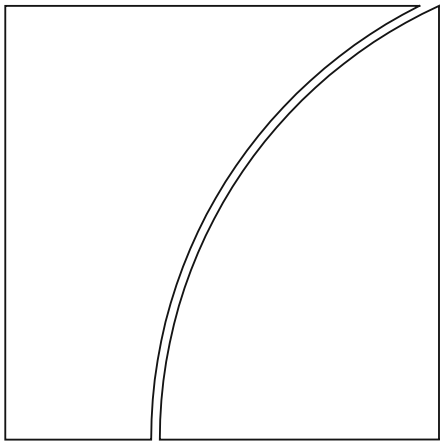

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by Ricardo Correa, Andrea Fabiani, Matias Ossandon Busch and Miguel Sarmiento

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Keywords: trade disruptions, cross-border credit, firm-to-firm credit, global value chains

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The Ripple Effect: Supply Chain Reconfigurations and Cross-border Credit Dynamics*

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Abstract

We study the role that cross-border firm-to-firm credit plays in financing exporters. Exploiting the exogenous shock of US tariffs on Chinese goods in 2018–2019, we examine the response of Colombian firms – bystanders not targeted by trade policy – to redirected US demand. Using credit registry information for cross-border and domestic non-financial firm financing, we find that almost 40 percent of the total credit sourced by exporters came from cross-border firm-to-firm credit at end-2019, which represented 80 percent of their cross-border credit. In contrast to traditional trade credit, which is typically short-term, firm-to-firm credit has an average maturity of almost 2 years, and has characteristics resembling bank lending. Our findings highlight an overlooked financial channel underpinning the international trade network.

Keywords: Trade disruptions, cross-border credit, firm-to-firm credit, global value chains

JEL Codes: G21, F34, F42

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1 Introduction

Recent trade policy and geopolitical developments have triggered sweeping changes in global supply chains (see, e.g., Fajgelbaum and Khandelwal, 2022; Alfaro et al., 2025), prompting firms to reconfigure production and sourcing networks across borders (Alfaro and Chor, 2023). This reallocation raises a natural but underexplored question: what enables firms to scale up quickly in response to shifting global demand for goods? In this paper, we explore this question and highlight a novel financing channel – cross-border firm-to-firm credit – that plays a central role in this process. Using detailed data from Colombia, a bystander to the 2018-2019 US-China trade war, we show that exporters increasingly relied on cross-border firm-to-firm credit as US demand for tariff-substituting goods rose. This shift reveals a hidden financial architecture that underpins the reorganization of global production.

Conventional wisdom holds that global banks are best positioned to finance trade, especially in emerging markets, given their liquidity, access to foreign exchange markets, and international reach (see, e.g., Claessens and Van Horen, 2021). Yet, our findings suggest otherwise. In response to tariff-driven demand shifts, Colombian exporters relied more heavily and at better terms on cross-border credit from foreign non-financial firms than from banks. Importantly, this is not standard short-term trade credit tied to specific transactions (Benguria et al., 2023; Garcia-Marin et al., 2025; Kim and Shin, 2012; Hardy and Saffie, 2024) – we identify longer-term loans with an average maturity of around 2 years that closely resemble bank financing in maturity and size. We argue that under policy uncertainty, frictions banks usually mitigate – such as information asymmetries – are better addressed by firms that are familiar with exporters and can potentially and more accurately assess their repayment capacity. For example, foreign buyers, with strong incentives to secure replacement suppliers quickly, are better positioned to provide such funding at speed.

To provide more context of why cross-border firm-to-firm credit matters for international trade, Figure 1(a) shows the evolution of total cross-border firm-to-firm credit from foreign-

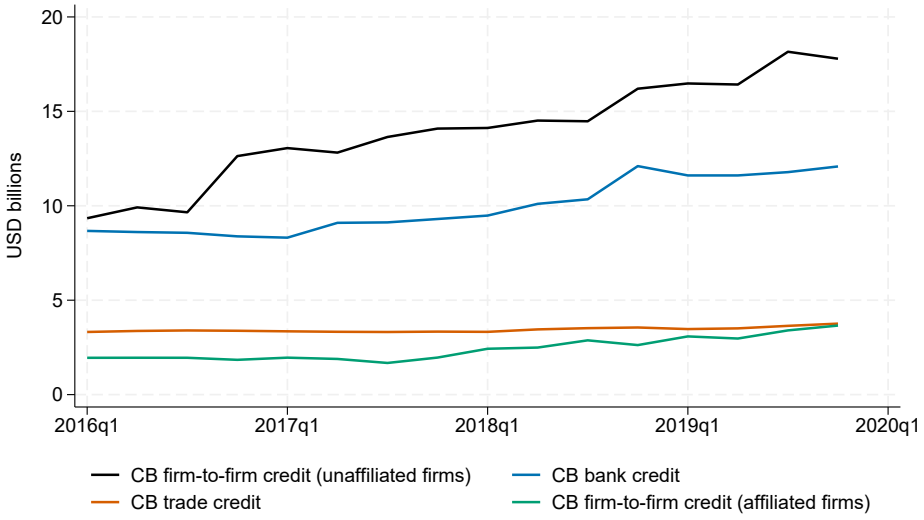
based affiliated and non-affiliated firms, cross-border bank credit, and cross-border trade finance in the late 2010s, when US-China trade tensions increased. Panel A shows that cross-border firm-to-firm credit became almost double the outstanding amount of cross-border bank credit in this period, with trade credit representing a relatively smaller fraction of the total external debt of non-financial firms. In panel B 1(b), we show the same pattern for firms in exporting sectors outside of commodities, which represent our working sample for the empirical tests.

After noting the relevance of cross-border firm-to-firm credit, we test whether this source of financing is used by exporters to boost their production capacity. We proceed in two steps. First, we focus on the 2018-2019 US-China trade tensions and find an increase in exports to the US by Colombian firms with a track record of exporting products, particularly intermediate goods, that eventually became subject to US tariffs on China.[1] Second, and most importantly, we document a notable shift in the composition of financing for exporting firms, characterized by a marked increase in firm-to-firm credit, which reaches about $13 billion by end-2019, close to the $16 billion in credit provided by local banks, and much larger than the roughly $3 billion lent by foreign banks. These changing patterns in exporters' financing are also reflected in lower interest rates and longer average maturities in the credit granted to firms active in product lines that were affected by US tariffs. Importantly, we find that this increase in exports cannot be attributed to Colombian firms that triangulate Chinese production to the US. This pattern is consistent with the notion that, under heightened uncertainty, global banks may be reluctant to expand credit due to increased exposure to currency risk or policy reversals (Correa et al., 2024), while trade restrictions may further constrain banks' cross-border lending capacity.[2]

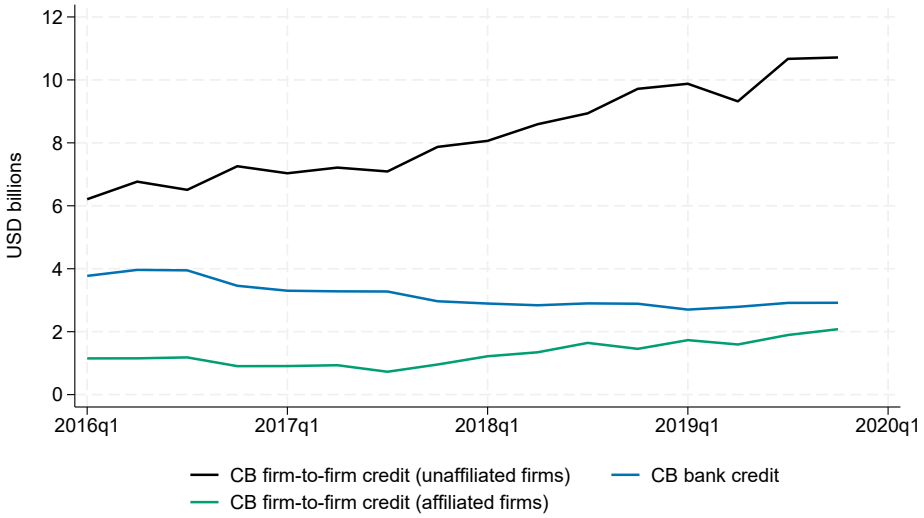
[1] Our finding that Colombian exporters increase sales to the US in product categories affected by US tariffs confirms earlier evidence of a reallocation of global supply chains following the US-China trade tensions (Fajgelbaum et al., 2024) through the lens of data from a bystander country.

[2] Global or local banks may not adequately support investments needed to increase exporters' production if financiers perceive increased risks – from currency fluctuations to further unexpected trade disruptions that produce an increase in uncertainty (Correa et al., 2024). Moreover, restrictions on trade could be coupled

Figure 1: Cross-border debt of Colombian non-financial firms



(a) Outstanding cross-border debt by source of credit



(b) Outstanding cross-border debt by source of credit (sample of exporters)

These figures present the quarterly outstanding cross-border (CB) debt balance (in USD bill.) of Colombian non-financial firms by source of lender. Panel A captures debt outstanding for all Colombian non-financial firms owed to foreign firms (affiliated and unaffiliated), foreign banks, and to foreign suppliers via trade credit. Affiliated firms are identified using Foreign Direct Investment (FDI) flows since 2011. The relation between the Colombian firm and the foreign lender is reported by the borrower. Panel B captures similar aggregates for Colombian exporters included in our sample (excludes firms in the oil, minerals and metals sectors). The series are constructed with information from the Central Bank of Colombia.

with limits for banks' cross-border credit, further limiting the financing of supply chain reallocation.

We study the financing of this reallocation process in the context of Colombia, a bystander to the US-China trade war that was not directly targeted by tariffs but was indirectly affected through shifting trade flows. Our identification strategy exploits the staggered rollout of US tariffs together with variation in firms' exposure to products that became subject to US tariffs on Chinese goods. This approach allows us to trace how affected Colombian exporters responded in terms of trade flows and financing, relative to similar firms less exposed to redirected demand. A key empirical challenge is to observe not only export performance but also how firms adjust their financing across different sources – a dimension often unmeasured in standard trade data.[3]

To address this, we assemble a novel dataset linking transaction-level customs records with the universe of corporate loans reported to the Colombian credit registry. Critically, these data include not just credit from domestic and foreign banks, but also cross-border loans from foreign non-financial firms — a rare and underexplored form of financing. This firm-to-firm credit data, reported for the purposes of monitoring Colombia's private external debt, allows us to track loans used to finance exports and cover working capital needs. We use a panel setup spanning from 2016Q1 to 2019Q4 to measure both trade and credit dynamics at the firm-product-destination level during a period of rapid supply chain reorganization.[4]

The first step in our empirical strategy is to estimate the impact of trade tensions on Colombian exports. We implement a difference-in-differences strategy exploiting the

[3]Colombia is a well-integrated middle-income economy with strong trade and financial ties to the global economy. The US accounted for roughly one-third of its trade over the sample period. As of 2017, forward GVC participation was 18%, above Mexico (8%), Argentina (16.2%), and Brazil (17.2%). While 64% of exports are primary commodities, Colombia ranked 50th in the 2023 Economic Complexity Index, second only to Mexico in Latin America, reflecting a more diversified export basket. It also maintains free trade agreements with the US, EU, Canada, Chile, and South Korea. On the financial side, cross-border banking claims on Colombian borrowers reached 9% of GDP in 2017 – above Mexico (5%) and Argentina (1.7%) – while foreign banks held an 18% domestic market share, comparable to Mexico (19%) and above Brazil (10%) and Chile (3%) (Panizza, 2024).

[4]Throughout our analysis, we exclude commodity exports, which account for a large share of Colombia's trade but are typically priced in global markets and less affected by firm-specific supply chain reconfigurations; they are also concentrated in a handful of firms. Moreover, the financing of commodity exports often involves specialized instruments (e.g., syndicated loans or forward contracts) that differ substantially from the firm-level credit relationships at the center of our analysis.

staggered imposition of US tariffs on Chinese goods during 2018–2019. We begin with a panel at the firm-product-destination-quarter level, where the dependent variable is the volume of exports in US dollars for each firm-product-destination triplet. The variable of interest is an interaction between a product-specific *Post* dummy – that equals 1 after the introduction of tariffs in a given product category – and a US destination indicator. This specification allows us to identify whether the export of affected products increased their sales to the US disproportionally more within a firm after the introduction of tariffs, relative to other products and destinations.

To address identification concerns, we include firm-product-quarter fixed effects, which absorb time-varying firm-level shocks at the product level (e.g., changes in capacity, product quality, or competitiveness). We also control for destination-country-by-time fixed effects to account for shifts in demand conditions across countries, and for firm-product-country fixed effects to capture persistent bilateral trade frictions such as distance, logistics, or market access within firms and across trade partners.

We complement the product-level specification with a firm-level analysis to assess whether firms expanded total exports, working capital, and investment—outcomes that go beyond the differential effects captured at the transaction level. The main variable of interest is an interaction between a firm-specific exposure measure – defined as the share of 2016–2017 exports in products later subject to US tariffs – and a post-period indicator equal to one in all quarters after 2018Q1. This specification allows us to trace how more exposed firms adjusted their overall activity once trade tensions materialized.[5]

We find that Colombian exports of products affected by US tariffs on Chinese goods increased significantly after the onset of the trade war. At the product-destination level, exports to the US of tariff-substituting goods rose by 6.2 percentage points more relative to

[5]We include firm fixed effects to absorb all time-invariant heterogeneity and time fixed effects to control for aggregate macroeconomic shocks. The use of pre-determined exposure and saturated fixed effects mitigates concerns related to reverse causality, selection bias, or concurrent demand shifts.

exports of the same products to other destinations. This effect is concentrated in intermediate goods, consistent with the reconfiguration of global supply chains away from China and toward bystander economies. At the firm level, exporters more exposed to affected products expanded their total exports and production inputs more than less exposed firms. These results underscore that demand reallocation translated into tangible scaling-up responses at the firm level, not just substitution between products or destinations.[6]

The second and main step of our empirical strategy tests how firms financed the observed expansion in exports and production. We estimate firm-level regressions using credit volumes, interest rates, and loan maturities as dependent variables, distinguishing across three financing sources: (i) domestic banks, (ii) foreign banks, and (iii) foreign non-financial firms. The main variable of interest is an interaction between a firm's pre-determined exposure to products later affected by US tariffs and a post-period indicator equal to one in all quarters after 2018Q1. Our regressions include firm-lender fixed effects to absorb time-invariant characteristics of credit relationships and firm-level selection into lenders along with a set of firm-level controls. We also include lender-time fixed effects to capture supply-side shocks or changing conditions in lending institutions, and sector-time fixed effects to control for industry-specific shifts in credit demand.

This saturated specification allows us to identify how the financing patterns of more exposed firms changed relative to others, net of common supply or demand shocks captured by the fixed effects. While the sector-time fixed effects absorb broad trends in credit demand at the industry level, we cannot rule out that residual variation in credit outcomes reflects product-specific demand shifts within sectors. Our estimates should therefore be interpreted as reflecting equilibrium changes in financing outcomes in response to trade shocks –capturing

[6]In additional tests, we examine the effects of China's retaliatory tariffs against the US and find some evidence that Colombian firms increased exports to China in product categories affected by these measures, consistent with bystander countries partially filling the gap left by restricted US exports. Importantly, we rule out the possibility that our main results are driven by Colombian firms triangulating Chinese goods through Colombia, as we do not observe increases in imports from China by the firms most exposed to US tariffs.

both the supply of and demand for credit driven by tariffs in specific product categories and conditional on sectoral and lender-level dynamics.[7]

Our results reveal substantial shifts in the composition and conditions of credit following the onset of trade tensions. Firms more exposed to tariff-affected products experienced significant increases in credit volumes, particularly from cross-border firm-to-firm sources. On average, these firms received approximately 20 percentage points more in firm-to-firm credit relative to less exposed peers. In contrast, the increase in domestic bank lending was more modest, around 6 percentage points. This reallocation of financing is also reflected in improved credit terms: interest rates declined for exposed firms in both domestic bank credit and cross-border firm-to-firm credit. Conversely, we find a decline in cross-border bank credit in exposed firms – especially from US institutions – consistent with deteriorating credit conditions and changes in US banks' risk appetite toward trade-exposed firms (Alfaro et al., 2025). These results point to a nuanced reconfiguration of financing sources as trade patterns shifted.

These findings underscore a largely overlooked dimension of global supply chain reorganization: the growing role of cross-border firm-to-firm credit. Unlike standard trade credit tied to individual transactions (Antràs and Foley, 2015), the loans we document resemble longer-term bank financing – averaging two years in maturity – and can be used to pre-finance production capacity expansion. This mechanism becomes especially relevant when policy uncertainty or liquidity constraints limit bank participation (Correa et al., 2024). In such environments, foreign buyers may act as more agile financiers, leveraging their superior information about potential suppliers to overcome credit frictions (Hardy et al., 2023). For emerging market exporters facing steep financing needs and limited access to international banking networks, firm-to-firm credit may emerge as a critical enabler of rapid supply-side

[7]This equilibrium interpretation aligns with similar approaches in the trade- and macro-finance literature that acknowledge the difficulty of isolating credit supply or demand channels in rich panel settings with multiple fixed effects and where both sides adjust simultaneously (see, e.g. Amiti and Weinstein, 2011; Chodorow-Reich, 2014).

adjustment. Our results thus point to a hidden architecture of global reallocation in which production shifts are underpinned not just by trade flows, but by the financing relationships that make them possible.[8]

Related literature We contribute to strands of literature that explore the role of global banks in trade; the real and financial effects of a reallocation in global supply chains; and the economic consequences of the US-China trade tensions in particular. Primarily, our findings build on previous evidence documenting a strong link between international financial integration and trade (see, e.g., Beck, 2002; Caballero et al., 2018). Financial integration can foster trade through an attenuation of exporter-importer information frictions (Hertzel et al., 2018; Agarwal et al., 2023) as well as through a reduction of financial constraints originated in low degrees of financial development in exporting countries (Bronzini and D'Ignazio, 2005). A subset of this literature has focused on examining the impact of financial integration via cross-border banking on trade (see, e.g., Niepman and Schmidt-Eisenlohr, 2017; Buch and Goldberg, 2020). Claessens and Van Horen (2021) show, for example, that foreign banks' entry can lead to increased exports to banks' home countries, whereas Paravisini et al. (2023) documents how exporting firms tend to borrow from banks specialized in their countries of destination. Berger et al. (2025) illustrate the stabilizing role of global banks in mitigating the effect of pandemic-related restrictions on trade. Our contribution emphasizes a geographical reconfiguration of cross-border credit – particularly firm-to-firm cross-border credit – in support of changing patterns in global supply chains.

Several studies have explored the drivers and consequences of supply chain reallocations in the wake of episodes including the US-China trade tensions, the COVID-19 pandemic, and the Russia-Ukraine war. Fajgelbaum et al. (2024) and Alfaro and Chor (2023) document how

[8]While cross-border firm-to-firm credit can play a catalytic role in reallocating supply chains, it may also pose monitoring and financial stability challenges. These credit arrangements are less likely to be captured in traditional supervisory frameworks, can generate unhedged foreign exchange exposures, and may increase firms' reliance on volatile external funding. Such dynamics have been discussed in the context of emerging market vulnerabilities (see Bruno and Shin, 2015; CGFS, 2020).

bystander countries benefited from larger export volumes following US-imposed tariffs after 2018. Qiu et al. (2023) argue that, while global value chains have recently been lengthened, there is no evidence of an increased diversification of suppliers, with importers in the US having increased their reliance on intermediaries between them and Chinese producers. The impact of US-China trade tensions on bystander countries has been explored by Blanchard et al. (2021) and Utar et al. (2023) showing, for example, that firms more susceptible to US-imposed tariffs increased their purchase of inputs and their participation in US-based global value chains. Alfaro et al. (2025) show that US importers of tariff-hit products from China were more likely to exit relationships with Chinese suppliers and to find new suppliers in other Asian countries. This shift in US importers' supply chains was associated with an increased use of bank credit at higher rates. However, US affected firms with specialized banks were able to borrow at lower rates and were more likely, and faster, to establish new supplier relationships than firms with financing arrangements with other banks. Complementing this work, we study the financing needs of exporters instead of those of importers, and focus on the sources (and terms) of the credit they access to adjust their exporting activities.

Our results also complement findings on the economic and financial consequences of US-China trade tensions (see Antràs and Chor, 2022, for a summary of this literature). A growing body of empirical work shows that US-imposed tariffs had an almost complete pass through to US prices (Amiti et al., 2019), negatively impacting consumption, investment, and employment (see, e.g., Waugh, 2019; Amiti et al., 2020). Hassan and Esposito (2021) note, however, that global trade has remained resilient in the aggregate, despite heightened trade policy uncertainty. Other studies have focused on the impact of trade tensions on financial markets, particularly on bank lending. Correa et al. (2024) provide evidence for a negative spillover of banks' exposure to US-China trade tensions on domestic lending in the US. Focusing on a different episode, Federico et al. (2023) and Federico et al. (2025) document a reallocation of domestic credit in Italy following China's entry to the World Trade Organization and Russian sanctions in 2014, respectively. We complement this literature by

showing that banks and firms in countries directly exposed to trade tensions support the reallocation of their supply chains by directly engaging in cross-border financing.

A related strand of literature has focused on the trade effects of financial shocks, illustrating the role of global banks in the propagation of adverse financial conditions to trade flows. For example, Amiti and Weinstein (2011), Paravisini et al. (2015), and Amiti and Weinstein (2018) show that declines in global trade can be attributed to banks failing to provide trade finance during episodes of widespread financial stress. An important part of this evidence has been drawn from analyzing the period around the Great Financial Crisis (see Chor and Manova, 2012). While this literature highlights a 'dark side' of banks' involvement in trade, our results underscore that both domestic bank credit and foreign firm-to-firm credit play a critical role in underpinning the reallocation of global supply chains, particularly when trade uncertainty becomes salient.

Finally, our paper also connects to the literature on trade credit as a source of financing for exporting firms, especially in emerging markets where bank credit is scarce (e.g., Cuñat, 2007; Amberg et al., 2021; Hardy and Saffie, 2024; Calani et al., 2025).[9] Trade credit is often viewed as short-term liquidity insurance within buyer-supplier relationships, and has been shown to substitute for bank lending in times of stress (Hassan and Esposito, 2023). We extend this literature by documenting a distinct form of cross-border firm-to-firm lending: longer-term loans, with average maturities around two years, that help exporters scale up production in response to global demand shifts. This form of credit, rarely captured in microdata, is shown to exceed cross-border bank financing in both volume and relevance.

[9] Calani et al. (2025) show that trade policy uncertainty reduces exports from Chile, primarily by constraining working capital among firms relying on cash-in-advance trade credit. Their findings highlight the fragility of short-term, transaction-based financing relationships under uncertainty. In contrast, our results point to a distinct channel: long-term firm-to-firm cross-border lending that supports production expansion during trade disruptions.

2 Empirical strategy

Our aim is to estimate the effect of firms' exposure to the US-China trade tensions on trade volumes. We conjecture that firms exporting product categories subject to US tariffs may increase their export volumes to the US, partially filling the gap of reduced Chinese imports. We are, thus, primarily interested in the effect of trade tensions that started in 2018 on export volumes at the firm-product-country level. Our baseline specification is represented in Eq. 1:

$$Y_{f,p,c,m} = \alpha + \beta_1 Post_{p,m} \times USA_c + \sigma_{f,c,p} + \mu_{f,p,q} + \delta_{c,m} + e_{f,p,c,m} \tag{1}$$

where $Y_{f,p,c,q}$ represents the log of either export values (measured in USD) or quantities at the firm (f), product (p), destination country (c), and monthly (m) level.

The main coefficient of interest is β_1. It loads the interaction between two dummies, $Post_{p,m}$ and USA_c. First, $Post_{p,m}$ varies across products and time, and takes value 1 from the first month in which a specific product category p becomes subject to US-imposed tariffs onward. Next, the dummy variable USA_c takes value 1 for US exports.

We augment the model with a rich vector of fixed effects. $\sigma_{f,c,p}$ denotes firm $\times$ destination $\times$ product fixed effects, controlling for all observed and unobserved time-invariant heterogeneity which may drive firms' specialization in exporting a certain product to a given destination. $\mu_{f,p,q}$ is a vector of firm $\times$ product $\times$ time fixed effects, absorbing any (demand or supply) shock which may affect firm f's exports of a specific product p. Moreover, we control for destination-specific demand shocks through a vector of destination $\times$ time fixed effects, $\delta_{c,m}$. Across specifications, we double cluster standard errors $e_{f,p,c,m}$ at the product and country level, in line with the layers of heterogeneity assigning the treatment dummy.

We expect β_1 to be positive and statistically significant if export volumes to the US of products affected by tariffs increase relatively more than those to other destinations within the same firm. This pattern would be consistent with the hypothesis that Colombian

firms filled part of the supply gap left by Chinese producers facing higher trade barriers. The identification strategy allows us to isolate this effect from a broad set of potential confounding shocks by comparing trade flows at the firm-product-destination level, while saturating the regression with fixed effects that control for time-varying firm-product shocks and demand shifts across destinations. In particular, firm-product-quarter fixed effects absorb any unobserved heterogeneity in exporting behavior across products within firms, such as production disruptions, price adjustments, or marketing changes. Meanwhile, destination-time fixed effects account for macroeconomic or policy changes in importing countries, and firm-product-destination fixed effects capture time-invariant frictions in bilateral trade such as logistics costs, contractual ties, or historical trade relationships.

In a second stage, we aggregate the panel at the firm-country level (i.e., we collapse the product dimension) to assess the aggregate firm-level effect of trade tensions on exports. To this end, we first define firms' exposure to trade tensions as follows:

$$Exposure_f^{Total} = \frac{\sum_p Y_{f,p} * 1(\tau_p > 0)}{\sum_p Y_{f,p}} \tag{2}$$

In Eq. 2, we first define τ_p as an indicator equal to one if a product category became eventually affected by US-imposed tariffs on China at any point in time between 2018Q1 and 2019Q4; we label these categories as 'affected' products. Then, we calculate the average share of affected products in a firms' total exports between 2016Q1 and 2017Q4. Importantly, we construct Eq. 2 by aggregating the universe of trade transactions recorded at the product level by each firm. Eq. 2 provides a broad measure of a firms' exposure to affected product categories, without distinguishing whether a firm has pre-existing trade links with the US. Thus, we also employ an alternative exposure definition to capture this latter dimension. This exposure is defined in Eq. 3:

$$Exposure_f^{US} = \frac{\sum_p Y_{f,p} * 1(\tau_p > 0) * US}{\sum_p Y_{f,p}} \tag{3}$$

where $Exposure_f^{US}$ represents firm's f exposure to affected goods as measured by the firm's pre-determined share of affected goods' exports to the US to total exports in the period between 2016 and 2017. For completeness, we also define $Exposure_f^{RoW} = Exposure_f$ - $Exposure_f^{US}$ as firms' exposure to affected goods based on their pre-determined exported volumes to the rest of the world (RoW). Armed with Eqs. 2 and 3, we examine whether firms' pre-determined exposure to goods that eventually became affected by US-imposed tariffs exhibit a different pattern in trade volumes after January 2018. Our specification is defined in Eq. 4:

$$\begin{aligned} Y_{f,q} =& \alpha + \beta_1 Post_q + \beta_2 Exposure_f^{US} + \beta_3 Exposure_f^{RoW} + \beta_4 Post_q \times Exposure_f^{US} \\ &+ \beta_5 Post_q \times Exposure_f^{RoW} + \mu_f + \delta_q + e_{f,q} \end{aligned} \tag{4}$$

where dependent variable $Y_{f,q}$ is the log of total FOB export values of firm f in quarter q. The indicator $Post_q$ equals one in all quarters after 2018Q1. The coefficient β_4 captures the differential response of firms with greater pre-determined exposure to affected products in their US-bound exports. In contrast, β_5 captures the interaction between $Post_q$ and the firm's exposure to the same product categories in exports to other destinations, thereby identifying any average effect of exposure to tariff-affected goods independent of direct trade with the US. Since the goal is to trace aggregate export responses, this specification abstracts from destination-level variation. Standard errors are clustered at the firm level.

The identification in Equation (4) relies the pre-determined firm-level exposure measure combined with fixed effects to mitigate common empirical concerns. Firm fixed effects (μ_f) control for time-invariant heterogeneity across firms, including sector, size, and historical export orientation. Time fixed effects (δ_q) absorb aggregate shocks, such as changes in macroeconomic conditions, currency fluctuations, or global demand trends. The interaction terms exploit cross-sectional variation in exposure to US tariffs and to tariff-affected products more generally, conditional on these fixed effects. Since the exposure variables are defined

using pre-treatment export patterns (2016–2017), the specification alleviates concerns of reverse causality or endogenous matching between firms and affected products.

To assess whether the export expansion documented above reflects an actual increase in production capacity – rather than a mere reallocation across destinations – we extend the analysis by using the same specification in Equation (4), replacing exports with (the log of) firms' working capital and total investment as dependent variables. This test will allow us to examine whether more exposed firms responded to trade reallocation opportunities by scaling up operations. Increases in working capital and fixed investment are natural prerequisites for firms seeking to meet sustained foreign demand (Bustos, 2011, Manova, 2013), particularly in settings where credit constraints limit rapid adjustment. Evidence of such real-side responses would confirm that exposure to US tariffs translated into capacity-building, not just trade diversion.

To investigate whether the observed export and investment responses are accompanied by shifts in financing, we extend our empirical framework to examine credit outcomes. Specifically, we assess how firms' pre-determined exposure to tariff-affected products (as defined in Eq. 2) influenced the volume and terms of their external financing following the onset of the US–China trade tensions. Building on the specifications used to analyze trade and investment dynamics, we estimate variations in credit volumes, interest rates and loan maturities at the firm–bank level, using detailed credit registry data that allow us to disaggregate loans by source. We exploit this granular breakdown – covering domestic bank credit, cross-border bank lending, and cross-border firm-to-firm credit – to uncover financial mechanisms underpinning firms' capacity to scale up. Equation 5 presents our main specification:

$$Y_{f,b,q} = \alpha + \beta_1 Post_q + \beta_2 Exposure_f^{Total} + \beta_3 Post_q \times Exposure_f^{Total} + \mu_{b,f} + \delta_{b,q} + e_{f,b,q} \quad (5)$$

where $Y_{f,b,q}$ denotes our outcome variable of interest for each firm-lender pair (f, b) in quarter

q. We examine three dimensions of firm financing: the log of loan volumes accumulated over the quarter, the interest rate applied, and the log of contractual loan maturity. Our main explanatory variable is $Exposure_f^{Total}$, as defined in Eq. 2.[10] Unlike the export regressions, which focus on destination-specific trade flows, credit outcomes are more plausibly linked to a firm's total exposure to tariff-affected product lines, regardless of destination. This broader measure captures the full scale of the production and working capital adjustments a firm may need to undertake, which lenders likely incorporate into their credit decisions. We would expect a positive coefficient on $Exposure_f^{Total}$ if more exposed firms obtain larger volumes of credit or longer maturities, while the coefficient may turn negative if firms face more favorable interest rates. As the exposure variable is pre-determined, this design helps mitigate concerns of simultaneity between financing and trade outcomes. In addition, we include firm–bank fixed effects ($\mu_{b,f}$) to absorb persistent relationship-specific lending patterns, and bank–time fixed effects ($\delta_{b,q}$) to control for time-varying shocks on the supply side of credit.

The inclusion these fixed effects allows us to compare the evolution of credit from the same lender to firms with different pre-determined exposure to tariff-affected products. In extended specifications, we also incorporate sector-time fixed effects to account for sector-specific demand shocks, and add firm-level time-varying controls for size, outstanding debt, and total investment. Standard errors are clustered at the bank level.While bank-time and sector-time fixed effects help absorb aggregate credit conditions and sector-wide demand shocks, residual variation may still reflect heterogeneous credit demand linked to product- or firm-specific export opportunities. Accordingly, we interpret our estimates as capturing equilibrium changes in financing outcomes in response to trade shocks – reflecting adjustments on both the credit supply and demand side, conditional on lender, borrower, and sectoral dynamics.

[10] $Exposure_f^{Total}$ is defined as the share of firm f's total export value in 2016–2017 accounted for by product categories that were subsequently targeted by US tariffs on China, regardless of the destination country. This measure captures a firm's overall dependence on tariff-affected goods and is thus suitable for credit regressions where financing needs are not destination-specific but tied to firm-level production and inventory decisions.

In a final specification, we explore heterogeneity in firms' financing responses depending on the origin of the lender, with a particular focus on US-based creditors. To do so, we extend the baseline credit regression by interacting the variable of interest with an indicator for whether the lender is based in the US. This approach allows us to assess whether credit from US-based lenders – be they banks or non-financial firms – responds differently to trade shocks relative to lenders from other jurisdictions. This estimation is formalized in Eq. 6:

$$\begin{aligned} Y_{f,b,q} =& \alpha + \beta_1 Post_q + \beta_2 Exposure_f^{Total} + \beta_3 US\,Lender_b \\ &+ \beta_4 Post_q \times Exposure_f^{Total} + \beta_5 Exposure_f^{Total} \times US\,Lender_b \\ &+ \beta_6 Post_q \times Exposure_f^{Total} \times US\,Lender_b + \mu_{b,f} + \delta_{b,q} + e_{f,b,q} \end{aligned} \tag{6}$$

In this specification, β_6 captures the differential effect of trade exposure on financing volumes provided by US-based lenders after tariffs are introduced, relative to non-US lenders. This enables us to test whether cross-border credit from the US – especially in the form of firm-to-firm lending – increased disproportionately for firms exposed to affected product categories. Identification follows the same approach as in our baseline credit regressions: we include firm-bank fixed effects ($\mu_{b,f}$) to account for unobserved heterogeneity in lender-borrower relationships, and bank-time fixed effects ($\delta_{b,q}$) to absorb time-varying lender characteristics, such as funding conditions or credit supply shocks. In some specifications, we also control for sector-time fixed effects and include firm-level controls to mitigate concerns that results could be affected by differential demand dynamics across sectors or firm fundamentals.

3 Data and sample

We combine four data sources provided by the Central Bank of Colombia (Banco de la República, BdR), the Colombian Financial Supervisory Authority (Superintendencia Financiera de Colombia), the National Administrative Department of Statistics of Colombia

(DANE), and the US International Trade Commission.

3.1 Trade data

We construct a monthly panel for exports at the firm-product-destination country level based on customs repositories collected by the DANE. We retain data from 2016 to 2019. Firms in Colombia are requested to report their export and import transactions while going through customs. Products are categorized according to the 10-digit Harmonized System (HS) from the World Customs Organization. We obtain two types of series: the FOB value of trade in USD and the physical volume of trade measured in quantities of exported products. We exclude exports of commodities, i.e. of oil, metals and minerals, since they are concentrated in a few firms, typically priced in global markets, and often financed through specialized instruments distinct from the firm-level credit relationships we study. In addition, their export values display strong seasonal patterns that are less informative for identifying firm-specific supply chain and financing responses.[11] Across the main specifications, we also exclude Colombian exports to China from the estimation sample, as these may have been influenced by Chinese retaliatory tariffs (an aspect we explore in detail below). Eventually, we collapse trade data at the HS 6-digit level, which allows us to link Colombian custom data with the information on US tariffs (explained in detail in the next paragraph).[12]

The original custom data sample covers data on more than 23,000 firms' exports of roughly 3,800 (non-commodity) HS-6 products to about 200 destination countries. Since we apply a demanding empirical model, including a rich set of fixed effects (see section 2), our sample is smaller and comprises 2,608 firms, exporting 1,658 HS-6 products to 169 destination countries. Our sample covers more than 90% of aggregate non-commodity exports, as clearly seen in Figure A.1, reflecting a notable degree of concentration in Colombian exports in a

[11] Export of non-commodity goods account for about 60% of total Colombian exports, as evident from the red dashed line connected by triangles in Figure A.1.

[12] The first 6 digits of the HS code are comparable across countries. Subsequent digits may in general vary across countries.

subset of firms (those included in the sample).

We merge this trade repository with information on US and Chinese tariffs imposed after 2018. As in Fajgelbaum et al. (2020), we exploit information on US import tariffs publicly available from the US International Trade Commission (USITC). Before 2018, the USITC would release annual baseline tariff schedules in January, with revisions in July. However, in 2018, due to a rapid succession of tariff increases, the USITC issued 14 revisions. These tariff increases were primarily applied at the eight-digit level of the Harmonized System (HS). We collapse tariff data at the HS 6-digit level in order to merge them with custom data on exports.[13]

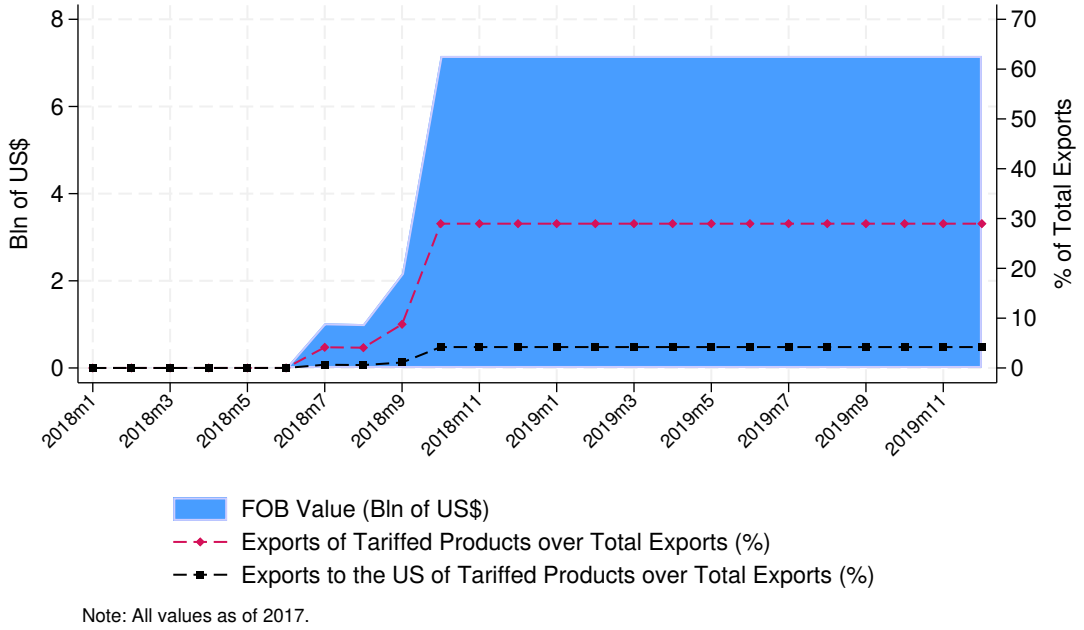
In total, 2,893 products became subject to US tariffs on imports from China during 2018-2019. Figure 2 shows the relevance of such tariffs for Colombian exports, as the waves of tariffs were implemented in 2018 and 2019. By October 2018 (the month of the last round of tariffs imposed by the US), the cumulative value of Colombian exports of non-commodity goods subject to US tariffs amounted to nearly $6 billion, that is, 30% of total exports of non-commodity goods. Colombian exports to the US of such affected products represent 4% of total exports of non-commodity goods.[14]

We also gather information on retaliatory tariffs imposed on US exports from the World Trade Organization (WTO), again following Fajgelbaum et al. (2020). These retaliatory tariffs are also ad valorem and took effect shortly after their announcement dates. We construct the retaliatory tariffs by combining the Most Favored Nation (MFN) tariff rates from the annual WTO database with the announced tariff rate changes. For each country-product combination,

[13]In practice, we start by defining a dummy with value 1 if the HS 8-digit product is subject to US tariffs. Next, within HS 6-digit products, we apply the maximum value of the dummy across all corresponding values of the associated HS 8-digit products. This procedure entails very little loss of information. Indeed, 94% of the HS 6-digit products covered in our estimation sample do not display any tariff heterogeneity across the associated HS 8-digit products.

[14]Since 2012, Colombia has a free trade agreement -TLC- with the US that promotes preferential access to both markets. The proclamation authorized changes in the U.S. Harmonized Tariff Schedule and Rules of Origin. See https://www.trade.gov/colombia-free-trade-agreement

Figure 2: Value of Colombian exports subject to US tariffs on imports from China

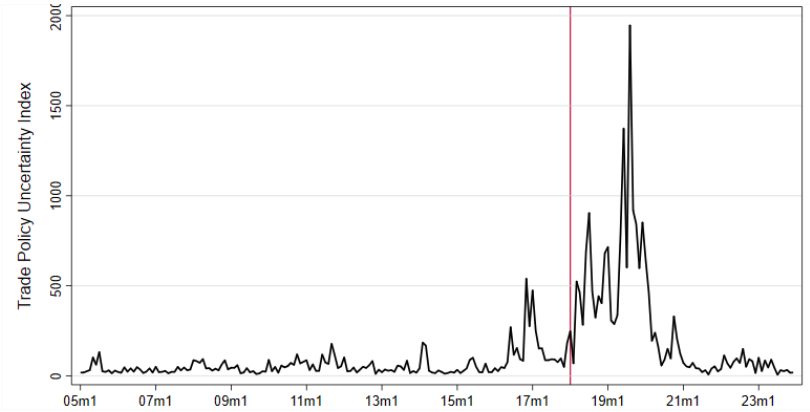


Notes: This figure reports the sum of the value of Colombian exports of goods subject to US tariffs on imports from China. Export values are taken as the total annual value for 2017, the last year prior to the introduction of tariffs. The blue area reports the total value of Colombian exports of non-commodity products subject to US tariffs in billions of USD. The red dotted line rescales such value by the aggregate value of Colombian exports of non-commodity goods. The black dotted line depicts the ratio between Colombian exports to the US of affected non-commodity goods and the aggregate value of Colombian exports of non-commodity goods.

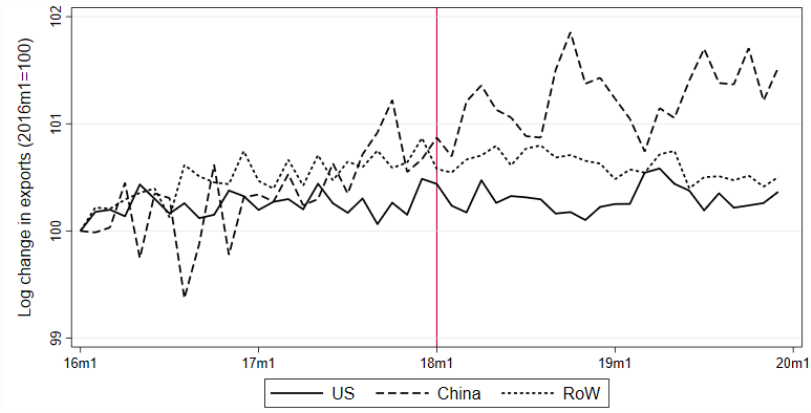
we calculated the retaliatory tariff rate by adding the MFN rate to the announced tariff rate change. We measure export tariffs at the HS6 level in line with the procedure applied to exports.

In Figure 3 we report the evolution of the Trade Policy Uncertainty Index (EPUTRADE) produced by Baker et al. (2025) from 2005 through 2023 (Panel a) and the log change in aggregate exports from Colombia to the US, China, and the rest of the world (RoW, Panel b). Panel (a) highlights a significant increase in trade policy uncertainty globally, starting in January 2018, in conjunction with the increase in tariffs. This figure supports our identification approach of exploiting product-specific exposures to US-imposed tariffs that materialize over this time window. Panel (b) shows that exports to the US and China – Colombia's two main trade partners – increased throughout our sample period starting in 2016Q1, although

Figure 3: Trade policy shocks and exports



(a) Trade Policy Uncertainty Index



(b) Colombian exports by destination (2016m1=100)

Notes: In this figure, Panel (a) illustrates the time series of the Baker et al. (2025) Trade Policy Uncertainty Index (EPUTRADE) from 2005 through 2023. Panel (b) shows the log change in total exports to the US, China, and the rest of the world (RoW) vis-á-vis 2016M1, the first observation in our sample. The vertical lines is set at 2018M1, the month in which newly-imposed tariffs start being in implemented in the US

following different patterns.

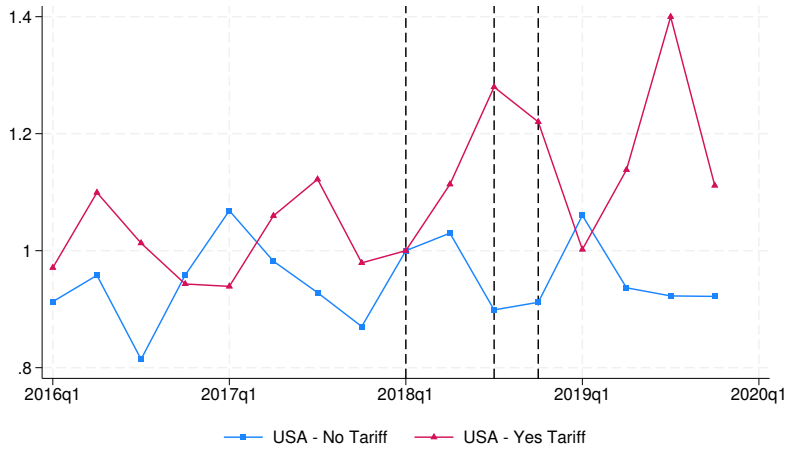
While exports to China increased significantly, with large peaks after 2018, monthly exports to the US remained slightly above 2016 figures. Similarly, Table 1 shows that exports to the US of products subject to tariffs increased significantly more than exports of non-tariff products. Furthermore, the growth rate was higher for products exported to the US than for products exported to the rest of the world. The identification approach outlined in Section 2 seeks to unravel a possible divergence trend between exports to the US in product categories affected by newly imposed tariffs and those not affected.

Table 1: Ex-post % growth of Colombian exports by product categories and destination

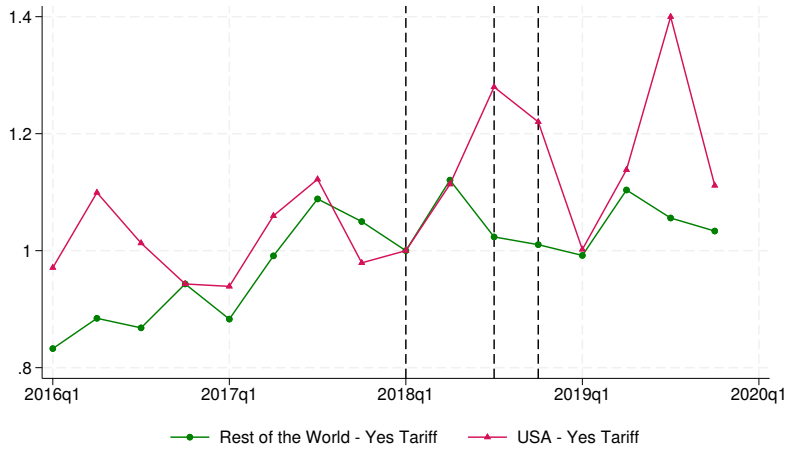
Product Category	(1) Tariff US	(2) NoTariff US	(3) Tariff RoW	(4) NonTariff RoW
Footwear / Headgear	120.5	-2.7	3.8	-9.1
Metals	97.2	15.9	-0.1	40.7
Wood & Wood Products	66.6	-8.0	0.6	4.3
Plastics & Rubbers	24.0	-24.1	5.2	-21.2
Miscellaneous	21.4	9.9	5.8	0.9
Transportation	19.6	26.6	81.1	-92.6
Animal Products	19.0	-35.3	-1.3	4.5
Foodstuff	16.5	-1.4	-8.3	-8.9
Textiles	12.6	-1.9	-1.9	-0.7
Machinery / Electrical	8.3	-53.9	-10.8	-11.9
Raw Hides, Skins, Leather & Furs	-0.5	-96.3	-38.6	-64.6
Chemicals & Allied Industries	-7.3	-37.4	-3.8	-17.1
Vegetable Products	-12.6	-6.4	-3.6	-8.0
Stone / Glass	-42.2	-29.4	32.7	-4.8
Mineral Products	-51.4	-76.5	-5.0	75.2
t-test (Tariff US $\neq$ X)	-	3.89***	1.15	1.73*

Note: the table reports the % growth of aggregate exports in the trade-tensions period (Feb-2018 to Dic-2019) as opposed to the pre trade-tensions period (Jan-2016 to Jan-2018) for different product categories (HS Sections). In column 1, we report the growth of exports to the US of products subject to tariffs. In column 2, we report the growth of exports to the US of products not subject to tariffs. In column 3, we report the growth of exports to the Rest of the World (RoW) of products subject to tariffs. In column 4, we report the growth of exports to the Rest of the World (RoW) of products not subject to tariffs. The last row reports the t-statistic associated with a t-test in which the null hypothesis is that the average growth of exports to the US of products subject to tariffs is equal to the growth of other exports, as indicated respectively in columns 2, 3 and 4. ***, $p < 0.01$; **, $p < 0.05$; *, $p < 0.1$.

Figure 4: Tariffs and Colombian exports



(a) Colombian exports to the US of products subject to tariffs (Yes Tariff) and of exempted products (No Tariff)



(b) Colombian exports of products subject to tariffs to the US and to the rest of the world

This figure illustrates the the quarterly volumes (in USD bill.) of Colombian exports (excluding oil, minerals and metals). Panel A represents Colombian exports to the US, distinguishing product categories that were affected by US tariffs against Chinese imports, versus product categories that were not. Panel B represents Colombian exports of product categories that were affected by US tariffs against Chinese imports, distinguishing by destination (US versus rest of the world). The dotted vertical lines denote quarters when US tariffs were raised. Export volumes are normalized so to be equal to 1 in 2018Q1. The series are constructed with data from the Colombian DANE and from the US International Trade Commission.

Figure 4 presents the quarterly evolution of Colombian export volumes (in USD billions), distinguishing between product categories that were eventually targeted by US tariffs on Chinese imports and those that were not. Panel (a) focuses on exports to the US and

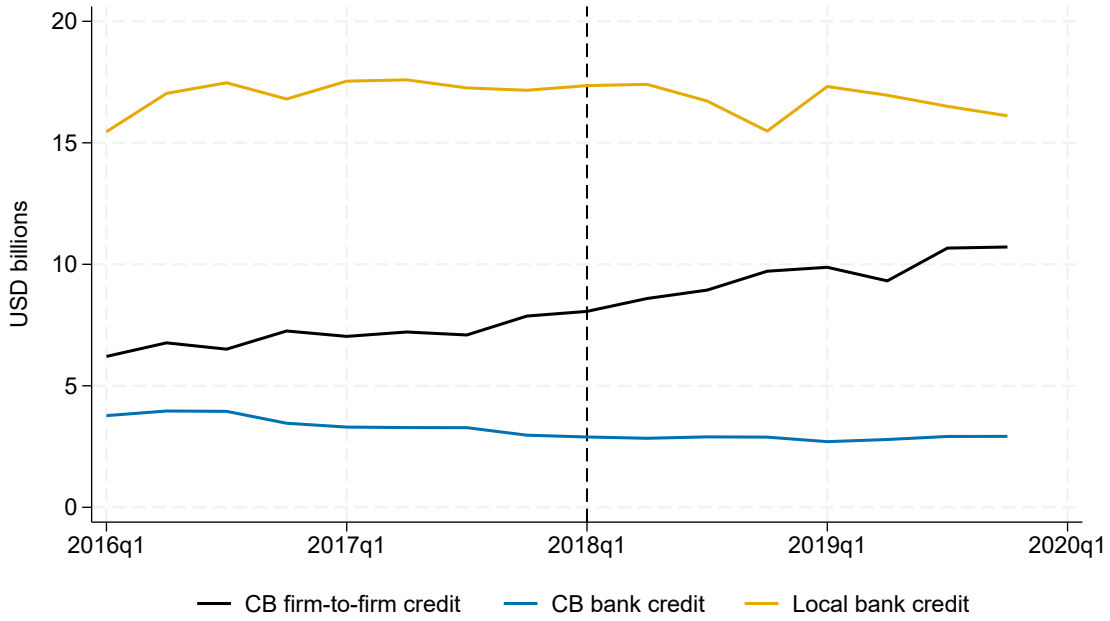
reveals a marked increase in the volume of affected products relative to exempt categories following the introduction of tariffs in 2018Q1. Prior to this period, the export trajectories of both groups followed similar trends, lending credibility to a parallel trends assumption. To assess whether this shift reflects tariff-induced demand or broader product-specific shocks, Panel (b) compares export volumes of affected products to the US versus other destinations. The divergence is clear: post-2018Q2, exports of tariffed products to the US accelerate significantly, while those to non-US markets remain comparatively flat. We next examine whether these dynamics persist in a difference-in-differences framework that accounts for potential confounders.

3.2 Domestic and cross-border credit register data

To examine how trade tensions influenced exporters' financing, we use quarterly data from Colombia's credit registry, compiled by the Financial Supervisory Authority and used by the Central Bank of Colombia for credit market surveillance. The dataset covers the universe of loans issued by 28 commercial banks, detailing loan amounts, interest rates, and maturities (see Morales et al., 2022 for details on the evolution of corporate credit in Colombia and banking sector developments). For consistency across specifications, we aggregate all variables to the quarterly level. Our sample focuses on firms with total assets exceeding COP 1,000 million (approximately USD 240,000 as of July 2025), resulting in 153,166 domestic loans extended to 19,227 firms between 2016 and 2019.

A central contribution of this paper is the use of novel data on firms' access to cross-border financing, particularly from unaffiliated foreign non-financial firms. We exploit a confidential dataset maintained by the Central Bank of Colombia that records the universe of cross-border loans to Colombian firms that includes 13,860 loans from 210 foreign banks and 45,090 loans from 4,730 non-financial firms across 90 jurisdictions. For our main analysis, we use information between 2016 and 2019. Crucially, these data also identify the stated purpose of each loan – such as export pre-financing or working capital – which allows us

Figure 5: Credit volumes by lending source



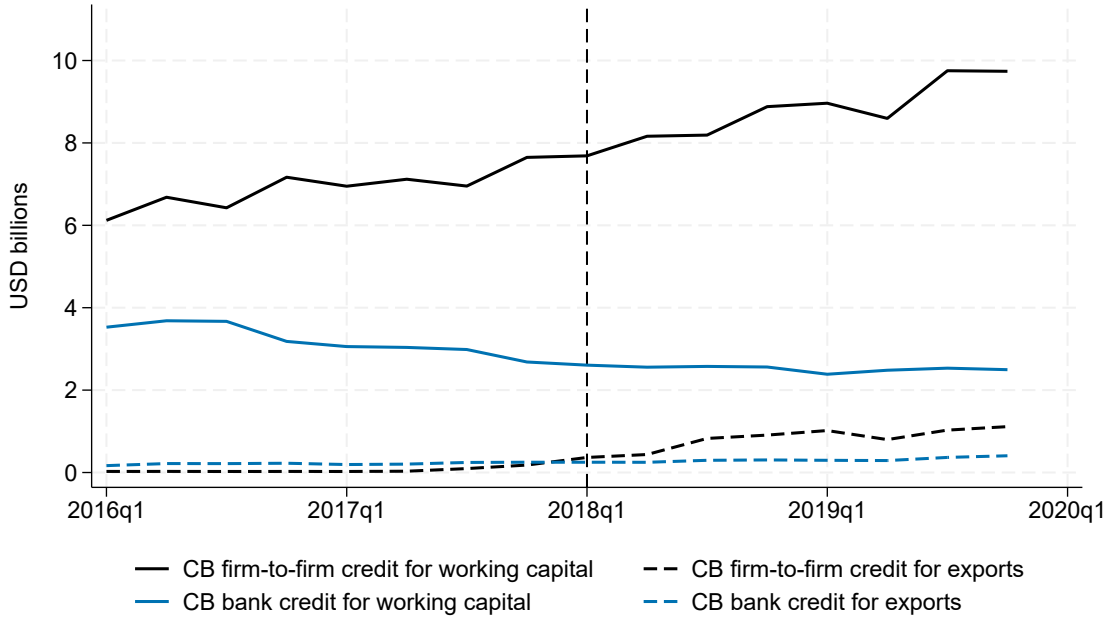
Notes: This figure reports the volumes of outstanding credit – in USD billions – as reported by borrowing firms according to the lending source. Lending sources include cross-border bank credit (blue line), firm-to-firm cross-border unaffiliated credit (black line), and credit vis-á-vis local banks in Colombia (yellow line). Borrower-level data is collected from credit registries from the Central Bank of Colombia. While the series of cross border bank and firm-to-firm credit are reported in USD millions, the series for local credit is transformed from the original series in Colombian Peso using end-of-quarter nominal exchange rates reported by the Central Bank of Colombia. The series span from 2016Q1 through 2019Q4 and capture credit volumes reported by the ∼19,200 Colombian firms engaging in foreign trade used across the specifications.

to isolate credit directly supporting export activities. Our analysis focuses on loans from non-affiliated foreign entities designated for these purposes. [15]

We refer to cross-border loans originating in non-financial firms as "firm-to-firm loans" rather than "trade credit" to reflect their long maturities, formal loan terms, and use for financing export expansion and sustained working capital needs. This distinguishes them from conventional cash-in-advance trade credit (invoice-based), which typically spans only 30–180 days (see Love et al., 2007; Jones, 2010; Committee on the Global Financial System, 2014) and is tied to specific transactions. Firm-to-firm loans more closely resemble bank

[15]This information is collected by the central bank to calculate Colombia's external debt statistics. More information can be found here (in Spanish): Banco de la República: Compendio de normas de cambios internacionales, Capítulo 5 and Guia metodológica de la deuda external de Colombia.

Figure 6: Cross border credit by type of lender and loan purpose



Notes: This figures reports the volumes of cross border credit – in USD billions – as reported by borrowing firms according to the lending source and purpose. Lending sources include cross-border bank credit and firm-to-firm cross-border credit granted to finance working capital and exports. Borrower-level data is collected from credit registries from the Central Bank of Colombia. The series span from 2016Q1 through 2019Q4 and capture credit volumes reported by the ∼19,200 Colombian firms engaging in foreign trade used across the specifications.

credit in both size and maturity (averaging 22 months and USD 83,000, respectively), and are predominantly earmarked to finance exports and working capital. This form of financing can emerge in global supply chains where inter-firm ties involve relational contracting and trust, which can be leveraged into financing (see Antràs and Foley, 2015) - particularly when banks remain cautious during periods of trade uncertainty.

Using firm-level tax identifiers, we merge the exposure measure from Eq. 2 –constructed from customs data – with loan-level records from both the domestic credit registry and the cross-border financing dataset. In total, 2,516 Colombian firms receive cross-border loans from foreign banks, while 5,200 firms access credit from unaffiliated foreign non-financial firms via firm-to-firm cross-border credit. Figure 5 plots quarterly credit outstanding (in USD billions) by source. Notably, cross-border firm-to-firm credit approaches the scale of domestic bank

lending over the sample period and significantly exceeds cross-border bank credit. Beginning in 2018, we observe a marked rise in cross-border firm-to-firm credit alongside a decline in cross-border bank lending, set against a general expansion in overall credit volumes.

Figure 6 shows the evolution of cross-border credit by lender and loan purpose. We observe that most of the cross-border bank and firm-to-firm credit is used to finance working capital, with a smaller fraction used to pre-finance exports. The evolution of these series mimics the patterns observed for the overall volume of credit, with cross-border firm-to-firm credit for working capital increasing materially after 2018, while bank credit gradually declines. Notably, after 2018Q1, cross-border credit for exports from both types of lenders increased rapidly, but credit growth from foreign firms outpaced that coming from foreign banks. In Section 4.2, we explore whether these changing patterns can be associated with exporting firms' exposure to trade tensions, as outlined above.

3.3 Trade and credit matched sample

Table 2 reports summary statistics for our working matched sample, including our main variables of interest outlined in Section 2. We distinguish between trade variables, variables capturing firms' exposure to trade tensions abroad, and credit variables. The final working sample consists of 624,362 observations in the baseline trade specification. We provide a definition for each variable that specifies the data sources in the Online Appendix (see Table A.1).

The table compares lending terms across the three credit types in our dataset. As expected, cross-border bank and firm-to-firm credit exhibit substantially lower average and median interest rates, consistent with foreign lenders' access to more liquid capital markets. Interestingly, the average maturity of cross-border firm-to-firm credit is around 1.8 years, significantly longer than both domestic and cross-border bank loans, and far exceeding the typical duration of trade credit used for single transactions. This underscores a largely

Table 2: Descriptive statistics

	(1) Mean	(2) Std. Dev.	(3) Min.	(4) Max.
Trade variables				
$Exports_{f,p,c,t}$	117,216	1.158e+06	0.01000	2.436e+08
$Ln(Exports)_{f,p,c,t}$	8.537	2.684	-4.605	19.31
$Ln(Q)$	6.641	3.256	-4.605	20.42
USA_c	0.0862	0.281	0	1
$Post_{p,t}$	0.399	0.490	0	1
$\Delta\tau_p$	-0.0408	0.0722	-0.100	0.200
Firms-level variables				
$Ln(Expo)_{f,t}$	10.64	2.232	-4.605	20.08
$Post_t$	0.465	0.499	0	1
$Exposure^{Total}$	0.542	0.465	0	1
$Exposure^{US}$	0.0961	0.254	0	1
$Exposure^{RoW}$	0.446	0.453	0	1
Credit variables				
Ln(Domestic loans, COP)	17.34	2.70	10.23	22.43
Ln(Cross-border bank credit, USD)	12.53	2.03	7.84	17.03
Ln(Cross-border firm-to-firm credit, USD)	11.33	2.00	7.54	16.03
Loan rate (Domestic loans)	14.61	8.56	2.54	32.88
Loan rate (Cross-border bank credit)	3.15	2.29	2.36	9.11
Loan rate (Cross-border firm-to-firm credit)	2.99	3.67	2.68	12.34
Maturity (Domestic loans, years)	1.73	1.45	0.52	4.78
Maturity (Cross-border bank credit, years)	1.12	1.37	0.41	2.46
Maturity (Cross-border firm-to-firm credit, years)	1.84	1.75	0.57	3.24

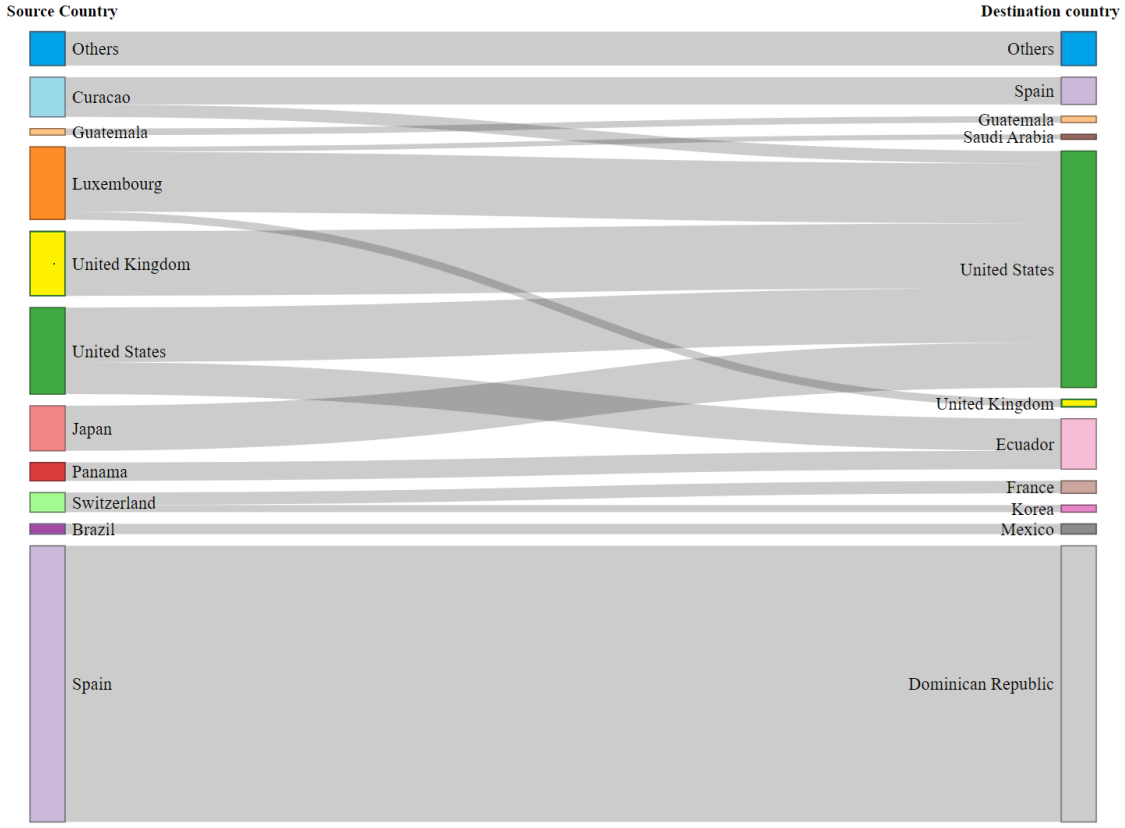
Notes: This table reports the summary statistics for the working sample. Variables definitions are reported in Table A.1. Cols. 1 to 4 report the mean, the standard deviation (S.d.), the minimum and maximum values. Interest rates for cross-border bank credit and firm-to-firm credit are defined as the spread between loan-level interest rates and a benchmark interest rate.

overlooked dimension of trade financing: long-term firm-to-firm credit supporting production scaling, rather than just shipment-level liquidity.

We then use the matched dataset to identify the intensity and geographical connections in the exports-credit relationship. Figure 7 reports the main source country of credit (left axis) and the main destination country of exports (right axis) for firms using cross-border firm-to-firm credit for exports in 2017Q4 (in USD millions). The figure shows that before the US-China trade tensions escalated, non-financial firms located in Luxembourg, the US, and the UK were the most important providers of firm-to-firm credit for Colombian firms exporting to the US as their main destination. The relationship between firm-to-firm credit financing from Spain for exports to Dominican Republic was also dominant in that period.

Figure 8 illustrates a shift in the geographic composition of firm-to-firm credit providers to Colombian firms exporting to the US during the US-China trade tensions. Notably, Panama –an international financial hub – emerged as a key provider, while the relative importance of

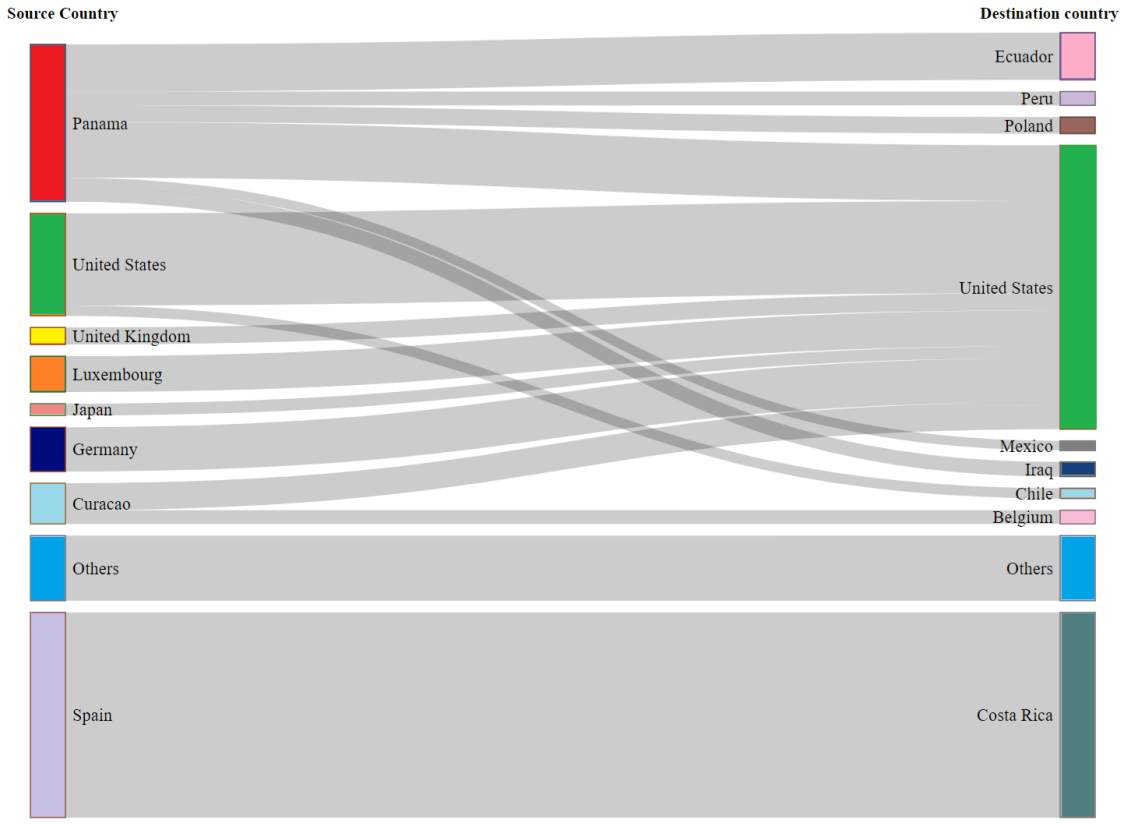
Figure 7: Cross border firm-to-firm credit for exports and destination of exports (2017Q4)



Notes: This figure shows the relationship between the main source of cross-border firm-to-firm credit for exports (country of origin, left axis) and the main export destination of firms (right axis) for 2017Q4 (ex-ante). Firms are grouped by source of financing and export destination, that is, the amounts of credit received by firms with the same source and the same export destination are grouped in this relationship. The figure shows the grouped amounts of the relationship on the financing side (in USD millions). It shows the intensity of the relationship between external financing and export destination.

UK and Luxembourg-based lenders declined. A similar reallocation is observed in the volume of cross-border firm-to-firm credit for export and working capital purposes (see Appendix Figures A.2 and A.3). In contrast, cross-border bank credit remains concentrated, with a smaller number of countries – primarily the US – providing the bulk of loans for working capital (see Appendix Figures A.4 and A.5). These patterns suggest a reconfiguration of cross-border financing relationships supporting exports to the US.

Figure 8: Cross border firm-to-firm credit for exports and destination of exports (2019Q4)



Notes: This figure shows the relationship between the main source of cross-border firm-to-firm credit for exports (country of origin, left axis) and the main export destination of firms (right axis) for 2019Q4 (ex-post). Firms are grouped by source of financing and export destination, that is, the amounts of credit received by firms with the same source and the same export destination are grouped in this relationship. The figure shows the grouped amounts of the relationship on the financing side (in USD millions). It shows the intensity of the relationship between external financing and export destination.

4 Results

4.1 Trade tensions and exports

Table 3 presents our baseline export results from estimating Equation 1. Column (1) reports the coefficient on the interaction term between the product-specific *Post* indicator and the *US* dummy, which captures the relative change in the log value of tariff-affected products to the US after 2018, compared to the same products exported to other destinations within the same firm. The estimated coefficient reflects a differential growth rate in exports to the US of 6.2 percentage points, conditional on firm-product-country, firm-product-time and

Table 3: Product-level effect of US tariffs on Colombian exports

	(1)	(2)	(3)	(4)	(5)	(6)
	Ln(Exp. value, fob)			Ln(Exp. volume, quant.)		
$Post * US$	0.0623*	0.0556	0.0582	0.0852**	0.0888**	0.0366
	(0.0346)	(0.0360)	(0.0389)	(0.0354)	(0.0386)	(0.0418)
$Post * US * \Delta\tilde{\tau}$		0.222			-0.117	
		(0.414)			(0.360)	
$Post * US * Intermediate$			0.00861			0.103**
			(0.0500)			(0.0488)
Firm*Product*Country FE	Yes	Yes	Yes	Yes	Yes	Yes
Firm*Product*Time FE	Yes	Yes	Yes	Yes	Yes	Yes
Country*Time FE	Yes	Yes	Yes	Yes	Yes	Yes
N	594595	594595	594595	594595	594595	594595
R^2	0.889	0.889	0.889	0.878	0.878	0.878

Notes: This table reports the results of estimating Eq. 1. The table shows results with the dependent variable defined as the log of the value of exports (cols. 1 to 3) or as the log of the volume of exports in tons. (cols. 4 to 6). The variable $\Delta\tilde{\tau}$ measures the quarterly change in a product-specific tariff minus the minimum change across product categories. The variable *Intermediate* represents a dummy equal to one if a product is labeled as an intermediate good and zero otherwise. All constitutive terms of the interaction terms are included as individual variables but excluded when subsumed by the fixed effects structure. All specifications include a complete set of fixed effects specified in Eq. 1: firm, product, country; firm, product, quarter; and country, quarter. Standard errors (in parentheses) are double clustered at the product and country levels. The sample period spans from 2016Q1 through 2019Q4 with the variable *Post* identifying the quarters after 2018Q1. *** p<0.01, ** p<0.05, * p<0.1.

destination-time fixed effects. This is a sizable effect considering that over the sample period, exports from Colombia to the US grew by aprox. 20% (and 28% to the world).[16] This result suggests that Colombian firms reallocated export volumes of affected products to the US, consistent with demand substitution effects triggered by the trade war.

In Column (4) we replicate the specification using the log volume of exports (in tons) as the dependent variable. We find that export quantities of affected products to the US rise by 8.5 percentage points more relative to the pre-period compared to other destinations within an average exporting firm. In Columns (2) and (5), we examine whether the magnitude of tariff increases matters by interacting our main variable with $\Delta\tilde{\tau}$, the change in product-specific

[16]This effect corresponds to approximately 4.4% of the within-sample standard deviation in log export changes at the firm-product-destination-month level (SD $\approx$ 1.42).

US tariffs net of the minimum change across products. The estimated coefficient is positive in Column (2) but not statistically significant, suggesting only a weak link between the size of the tariff hike and export growth. In Columns (3) and (6), we test for heterogeneity by product type, interacting our main variable with an indicator for intermediate goods. Results indicate that the increase in exports is concentrated in intermediate goods, particularly in quantities. This supports the view that Colombian firms helped fill the gaps in US supply chains disrupted by the trade war, especially in upstream segments.

Table A.2 in the Online Appendix shows estimates from otherwise identical models, though looking at the relative effect of retaliatory tariffs on Colombian exports to China.[17] The results suggest that Colombian firms over-proportionally increase their exports to China in affected product categories after retaliatory tariffs are implemented. Interestingly, we find that this effect is stronger for final goods – and has the opposite sign for intermediate goods – in line with the different nature and scope of tariffs implemented in the US and China.

Next, we use Eq. 4 to estimate the aggregate impact of firms' exposures on their total export values. To this end, we rely on Eqs. 2 and 3 to define firms' pre-determined exposure to product categories that eventually became affected by tariffs. Recall that in this specification, the variable *Post* is defined equally for all firms as a dummy that equals one in the period after 2018Q1 and zero otherwise. Our results are reported in Table 4. First, we find that, on average, firms increased their exports after the cutoff date by aprox. 8.9 p.p. with respect to the previous period (Column 1).

However, this average effect masks a surprising heterogeneity across firms depending on their ex-ante exposure to trade tensions. First, we find in Column (2) that the increase in exports is aprox. 2 p.p. larger (at 10.2 p.p.) for a firm with a one standard deviation larger US exposure (as defined by Eq. 3). Notably, Column (3) shows that this differential effect does not arise for firms with a relatively large exposure to other countries (rest of the world,

[17] In this case, the estimation sample excludes Colombian exports to the US.

Table 4: Firm-level effects of US tariffs on Colombian exports

	(1)	(2)	(3)	(4)	(5)
	Ln(Exp. value, fob)				
$Post_t$	0.0890***	0.0829***	0.0811***	0.0695***	0.0696***
	(0.0175)	(0.0180)	(0.0204)	(0.0216)	(0.0216)
$Post_t * Exposure^{US}$		0.0740*		0.0874**	
		(0.0389)		(0.0407)	
$Post_t * Exposure^{RoW}$			0.0209	0.0324	
			(0.0227)	(0.0237)	
$Post_{f,t} * Exposure^{Total}$					0.0421*
					(0.0227)
Firm FE	Yes	Yes	Yes	Yes	Yes
Time FE	Yes	Yes	Yes	Yes	Yes
N	151890	151890	151890	151890	151890
R^2	0.754	0.754	0.754	0.754	0.754

Notes: This table reports the results of estimating Eq. 4. The table shows results with the dependent variable defined as the log of the value of exports (fob). All constitutive terms of the interaction terms are included as individual variables but excluded when subsumed by the fixed effects structure. All specifications include a complete set of fixed effects specified in Eq. 4, i.e., firm and quarter fixed effects. Standard errors (in parentheses) are clustered at the firm level. The sample period spans from 2016Q1 through 2019Q4 with the variable *Post* identifying the quarters after 2018Q1. *** p<0.01, ** p<0.05, * p<0.1.

RoW). Hence, those firms with pre-dated trade links with the US in product categories that became affected by tariffs are those grasping the benefits of a reallocation in global supply chains the most. This conclusion remains in place when controlling simultaneously for US and RoW exposures, as reported in Column (4). Finally, using firms' total exposure as defined by Eq. 2, we find that overall, firms with a larger pre-dated exposure to affected goods where the ones that eventually increased their export value the most (Column 5).

We further investigate whether the export expansion associated with the tariffs reflects a potential triangulation mechanism in which Colombian firms simply intermediate US imports from China. This would imply that Colombian firms increase imports from China of goods subject to US tariffs after the policy shocks. Table 5 shows that this is not the case. We use a model otherwise identical to that in equation 1, though with log imports as dependent variable

Table 5: Firm-level effects of US tariffs on Colombian imports from China

	(1)	(2)
	Ln(Imports)	
Post*China	-0.0360	-0.0384
	(0.0388)	(0.0412)
Post*China*Exposed	0.0278	
	(0.0325)	
Post*China*Exposure^{US}		0.00350
		(0.0716)
Post*China*Exposure^{RoW}		0.0352
		(0.0388)
Firm*Product*Country FE	Yes	Yes
Firm*Product*Time FE	Yes	Yes
Country*Time	Yes	Yes
N	406153	406153
R^2	0.882	0.882

Notes: This table reports the results of estimating Eq. 1 for imports. We estimate the effect of US tariffs on Colombian imports from China, depending on whether firms ex-ante produce products subject to US tariffs or to continues proxies of ex-ante US and Rest-of-the-World. Standard errors double clustered at the product and origin-country level. *** p<0.01, ** p<0.05, * p<0.1.

and exploiting the interaction term between the usual $Post_{p,t}$ dummy for product-specific US tariffs on Chinese imports and $China_c$, a further dummy variable with value 1 if the origin country of a given import transaction is China. Evidently, the coefficient loading such interaction is not statistically significant and slightly negative in both columns (1) and (2). Moreover, the effect is not statistically different from 0 also for firms with positive ex-ante exposure (Column 1) or with higher levels or with higher ex-ante US or rest of the world exposure (Column 2).

We conclude this section exploring whether the observed export growth is accompanied by real economic adjustment, testing whether firms exposed to the US tariff shocks increased their investment and working capital accordingly. We use this step to verify whether the export response documented above reflects an actual expansion of productive capacity – as opposed to mere trade diversion or intermediation. Exporting at scale typically requires capital-intensive adjustments, particularly when firms are absorbing US demand previously

Table 6: Firm-level exposure to US tariffs shocks, investment and working capital

	(1)	(2)	(3)	(4)	(5)	(6)
	Ln(Investment)			Ln(Working Capital)		
$Post * Exposure^{US}$	0.071***	0.063***	0.062***	0.091**	0.089**	0.077**
	(0.024)	(0.021)	(0.018)	(0.044)	(0.042)	(0.040)
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes
Industry*Time FE	No	Yes	Yes	No	Yes	Yes
Location*Time FE	No	No	Yes	No	No	Yes
N	21237	21237	21237	21237	21237	21237
R^2	0.73	0.77	0.77	0.69	0.71	0.73

Notes: This table reports the results of estimating Eq. 4, with either log investment (columns 1 to 3) or log working capital (columns 4 to 6) as dependent variables. All constitutive terms of the interaction terms are included as individual variables but excluded when subsumed by the fixed effects structure. Standard errors (in parentheses) are clustered at the firm level. The sample period spans from 2016Q1 through 2019Q4 with the variable *Post* identifying the quarters after 2018Q1. *** p<0.01, ** p<0.05, * p<0.1.

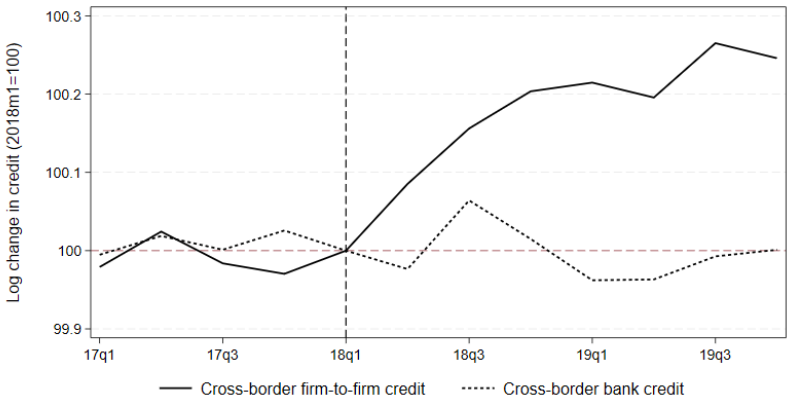
served by other foreign suppliers. An increase in investment and working capital would therefore provide direct evidence of a supply-side response and, in turn, help motivate the need for external financing documented in the next section.

Table 6 presents strong evidence in support of this hypothesis. On average, firms with a one standard deviation higher exposure to tariff-affected products exhibit an increase in investment that is 2.9 p.p. larger. Similarly, firms working capital increases by 3.6 p.p. more for firms in a one standard deviation larger exposure. These results confirm that trade exposure translated into expanded production capacity at the firm level, in line with the mechanism proposed in our framework.

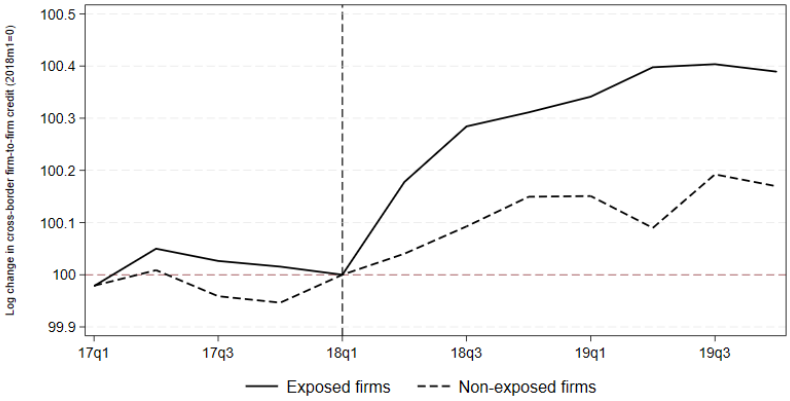
4.2 The effect of trade tensions on credit

A visual inspection of the aggregated credit time series lends support to the notion that firm-to-firm credit was particularly stable after 2018Q1 compared to cross-border bank credit. Figure 9 depicts the series for both sources of funding measured as log changes vis-á-vis 2018Q1. The figure shows that while both sources of cross-border funding followed

Figure 9: Cross-border credit time series



(a) Cross-border credit by source (2018Q1=100)



(b) Firm-to-firm credit by firms' exposure (2018Q1=100)

Notes: In this figure, Panel (a) illustrates the time series of log changes in aggregate unaffiliated firm-to-firm credit and cross-border bank credit vis-á-vis 2018Q1 for the universe of firms in the working sample. Panel (b) reports the log change in aggregate unaffiliated firm-to-firm credit for the groups of exposed vs. non-exposed firms, as defined by Eq. 3. The vertical lines is set at 2018Q1, the quarter in which newly-imposed tariffs start being in implemented in the US.

a downward trend during 2017, after 2018Q1 firm-to-firm credit stabilizes and cross-border bank credit shrinks. Figure 9(b) shows that exposed firms are more likely benefiting from stable firm-to-firm credit flows. When plotting the growth rate of firm-to-firm credit – as log changes vis-á-vis 2018Q1 – for exposed vs. non-exposed firms, we find that the former firms report an increase in firm-to-firm credit volumes compared to a decrease in firm-to-firm credit reported by non-exposed firms.

Tables 7 through 12 present our main credit results. We begin with domestic bank

Table 7: Effect of firms' exposure to trade tensions on local credit

Dependent variable:	Log (Credit, COP)		Interest rate (%)		Log (Maturity, years)	
	(1)	(2)	(3)	(4)	(5)	(6)
$Post * Exposure^{US}$	0.073**	0.069**	-0.542***	-0.538**	0.132***	0.141***
	(0.031)	(0.036)	(0.019)	(0.017)	(0.019)	(0.017)
N	334765	334765	334765	334765	334765	334765
R2	0.805	0.817	0.802	0.816	0.765	0.779
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes
Firm-lender FE	Yes	Yes	Yes	Yes	Yes	Yes
Industry-time FE	No	Yes	No	Yes	No	Yes
Lender-time FE	Yes	Yes	Yes	Yes	Yes	Yes

Notes: This table reports the results of estimating Eq. 5 for local credit. We estimate the effect of firms' exposure to trade tensions on the log of credit volumes, interest rates (in pp), and log of maturity (years). The estimations are based on loan-level data for the period between 2016 and 2019. Standard errors (in parentheses) are clustered at the firm level. *** p<0.01, ** p<0.05, * p<0.1. Variables' definitions are reported in Table A.1.

lending (Table 7), where we observe that credit volumes to exposed firms increased by 7 percentage points more than for non-exposed firms after 2018Q1. Strikingly, this expansion in credit is accompanied by a decline in borrowing costs: interest rates fell by approximately 54 basis points for exposed firms relative to others (Col. 4). This pattern contrasts with the standard prediction that rising credit demand -— such as that induced by export growth – should tighten lending terms, resulting in higher rates. Instead, our findings suggest that lenders may have perceived exposed firms as more creditworthy due to stronger growth prospects, leading to improved credit terms despite increased borrowing. This easing of credit conditions supports the interpretation of the trade shock as generating a positive firm-level demand shock met by an accommodating financial supply response.

In addition to higher credit volumes and lower interest rates, we also find that loans to exposed firms exhibit significantly longer maturities, which increase by approximately 13 to 14 p.p. more compared to non-exposed firms (Cols. 5-6). This extension of loan terms further supports the notion that firms respond to export opportunities not only by

Table 8: Effect of firms' exposure to trade tensions on local credit in FX

Dependent variable:	Log (Credit, COP)		Interest rate (%)		Log (Maturity, years)	
	(1)	(2)	(3)	(4)	(5)	(6)
$Post * Exposure^{US}$	0.026**	0.029**	0.731***	0.826**	0.112***	0.123***
	(0.014)	(0.013)	(0.022)	(0.023)	(0.012)	(0.015)
N	36517	36517	36517	36517	36517	36517
R2	0.65	0.67	0.71	0.72	0.67	0.69
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes
Firm-lender FE	Yes	Yes	Yes	Yes	Yes	Yes
Industry-time FE	No	Yes	No	Yes	No	Yes
Lender-time FE	Yes	Yes	Yes	Yes	Yes	Yes

Notes: This table reports the results of estimating Eq. 5 for local credit in foreign currency. We estimate the effect of firms' exposure to trade tensions on the log of credit volumes, interest rates (in pp), and log of maturity (years). The estimations are based on loan-level data for the period between 2016 and 2019. Standard errors (in parentheses) are clustered at the firm level. *** p<0.01, ** p<0.05, * p<0.1. Variables' definitions are reported in Table A.1.

borrowing more, but also by securing financing better suited for capacity expansion. Longer maturities are typically associated with investment-related credit, suggesting that domestic banks accommodate firms' needs to scale production in response to reconfigured global demand. Given an average loan maturity of 20 months in domestic bank credit, the estimated 14 p.p. differential effect implies that loans to exposed firms were, on average, extended by approximately 3 additional months compared to non-exposed firms.

We recall that these findings survive regardless of the inclusion of lender-time (Col. 1) and industry-time (Col. 2) fixed effects. Thus, improved credit conditions should not be attributed to unobserved macro or industry-specific shocks; neither should the results be attributed to an endogenous match between banks and exposed firms or to an overall increase in credit volumes by a given bank. In Table 8, we find that the amount of foreign currency loans granted by local banks increased for exposed firms after 2018Q1 compared to non-exposed firms. The loan maturity was also longer, while loan rates increased more for those firms. This result confirms the increased need for external financing by exposed firms

Table 9: Effect of firms' exposure to trade tensions on cross border bank credit: The role of US banks

Dependent variable:	Log (Credit, USD)		Interest rate (%)		Log (Maturity, years)	
	(1)	(2)	(3)	(4)	(5)	(6)
$Post * Exposure^{US}$	-0.123***	-0.114***	0.191***	0.184***	-0.062	-0.073
	(0.034)	(0.036)	(0.041)	(0.047)	(0.052)	(0.055)
Post x Exposure_f x US Lender		-0.067**		0.085**		-0.024***
		(0.029)		(0.041)		(0.010)
N	13860	13860	13860	13860	13860	13860
R2	0.68	0.70	0.81	0.83	0.72	0.73
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes
Firm-Lender FE	Yes	Yes	Yes	Yes	Yes	Yes
Industry-Time FE	No	Yes	No	Yes	No	Yes
Lender-Time FE	Yes	Yes	Yes	Yes	Yes	Yes

Notes: This table reports the results of estimating Eq. 5 for local credit in foreign currency. We estimate the effect of firms' exposure to trade tensions on the log of credit volumes, interest rates (in pp), and log of maturity (years). The estimations are based on loan-level data for the period between 2016 and 2019. Standard errors (in parentheses) are clustered at the firm level. *** p<0.01, ** p<0.05, * p<0.1. Variables' definitions are reported in Table A.1.

to finance additional exports as a result of trade tensions.

In Table 9, we report the results on the role of cross-border bank credit. We find that credit volumes decrease by more for exposed firms after 2018Q1 vis-á-vis non-exposed firms. To shed light on this result, we extend Eq. 5 by adding a triple interaction term that identifies whether the lending bank is based in the US. Across specifications, we find that the reduction in cross-border credit is particularly acute for loans originated in the US (Cols. 1-2). This result is accompanied by an increase in interest rates (Cols. 3-4) by aprox. 19 bsp compared to non-exposed firms. This differential increase is larger – at aprox. 26 bsp – in the case of US-based banks providing credit to exposed firms. Consistent with an overall decrease in credit terms, maturities increase by aprox. 6 p.p. more for exposed firms and 10 p.p. if the corresponding bank was US-based.[18]

[18]Given an average maturity in cross-border bank loans of 13.2 months, this latter effect implies that loans to exposed firms from US banks were, on average, extended by approximately 1.3 fewer months compared to non-exposed firms after 2018Q1. The fact that exposed firms exhibit a decrease in cross-border credit – particularly from the US – may reflect an overall decrease in credit by US banks exposed to trade tensions (see, e.g., Correa et al., 2024). These credit restrictions affect exposed firms the most, and could be potentially explained by the fact that these firms had, ex-ante, a larger initial value of cross-border bank liabilities.

Table 10: Effect of firms' exposure to trade tensions on cross border firm-to-firm credit

Dependent variable:	Log (Credit, USD)		Interest rate (%)		Log (Maturity, years)	
	(1)	(2)	(3)	(4)	(5)	(6)
$Post * Exposure^{US}$	0.136***	0.140***	-0.149***	-0.166***	0.034***	0.036***
	(0.030)	(0.028)	(0.027)	(0.020)	(0.008)	(0.012)
Post x Exposure_f x US Lender		0.011***		-0.020**		0.011***
		(0.008)		(0.008)		(0.005)
N	41345	41345	41345	41345	41345	41345
R2	0.73	0.77	0.62	0.66	0.71	0.73
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes
Firm-lender FE	Yes	Yes	Yes	Yes	Yes	Yes
Industry-time FE	No	Yes	No	Yes	No	Yes
Lender-time FE	Yes	Yes	Yes	Yes	Yes	Yes

Notes: This table reports the results of estimating Eq. 5 for cross-border firm-to-firm credit among unaffiliated firms. We estimate the effect of firms' exposure to trade tensions on the log of credit volumes, interest rates (in pp), and log of maturity (years). The estimations are based on loan-level data for the period between 2016 and 2019. Standard errors (in parentheses) are clustered at the firm level. *** p<0.01, ** p<0.05, * p<0.1. Variables' definitions are reported in Table A.1.

Lastly, we turn our attention to the role of firm-to-firm cross-border credit. The results are reported in Tables 10 to 12. In Table 10, we focus on all loans from unrelated non-financial firms for all purposes. We find that firms exposed to trade tensions benefit from significantly larger firm-to-firm credit volumes, lower interest rates, and larger maturity after 2018Q1, compared to non-exposed firms. On average, the increase in firm-to-firm credit is approximately 14 p.p. larger for exposed firms after the cutoff date (Col. 2). At the same time, we observe that the interest rates on firm-to-firm credit were lower by 17 bps in the post for exposed firms, and the maturity increased by an additional month compared to non-exposed firms – particularly when the lender was based in the US.[19] The effects are larger when the credit is granted by non-financial firms located in the US, suggesting that this type of credit operates as stabilizer of supply chains in times of trade tensions.

[19]This calculation is based on an average maturity for firm-to-firm loans of 1.84 years, aprox. 22 months. The result from Column (5) suggests an average differential increase in maturity of 0.7 months for exposed firms.

Table 11: Effect of firms' exposure to trade tensions on cross border firm-to-firm credit for exports

Dependent variable:	Log (Credit, USD)		Interest rate (%)		Log (Maturity, years)	
	(1)	(2)	(3)	(4)	(5)	(6)
$Post * Exposure^{US}$	0.203***	0.214***	-0.072***	-0.076***	0.041***	0.042***
	(0.041)	(0.044)	(0.023)	(0.029)	(0.017)	(0.019)
N	3442	3442	3442	3442	3442	3442
R2	0.70	0.73	0.72	0.74	0.73	0.74
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes
Firm-lender FE	Yes	Yes	Yes	Yes	Yes	Yes
Industry-time FE	No	Yes	No	Yes	No	Yes
Lender-time FE	Yes	Yes	Yes	Yes	Yes	Yes

Notes: This table reports the results of estimating Eq. 5 for cross-border firm-to-firm unaffiliated credit for exports. We estimate the effect of firms' exposure to trade tensions on the log of credit volumes, interest rates (in pp), and log of maturity (years). The estimations are based on loan-level data for the period between 2016 and 2019. Standard errors (in parentheses) are clustered at the firm level. *** p<0.01, ** p<0.05, * p<0.1. Variables' definitions are reported in Table A.1.

The effects of firm-to-firm credit are somewhat stronger in the subset of export-related credit (see Table 11), confirming the growing need for financing to increase exports by exposed firms. On average, firm-to-firm credit for exports grew by approximately 21 p.p. more for exposed firms after the cutoff date (Col. 2) compared to non-exposed firms. We also observe that the interest rates decreased in the post-period, albeit the magnitude is relatively small. An important effect is observed in loan maturity. After 2018Q1, exposed firms obtained loans from foreign firms at a maturity of close to a month longer than non-exposed firms (Col. 6). The effects on credit terms in the segment of cross-border firm-to-firm credit for working capital are presented in Table 12. The results are consistent, both in significance and magnitudes, to those observed for credit extended for exporting purposes.[20]

[20]A closer look at the results for firm-to-firm credit earmarked for exports versus working capital reveals notable differences. While loan volumes rose substantially in both segments – by 21 (pp) for export-related credit and 16 pp for working capital – the decrease in interest rates was markedly larger for working capital loans (-23.6 bps, compared to -7.6 bps for export loans). This stronger easing in financing terms may suggest that foreign firms were not merely securing short-run export channels, but investing in longer-term production relationships or capacity expansion. Loan maturities increased similarly across both segments, with exposed

Table 12: Effect of firms' exposure to trade tensions on cross border firm-to-firm credit for working capital

Dependent variable:	Log (Credit, USD)		Interest rate (%)		Log (Maturity, years)	
	(1)	(2)	(3)	(4)	(5)	(6)
$Post * Exposure^{US}$	0.166***	0.172***	-0.224***	-0.236***	0.045***	0.053**
	(0.032)	(0.033)	(0.023)	(0.025)	(0.015)	(0.022)
N	24975	24975	24975	24975	24975	24975
R2	0.71	0.73	0.68	0.69	0.72	0.75
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes
Firm-lender FE	Yes	Yes	Yes	Yes	Yes	Yes
Industry-time FE	No	Yes	No	Yes	No	Yes
Lender-time FE	Yes	Yes	Yes	Yes	Yes	Yes

Notes: This table reports the results of estimating Eq. 5 for cross-border firm-to-firm unaffiliated credit for working capital. We estimate the effect of firms' exposure to trade tensions on the log of credit volumes, interest rates (in pp), and log of maturity (years). The estimations are based on loan-level data for the period between 2016 and 2019. Standard errors (in parentheses) are clustered at the firm level. *** p<0.01, ** p<0.05, * p<0.1. Variables' definitions are reported in Table A.1.

The cross-border firm-to-firm lending channel we document is markedly different from short-term invoice financing (i.e., trade credit): these are long-term loans – averaging close to two years in maturity – and in aggregate size, they rival the volume of domestic bank credit received by exporters in our setting. This distinction is economically significant: it reveals a previously underappreciated channel through which foreign firms – often trading partners – actively finance the expansion of productive capacity in response to global demand shocks.

In line with findings by Kim and Shin (2012), Hardy and Saffie (2024) or Garcia-Marin et al. (2025), who emphasize the stabilizing role of trade credit during downturns, our results suggest that firm-to-firm lending can play a similarly important role across borders. Yet, we go beyond their focus by showing that such financing is not merely a substitute for short-term liquidity, but a key instrument for scaling up production when exporters seize new market

firms receiving credit extended by approximately one additional month relative to non-exposed firms.

opportunities. Uncovering this channel matters for understanding how supply chains adapt in crises, how investment is financed outside traditional banking systems, and how real and financial integration interact in emerging markets.

Better prospects for exposed borrowing firms coupled with limited asymmetric information between the preferred lenders and these borrowers are manifested in lower borrowing costs we document – both for domestic bank credit and cross-border firm-to-firm credit –, which enable these firms to invest more and exploit the export opportunities arising from trade tensions. These implications suggest that while trade tensions may disrupt traditional trade patterns and relationships, they also prompt adjustments in financial interactions among firms. Exposed firms seem to adapt by leveraging increased firm-to-firm credit availability and benefiting from favorable financing terms. This highlights the complex and multifaceted nature of responses to trade tensions in that particular business environment.

5 Conclusion

Recent periods of heightened trade uncertainty have received increasing attention given their widespread implications for both affected and bystander countries. These episodes raise questions about the resilience of global supply chains and about global firms' capacity to reconfigure their supplies by shifting their demand for production inputs across jurisdictions. While mounting evidence suggests that recent geopolitical tensions have had material implications for the geographical distribution of production networks worldwide, any policy guidance to grasp the benefits and mitigate the costs of supply chain reallocation requires understanding the mechanisms that drive these changing trade patterns.

In this paper, we advance this understanding by evaluating the financing of supply chains' reallocation in the context of the 2018-2019 US-China trade tensions. We use novel data for Colombia – a bystander country for which these external developments arise exogenously – linking exporting firms' outcomes at the product-destination country level with repositories

on firms' access to both domestic and cross-border credit. Most importantly, we consider the role of firm-to-firm cross-border financing, a material source of financing for Colombian exporters, and test whether firms abroad engage in the cross-border financing of new global supply chains.

Our main results are twofold. First, we document a significant increase in the export of products affected by US-imposed tariffs, particularly when the US is the destination country. Notably, this result arises when comparing export flows across products and within firms, controlling for several confounders. While this effect is stronger for intermediate goods, we find similar results when considering the effect of Chinese retaliatory tariffs on exports to China. Second, we document evidence supporting the notion that affected firms resort to firm-to-firm cross-border financing to adjust their production and participate in the reallocation of supply chains. Loan-level results illustrate an increase in the demand for both domestic and cross-border credit by Colombian firms with a large pre-determined exposure to trade tensions. This increase is larger for cross-border firm-to-firm credit, a dynamic that unveils a shift in exporting firms' financing from bank-based to firm-to-firm credit sources.

Our results reveal a novel angle on how international credit enables the reconfiguration of global supply chains, especially during periods marked by increased trade uncertainty. Our findings suggest that banks and businesses in jurisdictions facing trade limitations often provide financing to companies in other (bystander) countries. This result underscores the importance of initiatives aimed at improving regulations and enhancing transparency in cross-border transactions as a way to facilitate access to cross-border firm-to-firm credit. Implementing such measures could improve the effectiveness and availability of international financing channels, ultimately bolstering the resilience of global supply chains.

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Online Appendix

Table A.1: **Variables definition**

Variable	Definition	Unit; Source
Trade variables:		
$Ln(Exp.value)$	Log of quarterly exports defined at the firm-product-destination country level. Exports are reported in FOB USD.	USD; DANE
$Ln(Exp.volume)$	Log of quarterly exports defined at the firm-product-destination country level. Exports are reported in tons.	Tons, DANE
US	Dummy variable equal to one for export entries with the US as the destination country and zero otherwise.	0–1, DANE
$China$	Dummy variable equal to one for export entries with China as the destination country and zero otherwise.	0–1, DANE
$Intermediate$	Dummy variable equal to one for export entries identified as intermediate goods. Final goods are labeled with a zero.	0–1; DANE
Exposure variables:		
$Exposure^{Total}$	Firm's f exposure to export goods subjected to US tariffs on China's products as measured by the firm's pre-determined value (FOB) of exports in affected goods' categories as a share of total exports in the period between 2017 and 2018 (see Eq. 2).	0–1; DANE
$Exposure^{US}$	Firm's f exposure to export goods subjected to US tariffs on China's products as measured by the firm's pre-determined value (FOB) of exports in affected goods' categories to the US as a share of total exports in the period between 2017 and 2018 (see Eq. 3).	0–1; DANE
$Exposure^{RoW}$	Firm's f exposure to export goods subjected to US tariffs on China's products as measured by the firm's pre-determined value (FOB) of exports in affected goods' categories to all countries excluding the US as a share of total exports in the period between 2017 and 2018. This variables is defined as $Exposure^{Total}$ - $Exposure^{US}$.	0–1; DANE

NOTES: This table provides a description of the main variables used for the empirical analysis reported in the paper. Sources are reported in parentheses. DANE stands for the National Administrative Department of Statistics of Colombia; BdR stands for the Central Bank of Colombia (Banco de la República); and SFC stands for the Colombian Financial Supervisory Authority (Superintendencia Financiera de Colombia).

Table A.1: **Variables definition (continued)**

Variable	Definition	Unit; Source
Tariffs variables:		
$Post$	Product-specific dummy variable equal to one for the quarters following the inclusion of a product category in US tariffs and zero otherwise.	0–1; USITC
$\Delta\tilde{\tau}$	Quarter-to-quarter change in a product's category US tariffs minus the minimum change in tariffs across all product categories.	Percent; USITC
Credit variables:		
$Ln(loans)$	Domestic bank loans between firm f and bank b aggregated at the quarterly frequency. Loan values are defined in Colombian Pesos (COP) and represent the universe of bank-firm loans granted during the sample period for firms with a balance sheet above COP 1,000 million in assets (aprox. 240,000 USD, as of January 2025).	COP; BdR, SFC
$Ln(XB\,loans)$	Cross-border bank loans between firm f and bank b originated in country c aggregated at the quarterly frequency. Loan values are defined in Colombian Pesos (COP) and represent the universe of bank-firm loans granted during the sample period for firms with a balance sheet above COP 1,000 million in assets (aprox. 240,000 USD, as of January 2025).	COP; BdR, SFC
$Ln(Firm\,Credit)$	Cross-border firm-to-firm credit loans between firm f and customer firms located in country c. Loan values are defined in Colombian Pesos (COP) and represent the universe of bank-firm loans granted during the sample period for firms with a balance sheet above COP 1,000 million in assets (aprox. 240,000 USD, as of January 2025).	COP; BdR, SFC
Interest rate	Loan-level interest rate by credit segment. Interest rates for cross-border bank credit (Cross-border rate) and firm-to-firm credit (Firm credit rate) are defined as the spread between loan-level interest rates and a benchmark interest rate.	Rates; BdR, SFC

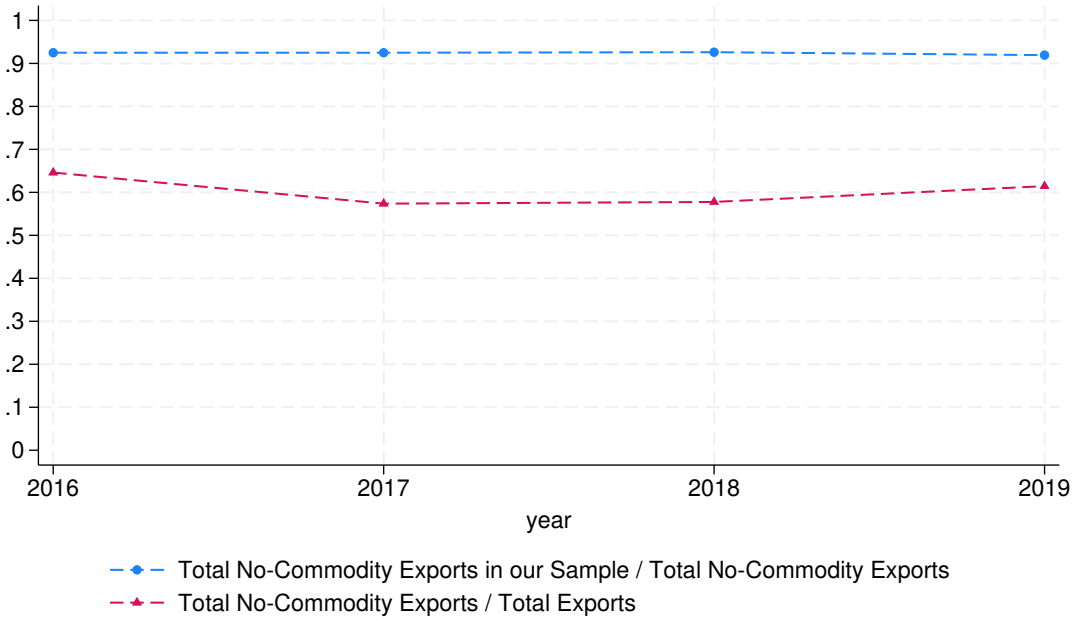
NOTES: This table provides a description of the main variables used for the empirical analysis reported in the paper. Sources are reported in parentheses. DANE stands for the National Administrative Department of Statistics of Colombia; BdR stands for the Central Bank of Colombia (Banco de la República); and SFC stands for the Colombian Financial Supervisory Authority (Superintendencia Financiera de Colombia).

Table A.2: Product-level effect of Chinese tariffs on Colombian exports

	(1)	(2)	(3)	(4)	(5)	(6)
	Ln(Exp. value, fob)			Ln(Exp. volume, tons.)		
$PostRet * China$	0.284***	0.464***	0.485***	0.241**	0.195	0.267**
	(0.0457)	(0.167)	(0.0815)	(0.113)	(0.141)	(0.118)
$PostRet * China * \Delta\tilde{\tau}^{ret}$		-1.835			0.0853	
		(1.331)			(0.849)	
$PostRet * China * Intermediate$			-0.394***			-0.0511
			(0.0817)			(0.0654)
Firm*Product*Country FE	Yes	Yes	Yes	Yes	Yes	Yes
Firm*Product*Time FE	Yes	Yes	Yes	Yes	Yes	Yes
Country*Time FE	Yes	Yes	Yes	Yes	Yes	Yes
N	556311	481335	556311	556311	481335	556311
R^2	0.891	0.901	0.891	0.889	0.895	0.889

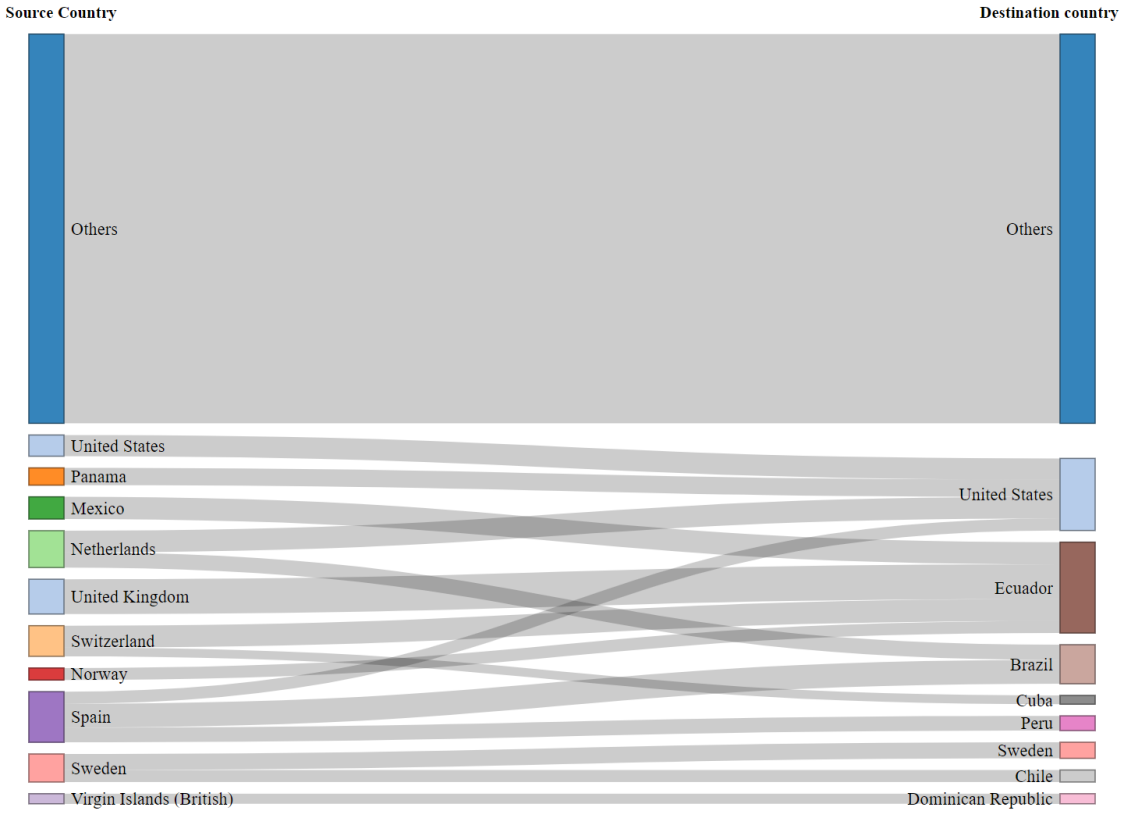
Notes: This table reports the results of estimating Eq. 1. The table shows results with the dependent variable defined as the log of the value of exports (cols. 1 to 3) or as the log of the volume of exports in tons. (cols. 4 to 6). The variable $\Delta\tilde{\tau}$ measures the quarterly change in a product-specific tariff minus the minimum change across product categories. The variable *Intermediate* represents a dummy equal to one if a product is labeled as an intermediate good and zero otherwise. All constitutive terms of the interaction terms are included as individual variables but excluded when subsumed by the fixed effects structure. All specifications include a complete set of fixed effects specified in Eq. 1: firm, product, country; firm, product, quarter; and country, quarter. Standard errors (in parentheses) are double clustered at the product and country levels. The sample period spans from 2016Q1 through 2019Q4 with the variable *Post* identifying the quarters after 2018Q1. *** p<0.01, ** p<0.05, * p<0.1.

Figure A.1: Coverage of aggregate exports by our estimation sample



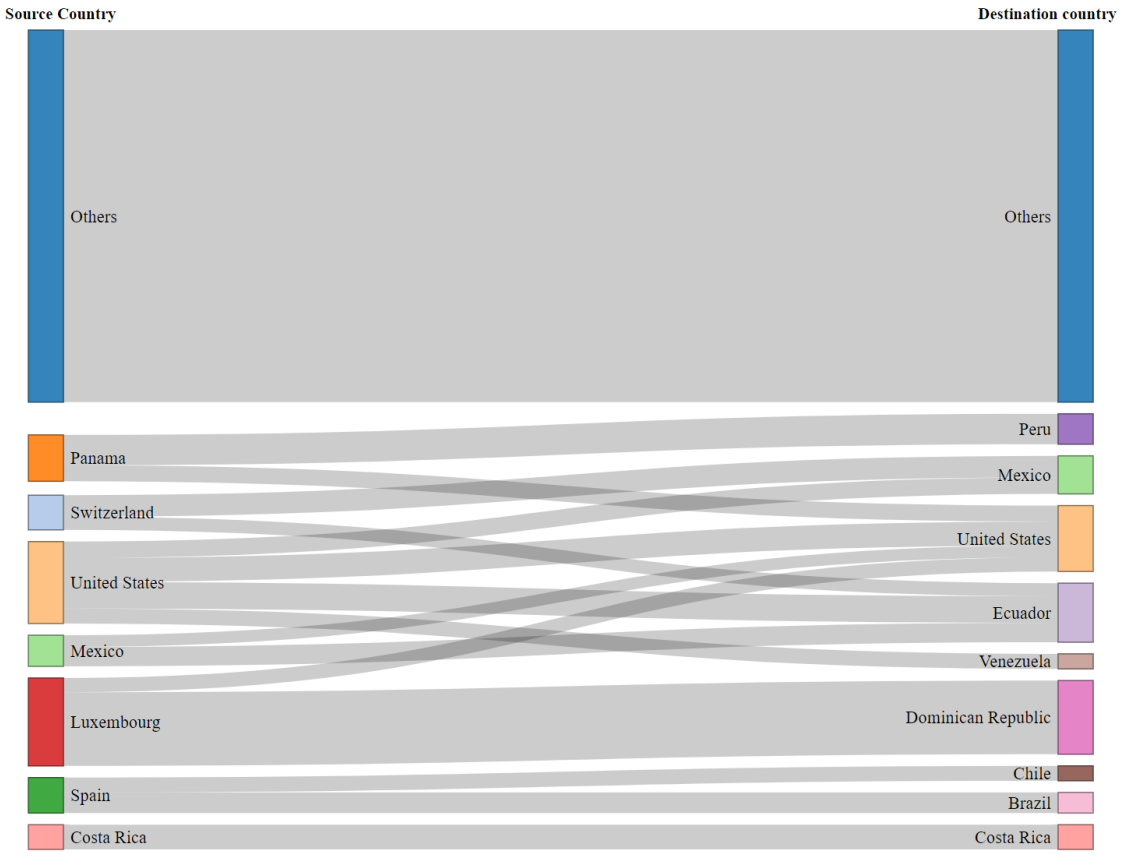
Notes: This figure shows the share of aggregate exports covered by our sample. The blue line connected by circles represents the ratio between the total value of no-commodity exports in our estimation sample and the total aggregate value of no-commodity exports. The red line connected by triangles shows the ratio between the total aggregate value of no-commodity exports and the total aggregate value of exports across all products (i.e., including commodities). Commodities denote oil, metals and minerals.

Figure A.2: Cross border firm-to-firm credit for working capital and destination of exports (2017Q4)



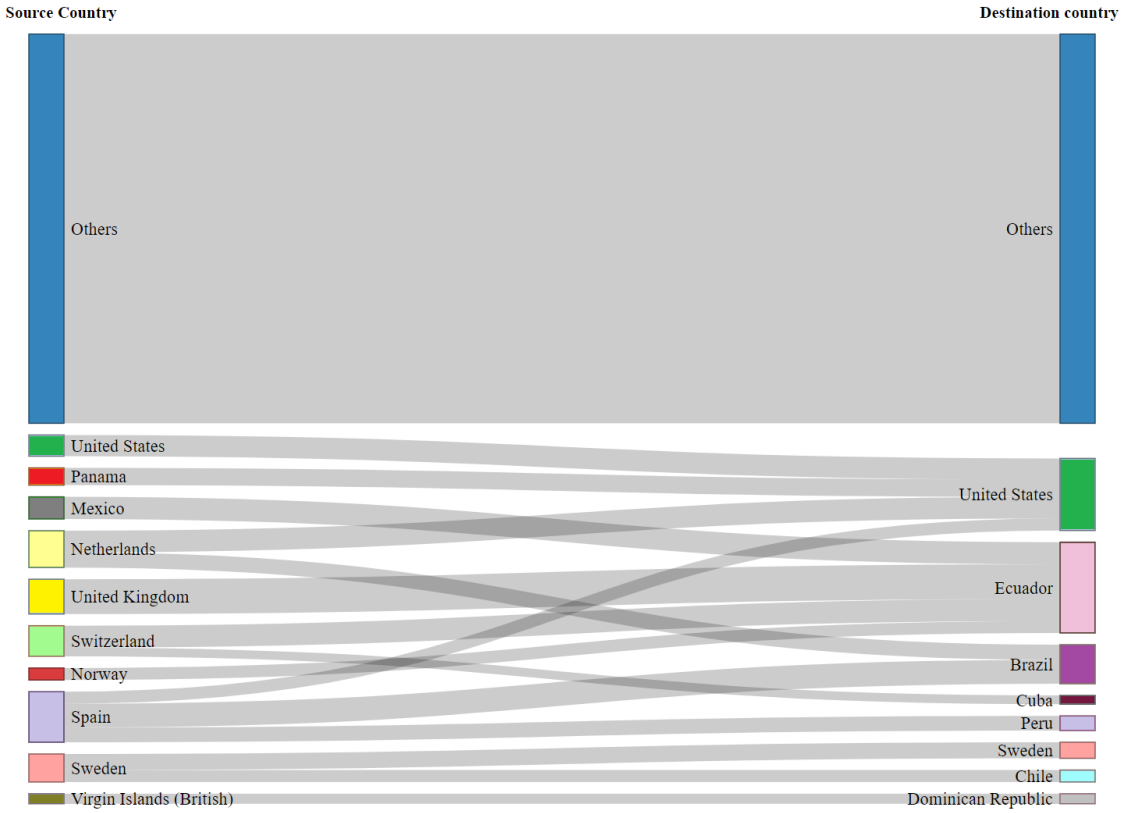
Notes: This figure shows the relationship between the main source of cross-border firm-to-firm credit for working capital (country of origin, left axis) and the main export destination of firms (right axis) for 2017Q4 (ex-ante). Firms are grouped by source of financing and export destination, that is, the amounts of credit received by firms with the same source and the same export destination are grouped in this relationship. The figure shows the grouped amounts of the relationship on the financing side (in USD millions). It shows the intensity of the relationship between external financing and export destination.

Figure A.3: Cross border firm-to-firm credit for working capital and destination of exports (2019Q4)



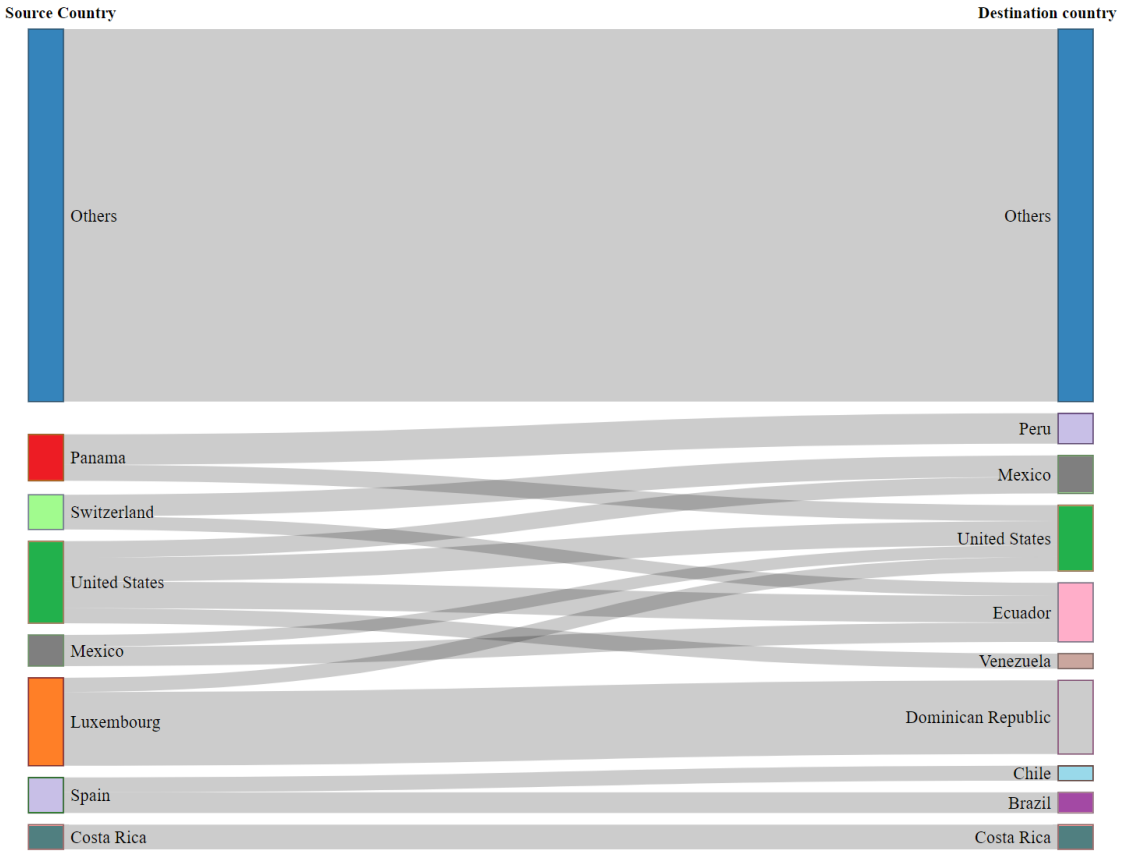
Notes: This figure shows the relationship between the main source of cross-border firm-to-firm credit for working capital (country of origin, left axis) and the main export destination of firms (right axis) for 2019Q4 (ex-ante). Firms are grouped by source of financing and export destination, that is, the amounts of credit received by firms with the same source and the same export destination are grouped in this relationship. The figure shows the grouped amounts of the relationship on the financing side (in USD millions). It shows the intensity of the relationship between external financing and export destination.

Figure A.4: Cross border bank credit for working capital and destination of exports (2017Q4)



Notes: This figure shows the relationship between the main source of cross-border bank credit for working capital (country of origin, left axis) and the main export destination of firms (right axis) for 2017Q4 (ex-ante). Firms are grouped by source of financing and export destination, that is, the amounts of credit received by firms with the same source and the same export destination are grouped in this relationship. The figure shows the grouped amounts of the relationship on the financing side (in USD millions). It shows the intensity of the relationship between external financing and export destination.

Figure A.5: Cross border bank credit for working capital and destination of exports (2019Q4)



Notes: This figure shows the relationship between the main source of cross-border bank credit for working capital (country of origin, left axis) and the main export destination of firms (right axis) for 2019Q4 (ex-ante). Firms are grouped by source of financing and export destination, that is, the amounts of credit received by firms with the same source and the same export destination are grouped in this relationship. The figure shows the grouped amounts of the relationship on the financing side (in USD millions). It shows the intensity of the relationship between external financing and export destination.

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