets ratio is at or above the 75th percentile of the firm's NACE-2 sector×year distribution); (iii) *Exporter vs. Non-exporter* ($D_{it} = 1$ if exports/total sales ≥ 10% in year t); and (iv) *Importer vs. Non-importer* ($D_{it} = 1$ if imports/COGS is at or above the 75th percentile of the sector×year distribution). All regressions include firm fixed effects, sector×quarter and province×quarter fixed effects, and year fixed effects, and control for lagged total assets, leverage, profitability, export intensity, and firm age. Standard errors are clustered at the firm level. ***, **, and * denote significance at the 1%, 5%, and 10% levels, respectively.

Table D2: FX Shocks × Main Quarter × Subgroup: Working-Capital Accounts

	(1) Trade Debt	(2) Trade Credit	(3) Inventory
Panel A: SME vs. Large			
Main Quarter × FX Shock × SME	-0.031***	-0.042***	-0.062***
	(0.005)	(0.005)	(0.006)
R-squared	0.679	0.707	0.705
Panel B: High vs. Low Leverage			
Main Quarter × FX Shock × High Leverage	-0.013***	-0.009***	-0.031***
	(0.003)	(0.003)	(0.005)
R-squared	0.679	0.707	0.706
Panel C: Exporter vs. Non-exporter			
Main Quarter × FX Shock × Non-exporter	-0.036***	-0.045***	-0.022***
	(0.002)	(0.003)	(0.003)
R-squared	0.679	0.708	0.707
Panel D: Importer vs. Non-importer			
Main Quarter × FX Shock × Importer	-0.012***	-0.015***	-0.005**
	(0.002)	(0.003)	(0.002)
R-squared	0.680	0.709	0.707
Firm FE	✓	✓	✓
Sector x Quarter FE	✓	✓	✓
Province x Quarter FE	✓	✓	✓
Year FE	✓	✓	✓
Firm Controls	✓	✓	✓
Observations	17,960,725	17,960,725	16,969,444
Mean Dep. Var.	8.741	8.367	10.06

Notes: This table reports coefficients from panel regressions using quarterly firm data from 2015–2024. Outcomes (listed at the top of each column) are in natural logs. The firm's *main quarter* is defined as the quarter of peak profitability based on a rank of the previous five calendar years. The specification follows the triple–interaction model in Eq. (D1), interacting the main–quarter indicator with the FX surprise and a subgroup indicator D_{it}. Subgroups D_{it} are defined as indicated in the panel headers: (i) *SME vs. Large* ($D_{it} = 1$ for SMEs); (ii) *High vs. Low Leverage* ($D_{it} = 1$ if the debt-to-assets ratio is at or above the 75th percentile of the firm's NACE-2 sector×year distribution); (iii) *Exporter vs. Non-exporter* ($D_{it} = 1$ if exports/total sales ≥ 10% in year t); and (iv) *Importer vs. Non-importer* ($D_{it} = 1$ if imports/COGS is at or above the 75th percentile of the sector×year distribution). All regressions include firm fixed effects, sector×quarter and province×quarter fixed effects, and year fixed effects, and control for lagged total assets, leverage, profitability, export intensity, and firm age. Standard errors are clustered at the firm level. ***, **, and * denote significance at the 1%, 5%, and 10% levels, respectively.

Table D3: FX Shocks × Main Quarter × Subgroup: Credit

	(1) Total Credit	(2) Short-term Credit	(3) Long-term Credit
Panel A: SME vs. Large			
Main Quarter × FX Shock × SME	-0.064***	-0.072***	-0.069***
	(0.010)	(0.011)	(0.009)
R-squared	0.694	0.673	0.685
Panel B: High vs. Low Leverage			
Main Quarter × FX Shock × High Leverage	-0.016***	-0.017***	-0.006**
	(0.003)	(0.003)	(0.003)
R-squared	0.694	0.673	0.685
Panel C: Exporter vs. Non-exporter			
Main Quarter × FX Shock × Non-exporter	-0.031***	-0.051***	-0.024***
	(0.003)	(0.003)	(0.004)
R-squared	0.694	0.673	0.684
Panel D: Importer vs. Non-importer			
Main Quarter × FX Shock × Importer	-0.003*	-0.005***	0.003
	(0.002)	(0.002)	(0.003)
R-squared	0.695	0.674	0.685
Firm FE	✓	✓	✓
Sector × Quarter FE	✓	✓	✓
Province × Quarter FE	✓	✓	✓
Year FE	✓	✓	✓
Firm Controls	✓	✓	✓
Observations	19,036,735	19,036,735	19,036,735
Mean Dep. Var.	8.352	7.320	5.302

Notes: This table reports coefficients from panel regressions using quarterly firm data from 2015–2024. Outcomes (listed at the top of each column) are in natural logs. The firm's *main quarter* is defined as the quarter of peak profitability based on a rank of the previous five calendar years. The specification follows the triple–interaction model in Eq. (D1), interacting the main–quarter indicator with the FX surprise and a subgroup indicator D_{it}. Subgroups D_{it} are defined as indicated in the panel headers: (i) *SME vs. Large* ($D_{it} = 1$ for SMEs); (ii) *High vs. Low Leverage* ($D_{it} = 1$ if the debt-to-assets ratio is at or above the 75th percentile of the firm's NACE-2 sector×year distribution); (iii) *Exporter vs. Non-exporter* ($D_{it} = 1$ if exports/total sales ≥ 10% in year t); and (iv) *Importer vs. Non-importer* ($D_{it} = 1$ if imports/COGS is at or above the 75th percentile of the sector×year distribution). All regressions include firm fixed effects, sector×quarter and province×quarter fixed effects, and year fixed effects, and control for lagged total assets, leverage, profitability, export intensity, and firm age. Standard errors are clustered at the firm level. ***, **, and * denote significance at the 1%, 5%, and 10% levels, respectively.