The Impact of a Higher Cost of Credit on Exporters: Evidence from a Change in Banking Regulation*

Joao Monteiro† Pedro Moreira‡

January 2026

Abstract

We study how tighter credit conditions affect firms' international trade. Exploiting a change under Basel III that raised the cost of trade finance for exports to high-risk destinations while leaving other destinations unaffected, we identify the causal effects of credit tightening on exporters. Using firm-level export data matched to loan-level credit registry records, we show that higher trade finance costs lead to a large and persistent decline in exports to high-risk destinations. Firms adjust along multiple margins: they reduce export volumes, exit high-risk markets, and reallocate toward products with lower working-capital requirements. Substitution toward low-risk destinations is incomplete, and overall firm sales decline. Direct evidence from credit markets shows that exposed firms receive smaller loans, face higher interest rates, and are less likely to obtain bank credit. Our results demonstrate that macroprudential regulation propagates to the real economy by tightening firm-level financing constraints, with substantial effects on firms' export decisions.

*Joao Monteiro would like to thank his committee, Efraim Benmelech, Marty Eichenbaum, Dimitris Papanikolaou, Mitchell Petersen, and Jacopo Ponticelli for their continued guidance and support. We thank Filipe Correia (discussant), Carola Frydman, Joao Guerreiro, Fergal Hanks, Victoria Ivashina, Kalina Manova, Filippo Mezzanotti, Laura C. Murphy, Friederike Niepmann, Mounu Prem, Sergio Rebelo, Miguel Santana, Paola Sapienza, Tim Schmidt-Eisenlohr, Liliana Varela, and Vikrant Vig for helpful comments and discussions. We also thank participants in seminar participants at several institutions for useful comments. Joao Monteiro also acknowledges the support of FCT under grant 2022.10595.BD. All errors are our own. The views expressed in this article are those of the authors and do not necessarily represent those of Banco de Portugal or the Eurosystem.

†Einaudi Institute for Economics and Finance. Email: joao.monteiro@eief.it.

‡Banco de Portugal. Email: pedro.moreira@bportugal.pt.

1 Introduction

How does the cost of credit shape international trade? Credit frictions distort firm production, investment, and growth (Khwaja and Mian, 2008; Chodorow-Reich, 2014; Benmelech, Frydman and Papanikolaou, 2016). Exporters are especially exposed to these frictions because they must finance production, shipment, and payment delays long before revenues are realized. Yet the empirical literature on trade and finance suggests a surprisingly limited role for credit: adverse credit shocks appear to reduce export volumes primarily along the intensive margin, with little impact on firms' participation in foreign markets (Manova, 2013; Paravisini et al., 2015).

This conclusion is difficult to reconcile with standard models of firm dynamics and international trade. When the cost of credit rises, firms should reassess not only how much they export, but also where they export and what they produce. Entry and exit across markets, as well as reallocation across products with different financing needs, are central margins through which credit shocks propagate and generate persistent real effects. If credit tightening operates through these margins, its impact on trade may be deeper, more persistent, and more distortionary than suggested by existing evidence. This paper revisits the effects of credit tightening on exports by studying how firms adjust along three margins: export volumes, market participation, and product mix.

Exporters rely more heavily on credit than firms operating solely in domestic markets. Long lags between production, shipment, and payment generate substantial liquidity needs, as revenues are realized only well after costs are incurred. Even within the European Union, goods may spend several weeks in transit (Djankov et al., 2010), during which exporters must finance supplier payments, inventories, and working capital without incoming cash flows. Beyond liquidity, exporters also face counterparty risk: enforcing payment from foreign buyers is costly and uncertain, particularly when transactions span jurisdictions with weak contract enforcement. Banks play a central role in mitigating these frictions by intermediating payments, pooling risk, and enforcing contracts through cross-border banking relationships—roles that become especially important when legal institutions are weak (Antràs and Foley, 2015).

The predominant form of bank-intermediated credit in international trade is trade finance. Trade finance consists primarily of short-term working capital loans extended by domestic banks and secured by payment guarantees—such as letters of credit—issued by foreign banks. These arrangements allow exporters to finance production and shipment while transferring counterparty risk to the banking system. In this paper, we study a setting in which the cost of trade finance rises for a subset of destinations while re-

maining unchanged for others. This differential change is induced by a regulatory reform—Basel III—that alters the capital cost of cross-border bank exposures and provides a sharp source of variation to study how tighter credit conditions affect firms' export decisions.

Basel III introduces substantial changes to banks' risk management and capital allocation. Under the new framework, banks are required to hold a minimum level of equity relative to their risk-weighted assets.[1] Assets with higher regulatory risk weights therefore become more expensive to hold, as they require banks to allocate additional equity capital.

A central feature of Basel III is the revision of risk weights applied to short-term cross-border bank exposures, including those arising from trade finance. Under the new regulation, exposures to banks located in OECD countries continue to receive low risk weights, while exposures to banks in non-OECD countries—classified as high risk—are assigned substantially higher risk weights. As a result, the regulatory capital cost of extending trade finance increases discretely for transactions involving high-risk destinations, while remaining unchanged for otherwise identical transactions involving low-risk destinations.

This regulatory change raises the marginal cost to banks of providing trade finance for exports to high-risk countries. Because trade finance is short term and competitively priced, banks are likely to pass part of this increase in capital costs on to exporters through tighter credit conditions. Basel III therefore generates an exogenous increase in the effective cost of exporting to high-risk destinations, providing a natural experiment to study how credit tightening reshapes firms' export behavior.

We use a unique dataset on Portuguese firms to study the effects of higher trade finance costs. Portugal is an ideal setting for this analysis. Most exporters are small, financially constrained, and rely almost exclusively on bank credit to finance working capital. Moreover, a sizable share of Portuguese exports—22 percent—is directed to high-risk destinations, making firms particularly exposed to the regulatory shock induced by Basel III. Our data combine the universe of Portuguese firm-level exports, observed at the destination–product–year level, with matched credit registry records covering all bank loans obtained by firms, including loan amounts, maturities, and interest rates. This linkage allows us to exploit within-firm variation and compare the evolution of exports to high-risk and low-risk destinations in response to an exogenous increase in the cost of trade finance.

[1] Risk-weighted assets are defined as the sum of balance-sheet exposures, each multiplied by a regulatory risk weight intended to capture its credit risk.

We begin by studying the intensive-margin response to the Basel III shock. Using within firm–product variation, we find that exports to high-risk destinations decline by approximately 20 percent between 2013 and 2018 relative to exports to low-risk destinations. This effect corresponds to an average decline of EUR 94,181 per firm. Absent full reallocation toward low-risk destinations, the estimated contraction implies a 4.4 percent decline in total exports.

We then examine how firms adjust their product portfolios in response to tighter trade finance conditions. To do so, we construct a novel measure of product-level dependence on working capital based on the cash conversion cycle, which captures the time elapsed between production expenditures and cash inflows from sales. We find that the decline in exports to high-risk destinations is significantly more pronounced for products with higher working-capital dependence, providing direct evidence for the trade-finance mechanism underlying our analysis.

We also examine whether firms partially reallocate exports toward low-risk destinations. Using across-firm variation, we find that firms exposed to high-risk destinations increase their exports to low-risk markets relative to unexposed firms. However, this reallocation is incomplete: exposed firms experience a larger decline in total sales, indicating that substitution across destinations does not fully offset the increase in credit costs.

Adjustment also occurs along the extensive margin of trade. Between 2013 and 2018, the probability that a firm exports to at least one high-risk destination declines by approximately 3 percentage points relative to low-risk destinations, corresponding to a 26 percent reduction relative to the unconditional mean. Firms continue to export, but are less likely to operate in destinations where the cost of trade finance increases.

Finally, we study adjustment along a second extensive margin: product scope. While Basel III is associated with a decline in the number of products sold to high-risk destinations in the full sample, this effect is driven by firms that exit these destinations altogether. Conditional on continued participation, firms expand the range of products they sell in high-risk destinations, consistent with active product reallocation toward goods with lower working-capital requirements.

Taken together, these results point to tighter credit conditions as a key driver of firms' export responses. The contraction in exports to high-risk destinations, the shift toward less working-capital-intensive products, and the incomplete reallocation toward low-risk markets are difficult to reconcile with a demand-based explanation. We therefore turn to credit registry data to test the mechanism directly.

Using loan-level data, we show that firms with greater exposure to high-risk destinations receive loans that are, on average, 7 percent smaller following the implementation of

Basel III. Interest rates increase by 13 basis points, or 1.8 percent relative to the pre-reform mean. Finally, firms exposed to high-risk destinations become significantly less likely to obtain bank credit at all, with the probability of receiving a loan declining by approximately 7 percent. These findings provide direct evidence that Basel III tightened credit supply for exporting firms and that this tightening propagated to real trade outcomes through both intensive and extensive margins.

Related literature. Our paper contributes to the literature on the role of credit in international trade. A large body of work shows that financial frictions shape countries' comparative advantage and firms' export performance (Gertler and Rogoff, 1990; Matsuyama, 2005; Chor, 2010). Empirically, Manova (2013) documents that limited access to finance substantially reduces exports, while during the Great Recession disruptions to credit markets played a central role in the collapse of global trade (Chor and Manova, 2012; Ahn, Amiti and Weinstein, 2011).[2]

The paper most closely related to ours is Paravisini et al. (2015), who study the 2008 Peruvian sudden stop as a shock to exporters' access to credit.[3] They find that credit disruptions affect exports exclusively through the intensive margin. We depart from this result in three key ways. First, we show that credit tightening generates large and persistent adjustments along the extensive margin, including destination exit and changes in product scope. Second, unlike sudden stops or banking crises, Basel III constitutes a permanent regulatory increase in the cost of trade finance, allowing us to study longer-run adjustments that are difficult to detect in short-lived shocks. Third, our empirical design exploits within-firm variation across destinations and products, enabling us to document substitution patterns within firms' export portfolios in response to credit tightening.

Our findings also relate to a growing literature on firms' product-mix adjustments. Theoretical work emphasizes product reallocation as a central margin of adjustment to changes in trade costs and competitive conditions (De Loecker, 2011; Mayer, Melitz and Ottaviano, 2014). We contribute to this literature by showing that tighter trade-finance conditions induced by macroprudential regulation reshape firms' product portfolios within destinations, rather than merely affecting aggregate export volumes.

Finally, we contribute to the literature on macroprudential policy and its real effects.

[2] A broader literature studies the effects of credit on real activity at the firm level, including Paravisini (2008); Khwaja and Mian (2008); Chodorow-Reich (2014); Huber (2018) and Benmelech, Frydman and Papanikolaou (2016). Exporters are typically more sensitive to credit shocks than non-exporters, as shown by Minetti and Zhu (2011).

[3] There is also a literature studying trade finance, which is the most common form of financing for exporters. Some examples include Schmidt-Eisenlohr (2013), Antràs and Foley (2015), and Niepmann and Schmidt-Eisenlohr (2017).

While existing work studies the design and aggregate consequences of banking regulation (Kashyap and Stein, 2004; Hanson, Kashyap and Stein, 2011; Repullo and Suarez, 2013), and documents bank-level lending responses to regulatory changes (Aiyar et al., 2014; Gropp et al., 2019), we provide micro-level evidence on how macroprudential regulation propagates through firms' international trade decisions, affecting export participation, destination choice, and product scope.

Outline. Section 2 describes the institutional background and the shock. Section B describes the intensive margin response and Section 5 describes the extensive margin response. Section 6 provides direct evidence of the contraction in the supply of credit. Section 7 concludes.

2 Trade Finance and the Basel III Capital Shock

2.1 Trade Finance, Working Capital, and Cross-Border Bank Exposure

International trade magnifies two frictions that are largely absent from domestic transactions. Cross-border exchanges involve long delays between production, shipment, and payment, and they take place in environments with limited legal recourse in the event of default. As a result, exporters must finance production costs and working capital needs over extended horizons while bearing substantial counterparty risk. These frictions are quantitatively important. Using data on manufacturing firms in 180 countries, Djankov, Freund and Pham (2010) document a median delay of 21 days between production and shipment. Similarly, Hummels and Schaur (2013) show that goods imported into the United States by sea typically spend around 20 days in transit. Payment delays are even longer: Amiti and Weinstein (2011) find that importers frequently defer payment for up to 90 days after delivery.

Trade finance is a contractual arrangement designed to mitigate both the time-to-payment and enforcement frictions inherent in international trade. Figure 1 illustrates the canonical structure. Four agents are involved. In the exporting country—Portugal in our setting—there is an exporter and a domestic bank. In the destination country, there is an importer and a foreign bank. The transaction unfolds in five stages. First, the exporter and importer negotiate a contract specifying price, quantity, delivery conditions, and payment terms. At this stage, the importer requests a letter of credit from the foreign bank, which constitutes a contingent payment guarantee: conditional on proof of shipment, the foreign bank commits to pay the exporter, thereby insuring the exporter against

counterparty default. Second, the exporter obtains a working capital loan from the Portuguese bank to finance production and the delay between shipment and payment. The letter of credit serves as collateral, allowing the exporter to borrow against the future receivable generated by the export contract. Third, production and shipment take place. Fourth, upon verification of the shipping documents, the foreign bank issues a banker's acceptance—typically with a maturity of around 90 days—to the exporter. The exporter uses this instrument to repay the working capital loan. Finally, at maturity, the foreign bank settles the banker's acceptance and collects payment from the importer.

From the perspective of the Portuguese bank, this process involves a transformation of its balance-sheet exposure. At the outset, the bank holds a claim on the exporter, analogous to a standard working capital loan extended to a domestic firm. Once the banker's acceptance is issued, this claim is effectively replaced by a claim on the foreign bank. The nature of the asset therefore changes: the counterparty is no longer a domestic nonfinancial firm, but a foreign financial institution. Trade finance thus converts firm-level credit exposure into a short-term, cross-border interbank claim.

Trade finance is not the only way to finance international transactions. Exporters and importers may rely on cash-in-advance arrangements, open account terms that bypass direct bank intermediation, or documentary collection contracts that involve banks but provide weaker payment guarantees. As shown by Antràs and Foley (2015), large firms exporting to destinations with strong contract enforcement tend to favor financing methods that require less intermediation. Nevertheless, bank-intermediated trade finance remains economically important. Using SWIFT data from 2007 to 2012, Niepmann and Schmidt-Eisenlohr (2017) estimate that such transactions account for roughly 15 percent of global trade volume, while other estimates place this share closer to 47 percent.

Crucially, regardless of the contractual form, international trade systematically increases exporters' working capital needs by lengthening the interval between production and final payment. When transactions are intermediated by banks, these working capital requirements are reflected directly on bank balance sheets through short-term, cross-border exposures. As a result, changes in the regulatory treatment of such exposures have the potential to affect the supply of trade finance and, through it, firms' participation in international markets. We turn next to the macro-prudential framework governing these exposures and to the regulatory change that motivates our empirical analysis.

2.2 Basel III and the Repricing of Cross-Border Trade Finance

Basel III is a globally coordinated regulatory framework developed by the Basel Committee on Banking Supervision in response to the 2007–2009 Global Financial Crisis. In the European Union, Basel III was approved in 2013 and began to be implemented on January 1, 2014.[4] The reform introduced three major changes: stricter capital requirements, the introduction of macro-prudential capital buffers, and new measures aimed at limiting excessive leverage and liquidity risk.

At the core of the reform is the capital adequacy ratio,

$$\text{Capital ratio} = \frac{\text{Tier 1 capital}}{\sum_k \omega_k \, \text{Asset}_k},$$

where Tier 1 capital consists primarily of equity and disclosed reserves, and the denominator aggregates risk-weighted assets. Each asset k is assigned a risk weight ω_k that reflects its regulatory riskiness: safer assets receive lower weights, while riskier assets receive higher ones. For example, a AAA-rated bond carries a risk weight of 0.1, whereas a bond rated below B− receives a weight of 1.

Prior to Basel III, short-term claims on foreign banks—including those arising from trade finance—were assigned a uniform risk weight of 0.2, irrespective of the foreign bank's creditworthiness or country of origin. Basel III replaced this uniform treatment with a more granular approach that ties risk weights to the regulatory classification of the foreign bank. Under the new rules, trade finance exposures continue to receive a risk weight of 0.2 if the foreign bank is classified as low risk. If the foreign bank is classified as high risk, however, the applicable risk weight rises to 0.5.[5]

This regulatory change constitutes the shock we exploit. It induces a discrete and externally imposed increase in the capital cost of extending trade finance to exporters selling to destinations served by high-risk foreign banks, while leaving unchanged the capital treatment of otherwise identical transactions involving low-risk foreign banks. Conditional on the regulatory classification of the foreign bank, the applicable risk weight is fixed by regulation and does not depend on exporter characteristics, contract terms, or the domestic bank's portfolio composition. Countries whose banking systems are uni-

[4] In the E.U., Basel III is implemented through two legislative acts: Directive 2013/36/EU (June 26, 2013), which establishes the general principles, and Regulation (EU) No. 575/2013 (November 30, 2013), which provides detailed prudential requirements. These rules apply uniformly across E.U. member states.

[5] Under Articles 120 and 121 of Regulation (EU) No. 575/2013, trade finance exposures to unrated foreign banks with maturities exceeding three months receive a risk weight of 0.5. Unrated institutions—typically banks without external credit ratings—are treated as high risk. Banks in many low-income and emerging economies fall into this category (BIS, 2015).

formly classified as low risk are therefore mechanically unaffected by the reform.

From the perspective of an E.U. bank, maintaining a constant capital ratio when extending a trade finance loan to a high-risk destination requires adjustment along one of three margins. First, the bank can raise additional Tier 1 capital, typically by issuing equity. Second, it can increase its holdings of low-risk assets, such as government bonds, thereby reducing average portfolio risk. Third, it can shrink its balance sheet by cutting back on other high risk-weighted assets. All three adjustments are costly. Equity issuance is expensive, low-risk assets offer low returns, and balance-sheet reallocation crowds out profitable lending opportunities. As a result, Basel III raises the marginal cost of trade finance exposures involving high-risk foreign banks. In practice, banks can respond by repricing affected trade finance instruments, tightening credit limits, or both, increasing exporters' effective cost of external finance. Such responses are consistent with evidence that banks adjust lending terms when capital requirements tighten (Gropp et al., 2019). None of these adjustments are required for trade finance transactions involving low-risk foreign banks.[6]

Since we do not directly observe the regulatory classification applied by banks to foreign counterparties, we proxy for foreign bank risk using sovereign risk classifications published by the OECD. In our baseline analysis, destinations in OECD countries are classified as low risk, while non-OECD destinations are classified as high risk.[7] Sovereign risk classifications provide a natural benchmark for the regulatory treatment of cross-border bank exposures under standardized approaches, but they are necessarily coarse. In particular, individual banks operating in higher-risk countries may nonetheless be subject to lower effective risk assessments due to external support, ownership structure, or supervisory discretion. Consistent with this view, Borensztein, Cowan and Valenzuela (2013) show that sovereign ceilings do not bind uniformly and that financial institutions may receive credit assessments that differ from those implied by sovereign risk alone.

As a result, our classification likely introduces conservative measurement error. Some banks operating in non-OECD countries may continue to receive low risk weights despite being located in higher-risk jurisdictions, while banks in OECD countries are almost uniformly classified as low risk. This misclassification implies that part of the high-risk group is effectively untreated, biasing our estimates toward zero and rendering our re-

[6]Large banks using Internal Ratings-Based (IRB) approaches may apply internal models to certain exposures. However, trade finance instruments are typically treated under standardized approaches or subject to supervisory floors, and the regulatory change described above applies to the risk-weighting of cross-border bank claims independently of internal model choice.

[7]Online Appendix Figure A.1 shows the geographic distribution of high-risk countries. Online Appendix Figure A.2 shows that the OECD ratings are highly correlated with Moody's sovereign risk ratings.

sults conservative.

A second source of attenuation arises from firms' endogenous responses. Faced with higher trade finance costs, exporters may reallocate their financing relationships toward lower-risk foreign banks, even when exporting to high-risk destinations. If letters of credit are issued by low-risk banks, the regulatory cost increase does not materialize, further dampening the measured impact of Basel III on trade flows.[8]

While systematic evidence on banks' responses to Basel III in trade finance markets is limited, contemporaneous accounts point to economically meaningful adjustments. In 2014, the International Chamber of Commerce (ICC) published *Rethinking Trade & Finance*, a survey-based report covering export finance professionals across major international banks. Seventy-eight percent of respondents reported that Basel III had increased the cost of trade finance, and 69 percent indicated that banks had raised prices charged to customers as a direct consequence.[9]

Taken together, Basel III induces a sharp and differential increase in the capital cost of trade finance tied to the risk profile of the foreign bank. Because trade finance is a primary vehicle through which exporters finance production and shipment delays, this regulatory change provides a clean setting to study how macro-prudential regulation propagates to firms' participation in international trade.

3 Data

This section describes the data sources and key variables used in the analysis. We combine detailed administrative customs records with firm-level accounting data and credit registry information to construct measures of export activity, working capital intensity, and credit outcomes. We conclude by documenting aggregate export patterns around the implementation of Basel III.

3.1 Data Sources

Customs data. Our main dataset consists of administrative customs records from Statistics Portugal. The data cover the universe of Portuguese firms and report monthly values

[8]Such reallocation would mute the observed treatment effect by allowing firms to partially circumvent the increase in regulatory capital charges.

[9]Using transaction-level data from 24 banks covering more than 4.5 million trade finance operations—representing exposures of roughly $2.4 trillion—the ICC reports a customer default rate of just 0.033 percent. By comparison, a corporate bond with a similar default probability would be rated between Aa and Aaa by Moody's, highlighting the low intrinsic risk of trade finance despite its regulatory treatment.

of exports and imports of goods by firm, product, and source or destination country over the period 2010–2019. We focus on exports of goods and aggregate the data to the annual frequency. Products are aggregated at the Harmonized System (HS) four-digit level, corresponding to HS headings. The resulting dataset is organized at the firm–destination–product–year level and we observe 170,454 exporters. We merge these data with firm-level balance sheet and income statement information from *Informação Empresarial Simplificada* (IES).[10]

Product-level data. We construct a novel product-level measure of reliance on working capital. Specifically, for each four-digit product, we measure the cash conversion cycle (CCC), which captures the number of days required for expenditures on inputs and inventories to be converted into cash receipts from sales. This measure is particularly relevant for exporters, as it quantifies how long net input costs remain tied up before generating revenue. A longer CCC implies a greater need for external finance to bridge the gap between production and payment.

The cash conversion cycle is defined as

$$\text{CCC} = \left(\frac{\text{Average Inventory}}{\text{COGS}} + \frac{\text{Average Receivables}}{\text{Sales}} - \frac{\text{Average Payables}}{\text{COGS}} \right) \times 365,$$

where average inventory, receivables, and payables are computed as the mean of beginning- and end-of-period balances. A higher CCC reflects a longer delay between cash outflows associated with production and cash inflows from sales, and thus a greater reliance on working capital finance.

Product-level balance sheet data are not available, preventing the direct computation of the CCC at the product level. We therefore follow the approach of Rajan and Zingales (1998) and Chor and Manova (2012), who use firm-level Compustat data to construct industry-level measures of financial dependence for U.S. firms.[11]

We compute the CCC for all Compustat firms in 2013 and aggregate it to the three-digit NAICS industry level using sales-weighted averages. We then map these industry-

[10] IES data are collected through mandatory annual filings by all Portuguese firms. Both the firm-level and customs data are anonymized, but firms can be consistently linked across datasets using a common identifier.

[11] The literature typically relies on U.S.-based measures of financial dependence, which offer several advantages. Our objective is to capture technological reliance on working capital, abstracting from country-specific financial conditions. Because Compustat primarily covers large firms operating in a highly developed financial system, these measures are likely to reflect underlying technological needs rather than binding financial constraints. We therefore interpret them as benchmarks for credit dependence arising from production technologies.

level measures to four-digit product codes using the concordance developed by Pierce and Schott (2009).[12]

Online Appendix Figure A.5 shows the distribution of the CCC across products. The average product in our sample has a CCC of 91 days. Manufacturing products exhibit systematically longer cash conversion cycles: for example, automobiles have a CCC of 130 days, and car engines have a CCC of 121 days. In contrast, agricultural products display substantially shorter cycles.

Our product-level measure of working capital dependence is strongly correlated with the Product Complexity Index developed by Hausmann et al. (2014), as shown in Online Appendix Figure A.6. Products characterized by longer delays between production and cash inflows also tend to be more complex. Importantly, we show in Online Appendix Figure A.7 that the distribution of demand elasticities does not differ systematically between products with high and low CCCs, indicating that our measure captures financial, rather than demand-side, characteristics.

Credit registry. We also use data from the Portuguese credit registry, which records all new bank loans and loan renegotiations over the period 2013–2018.[13] For each loan, the registry reports the origination date, lending bank, borrowing firm, interest rate, loan amount, and maturity. We exclude overdrafts and renegotiated loans to focus on new credit origination.

The credit registry and the customs data cannot be directly merged because they rely on different anonymization procedures. As a result, the customs data constitute the primary dataset used throughout the paper. We nevertheless use the credit registry to study the impact of Basel III on loan interest rates and loan amounts in Section 6. To do so, we implement a matching procedure that pairs each firm in the credit registry with a firm in the customs data operating in the same five-digit sector and with the closest level of exports. Following Niepmann and Schmidt-Eisenlohr (2017), we exclude firms whose annual exports account for less than 5 percent of total sales. This procedure yields a matched sample of 11,159 exporters observed in the credit registry.

The matched sample is used to identify exporting firms and to compute our measure of firm-level export exposure, defined as the share of exports to high-risk destinations.

[12] We use three-digit NAICS industries to ensure sufficient firm coverage within each industry. When multiple industries map to a given product, we aggregate industry-level CCCs using total industry sales as weights.

[13] Until December 2014, reporting to the registry was mandatory only for banks with an annual volume of new lending to firms exceeding EUR 50 million. From January 2015 onward, the reporting requirement was extended to all banks.

All outcome variables analyzed in Section 6—including interest rates, loan amounts, and maturities—are drawn exclusively from the credit registry. No loan-level outcomes are merged across datasets.

Because the matching procedure is imperfect, firm-level export exposure is measured with error. This measurement error arises from imprecision in assigning customs records to firms in the credit registry and does not affect loan outcomes directly, which are observed independently in the registry. When firm-level exposure is used as a regressor, this constitutes classical measurement error in the explanatory variable. Under standard assumptions, classical measurement error attenuates estimated coefficients toward zero. As a result, any bias introduced by imprecision in the matching procedure works against finding an effect of Basel III on credit terms, rendering our estimates conservative.

3.2 Summary Statistics

Figure 2 plots the evolution of total exports and the share of exports directed to high-risk destinations, both computed using the customs data. Total Portuguese exports display a clear upward trend over the sample period, interrupted by a sharp contraction during the Great Recession and a second decline during the Covid-19 pandemic. In 2013, the year preceding the implementation of Basel III, total exports amount to 44 billion euros, corresponding to 27 percent of GDP.

Panel (b) plots the share of exports to high-risk destinations. In 2000, this share was 8 percent. By 2013, it had risen to 22 percent. With the exception of a small decline in 2010, the share of exports to high-risk destinations increases monotonically until 2013. After 2013, it begins a sharp and persistent decline.

Portuguese exporters sell 1,272 products to 196 destination countries. Online Appendix Figure A.4 presents the main export destinations. Spain is the largest destination, accounting for 24 percent of total exports in 2013. The fourth-largest destination is Angola—a high-risk country—which represents 7 percent of exports in that year.[14] The three most important product categories are vehicles (11 percent of exports in 2013), electrical machinery (9 percent), and mineral fuels (7 percent).

Table I reports summary statistics for the full sample and for the sub-sample matched to the credit registry. The average exporter sells 10 products to 3 destinations, corresponding to an average of 6 products per destination. These distributions are highly right-skewed, however, as reflected by median values that are substantially lower than the means. Online Appendix Figure A.10 shows that this skewness is driven by a small

[14] Online Appendix Figure A.3 presents the global distribution of Portuguese exports.

number of firms exporting a large number of products or serving many destinations.

For the average firm in the sample, exports account for 25 percent of total sales. Moreover, 79 percent of exports are directed to high-risk destinations. As shown in Online Appendix Figure A.9, the distribution of firm-level exposure is sharply bimodal, with most firms exporting either almost exclusively to low-risk or to high-risk destinations. Given that only 22 percent of aggregate exports are directed to high-risk destinations in 2013, this pattern indicates that larger exporters disproportionately serve low-risk markets. The average cash conversion cycle across products is 88 days.

In the sub-sample matched to the credit registry, exporters obtain an average of 16 loans in 2013, though this figure is driven by outliers, with a median of five loans. Exporters typically borrow from two different banks. The median loan maturity is 134 days, consistent with the short maturities characteristic of trade finance instruments, which typically range between 90 and 180 days.

3.3 Aggregate Effects

Before turning to the firm-level analysis, we examine aggregate export patterns around the implementation of Basel III. While these aggregate patterns are not intended to establish causality, they provide suggestive evidence and help discipline the micro-level analysis that follows. We write total exports to destination group j in year t as the product of two components: (i) the average value of exports per firm, corresponding to the intensive margin of trade, and (ii) the number of exporting firms active in that destination group, corresponding to the extensive margin. We compute this decomposition separately for high-risk and low-risk destinations over the period 2010–2019 and present the results in Figure 3.

Panel (a) reports the evolution of the intensive margin. Following 2013, the average value of exports to low-risk destinations remains broadly stable relative to its pre-reform trend. In contrast, the average value of exports to high-risk destinations declines markedly, falling by approximately 20 percent between 2013 and 2016. This divergence is consistent with an increase in the cost of external finance faced by firms exporting to high-risk destinations.

Panel (b) reports the extensive margin response. As with the intensive margin, the number of firms exporting to low-risk destinations exhibits no discernible change relative to its pre-2013 trend. By contrast, the number of firms exporting to high-risk destinations declines sharply and persistently. Between 2013 and 2016, the number of exporters serving high-risk destinations falls by approximately 15 percent. These patterns indicate

that both the intensive and extensive margins contribute to the aggregate adjustment of exports following the introduction of Basel III.

These aggregate patterns motivate the time window used in the firm-level analysis. In the baseline specifications, we focus on the 2010–2019 period. This choice allows us to exclude two major confounding episodes. First, the Great Recession involved large and widespread disruptions to credit markets that are unrelated to the regulatory change studied here (Chor and Manova, 2012). Second, we exclude the Covid-19 period. While extending the sample beyond 2019 yields qualitatively similar aggregate patterns, trade costs during the pandemic increased sharply and in ways that scale with distance. Because low-risk destinations are predominantly EU countries and thus geographically close to Portugal, while high-risk destinations are non-European, pandemic-related disruptions mechanically affect the two groups differently. This makes it difficult to separately identify the effects of Basel III from Covid-related trade frictions.

The analysis using credit registry data necessarily focuses on the 2013–2018 period, reflecting data availability. This window fully overlaps with the implementation of Basel III and allows us to study how the reform affected loan pricing and quantities during the years in which the regulation was actively binding.

4 The Intensive Margin of Adjustment

This section examines how firms adjust their export activity in response to the increase in the cost of trade finance induced by Basel III. We focus on three margins of adjustment. First, we study changes in export values within existing firm–product–destination relationships. Second, we analyze how firms adjust their product mix. Third, we examine whether these adjustments propagate to unaffected destinations and to firms' overall scale of activity. Taken together, the evidence in this section shows that tighter macroprudential regulation affects not only where firms export, but also what they export and how much they produce.

4.1 Within-Firm Effects

We begin by studying how firms adjust to the increase in the regulatory cost of trade finance induced by the implementation of Basel III. This increase applies only to exports involving high-risk destinations. We therefore exploit *within firm–product* variation and compare the evolution of exports to high-risk destinations (the treated group) with exports to low-risk destinations (the control group). This comparison isolates the response

of the intensive margin of trade.

We estimate the following event-study specification:

$$\log Y_{ipdt} = \mu_{ipd} + \lambda_{ipt} + \beta X_{dt} + \sum_{m=-4, m\neq -1}^{5} \gamma_m \cdot \mathbf{1}\{t = 2014 + m\} \cdot \mathbf{1}\{d \in \text{High-risk}\} + \varepsilon_{ipdt}, \quad (1)$$

where the outcome variable is the logarithm of exports by firm i, product p, to destination d in year t. We include firm–product–destination fixed effects, μ_{ipd}, which absorb all time-invariant characteristics of each export relationship, and firm–product–year fixed effects, λ_{ipt}, which absorb all shocks common to a firm–product pair in a given year, including changes in productivity, demand, or overall access to finance.

The vector X_{dt} contains time-varying destination-level controls, including the logarithm of GDP, the logarithm of total imports, the import-to-GDP ratio, the logarithm of GDP per capita, the current-account-to-GDP ratio, the nominal exchange rate, and the real exchange rate. These controls allow us to absorb potential changes in demand. The coefficients γ_m capture the dynamic response of exports to high-risk destinations relative to low-risk destinations m years from 2014, the first year in which Basel III becomes effective. Standard errors are clustered at the firm level.[15]

The identification of the intensive-margin effects relies on the assumption that, absent Basel III, exports to high-risk and low-risk destinations would have evolved similarly within firm–product pairs. The main threat to this assumption is the presence of destination–year shocks—such as changes in demand or trade costs—that differentially affect high-risk destinations around the implementation of the reform and are not fully captured by observable destination-level controls. We mitigate this concern by exploiting within firm–product variation and including firm–product–year fixed effects, which absorb all time-varying shocks common to a firm–product pair, including changes in productivity, overall demand, and access to finance. In addition, we show in Online Appendix Figure B.7 that there is no differential change in tariffs imposed by high-risk destinations on Portuguese exports relative to low-risk destinations around the reform. We also flexibly control for destination–year fundamentals. The plausibility of the identifying assumption is assessed by examining pre-trends in an event-study framework.

[15]Standard errors are clustered at the firm level to account for arbitrary serial correlation and heteroskedasticity in export outcomes within firms over time, as well as cross-destination correlation induced by firm-level shocks to financing conditions or export capacity. In robustness checks, we alternatively cluster standard errors at the destination level and at the firm–destination level to allow for correlation within export markets. Inference is unaffected by these alternative clustering choices, as we show in Online Appendix Figure B.2.

Further evidence against a demand-driven explanation comes from the credit registry data. As shown in Section 6, the implementation of Basel III is associated with an increase in loan interest rates faced by exporting firms. This pattern is difficult to reconcile with a pure demand-side explanation: if exports to high-risk destinations were declining due to weaker demand, exporters would tend to borrow less, which would place downward, rather than upward, pressure on interest rates.

A related concern is that firms may respond to the increase in the cost of trade finance by reallocating exports toward low-risk destinations. Such reallocation would imply that the control group is not entirely unaffected by the reform, compressing the treated–control contrast and biasing estimates toward zero. We study reallocation explicitly later in the paper. Finally, adjustments along the extensive margin are analyzed separately, allowing the intensive-margin estimates to be interpreted independently of entry and exit dynamics.

We present the results from estimating equation (1) in Figure 4. We find no evidence of differential pre-trends: prior to the implementation of Basel III, exports to high-risk destinations evolve similarly to exports to low-risk destinations. Following 2014, however, exports to high-risk destinations exhibit a large, persistent, and statistically significant decline. Between 2013 and 2018, exports to high-risk destinations fall by approximately 20 percent relative to exports to low-risk destinations.

This magnitude closely mirrors the aggregate decline documented for high-risk destinations in Figure 3. If exports to low-risk destinations do not offset this contraction, the estimated intensive-margin response implies a 4.4 percent decline in total exports, using the fact that 22 percent of Portuguese exports were directed to high-risk destinations in 2013. Given that exports accounted for 27 percent of GDP in that year, this mechanically corresponds to a partial-equilibrium reduction in GDP of approximately 1.2 percent.

We also estimate a condensed version of the event-study specification by estimating the following difference-in-differences equation:

$$\log Y_{ipdt} = \mu_{ipd} + \lambda_{ipt} + \beta X_{dt} + \gamma \cdot \mathbf{1}\{t \geq 2014\} \cdot \mathbf{1}\{d \in \text{High-risk}\} + \varepsilon_{ipdt}, \tag{2}$$

where γ captures the average effect of Basel III on exports to high-risk destinations relative to low-risk destinations. Table II reports estimates of γ across a range of specifications. Across all specifications, we find that the implementation of Basel III is associated with a statistically and economically significant reduction in exports to high-risk destinations. Introducing more granular fixed effects increases the magnitude of the estimated coefficient, indicating that controlling for persistent firm–product–destination character-

istics is important. By contrast, the inclusion of destination-level controls has only a modest effect on the estimated treatment effect.[16]

A potential concern is that some major high-risk destinations—notably Angola and Brazil—experience economic downturns after 2014. To address this issue, Online Appendix Figure B.3 shows that excluding Angola, Brazil, both countries jointly, or China from the sample does not materially affect the estimated coefficients. Similarly, excluding extreme observations with very large or very small export values leaves the estimated average treatment effect unchanged (Online Appendix Figure B.5). We also restrict the sample to firms for which exports represent at least a given share of total sales. As shown in Online Appendix Figure B.6, these restrictions do not alter the estimated effects.

To further assess whether the estimated treatment effect could arise spuriously from destination-level shocks unrelated to the policy change, we implement a permutation test. The test repeatedly reassigns treatment status across destinations while holding fixed both the common treatment year and the fraction of treated destinations, and re-estimates equation (2) for each permutation. Online Appendix Figure B.4 reports the resulting distribution of placebo treatment effects. The baseline estimate, shown as a dashed line, lies in the extreme tail of this distribution, indicating that the observed effect is unlikely to be driven by chance destination-level variation or generic shocks common to treated destinations.

Finally, we examine the robustness of the results to alternative levels of aggregation. Aggregating the data across firms, products, or destinations changes both the unit of observation and the underlying correlation structure, providing a stringent test that the findings are not driven by idiosyncratic micro-level variation or a small number of firm–product–destination relationships. We continue to find a large and statistically significant decline in exports when aggregating across firms (Online Appendix Figure B.8), products (Online Appendix Figure B.9), or destinations (Online Appendix Figure B.10).

4.2 Within-Firm Product Reallocation

We next examine how firms adjust their product portfolios in response to the increase in the cost of trade finance induced by Basel III. We classify products according to their dependence on working capital using the cash conversion cycle (CCC). Products with a CCC above the cross-sectional median are classified as having high working-capital dependence, while products below the median are classified as having low working-capital

[16] Online Appendix Figure B.1 shows that the dynamic path of the treatment effects is also robust to alternative sets of controls.

dependence. Because the CCC is constructed using pre-reform data, it reflects technological characteristics of products rather than post-reform adjustments. We then estimate equation (2) separately for these two groups of products and report the results in Table III.

In our preferred specification, which includes destination-level controls, we find that the decline in exports to high-risk destinations relative to low-risk destinations is substantially larger for products with high working-capital dependence. Exports of high-CCC products decline by approximately 14 percent following the implementation of Basel III, corresponding to an average reduction of EUR 4,533 per firm–product–destination. By contrast, exports of low-CCC products decline by about 8 percent, or EUR 3,877. These results indicate that products requiring more working capital are disproportionately affected by the increase in the cost of trade finance.

This heterogeneity provides a direct test of the trade-finance mechanism underlying our analysis. Basel III raises the regulatory cost of extending trade finance, which should disproportionately affect products that require more working capital to bridge the gap between production and payment. The fact that export declines are concentrated in products with high working-capital dependence is therefore difficult to reconcile with a demand-side explanation, which would not predict differential effects across products within the same firm based on financing intensity.

Importantly, these results are identified using within-firm variation. By comparing high- and low-CCC products exported by the same firm, we isolate changes in the composition of firms' export portfolios rather than differences across firms with distinct product mixes. This design rules out explanations based on systematic differences between firms and shows that firms actively reallocate export activity away from products that are more intensive in working capital in response to the increase in the cost of trade finance.

We also study another form of within-firm product reallocation. For each firm, we define the *core product* as the product with the highest share of firm exports in 2013. In Online Appendix Table B.I, we show that the decline in exports to high-risk destinations relative to exports to low-risk destinations is lower for core products than it is for non-core products. As our design relies on within-firm variation, this implies that the share of the core product increases in high-risk destinations relative to low-risk destinations. This finding is consistent with Mayer, Melitz and Ottaviano (2014) who show that tougher competition induces firms to skew its product mix towards its core products.

4.3 Reallocation Across Destinations and Firm Scale

So far, we have studied the evolution of exports to high-risk destinations using exports to low-risk destinations as a control. A natural concern is that firms exporting to both types of destinations—the firms that identify the within-firm estimates—may reallocate exports away from high-risk destinations toward low-risk destinations following the implementation of Basel III. Such reallocation is consistent with the economic mechanism underlying our analysis, as Basel III raises the relative cost of trade finance for high-risk destinations, but it may affect the interpretation of the estimated treatment effects.

To study this reallocation directly, we exploit across-firm variation within low-risk destinations. We focus on exports to low-risk destinations and compare firms that exported to high-risk destinations in 2013 (treated firms) with firms that did not export to high-risk destinations in that year (control firms).[17] We estimate the following event-study specification:

$$\log Y_{ipdt} = \mu_{ipd} + \lambda_{pdt} + \beta X_{it} + \sum_{m=-4, m\neq -1}^{5} \gamma_m \cdot \mathbf{1}\{t = 2014 + m\} \cdot \mathbf{1}\{i \in \text{Treated}\} + \varepsilon_{ipdt}, \tag{3}$$

where μ_{ipd} denote firm–product–destination fixed effects and λ_{pdt} denote product–destination–year fixed effects. The vector X_{it} includes time-varying firm characteristics, namely total leverage (total liabilities over total assets), financial leverage (total debt over total assets), the ratio of cash holdings to assets, the logarithm of assets, the logarithm of employment, the share of exports in total sales, and the logarithm of total sales. The coefficients γ_m capture the dynamic response of exports to low-risk destinations of treated firms relative to control firms m years from 2014, the first year in which Basel III becomes effective. Standard errors are clustered at the firm level. Figure 5 reports the results.

We find that, following the implementation of Basel III, firms exposed to high-risk destinations increase their exports to low-risk destinations relative to firms without such exposure. Between 2013 and 2019, treated firms increase exports to low-risk destinations by approximately 14 percent relative to control firms. This pattern is consistent with a reallocation of exports away from high-risk destinations toward low-risk destinations. However, unlike the baseline results, this analysis relies on across-firm variation rather than within-firm variation. We therefore interpret these findings as suggestive evidence

[17] Online Appendix Figure A.9 shows that the distribution of firms' export exposure to high-risk destinations is sharply bimodal, with most firms concentrated either at zero or one, supporting this binary classification.

of reallocation rather than as causal estimates.

We also examine whether the increase in the cost of trade finance induced by Basel III is associated with changes in overall firm scale. To do so, we estimate the following event-study specification:

$$\log Y_{it} = \mu_i + \lambda_t + \beta X_{it} + \sum_{m=-4, m\neq -1}^{5} \gamma_m \cdot \mathbf{1}\{t = 2014 + m\} \cdot \mathbf{1}\{i \in \text{Treated}\} + \varepsilon_{it}, \quad (4)$$

where the outcome variable Y_{it} is either the logarithm of total domestic sales or the logarithm of total firm sales. The specification includes firm fixed effects μ_i, year fixed effects λ_t, and a vector of time-varying firm controls. The coefficients γ_m capture the dynamic evolution of outcomes for firms exposed to high-risk destinations relative to unexposed firms m years from 2014, the first year in which Basel III becomes effective. Standard errors are clustered at the firm level. Figure 6 reports the results.

Panel (a) shows that, prior to the implementation of Basel III, treated and control firms exhibit similar trends in domestic sales. Following the reform, however, treated firms experience a persistent decline in domestic sales relative to control firms. Between 2013 and 2019, domestic sales of treated firms fall by approximately 6 percent. Panel (b) shows a similar pattern for total firm-level sales, which also decline persistently for treated firms after 2014.

Taken together, these findings suggest that the effects of Basel III on trade extend beyond export volumes and destination choices and propagate to firms' overall scale of activity. While exposed firms partially reallocate exports toward low-risk destinations, this reallocation is incomplete. The resulting contraction in export activity is accompanied by a decline in domestic sales and total firm-level sales, indicating that tighter trade finance constraints affect production and sales more broadly. This pattern is consistent with working-capital frictions that operate at the firm level: when access to external finance becomes more costly, firms scale down production, affecting both foreign and domestic markets.

5 The Extensive Margin of Adjustment

This section examines how firms adjust along the extensive margin in response to the increase in trade-finance costs induced by Basel III. We distinguish between two conceptually separate decisions: whether firms continue to serve high-risk destinations at all, and—conditional on serving a destination group—how many products they export. This

distinction is essential, as the same regulatory shock can simultaneously induce exit by marginal firms and trigger active portfolio adjustment among firms that remain in affected markets.

5.1 Destination Exit: Extensive Margin Across Markets

So far, we have focused on firms' adjustments along the intensive margin. However, as shown in Figure 3, changes in export participation also contribute importantly to aggregate outcomes. By increasing the cost of trade finance for exports involving high-risk destinations, Basel III raises the marginal cost of operating in these markets and reduces expected operating profits. Standard heterogeneous-firm models of trade (Melitz, 2003) therefore predict exit from, or reduced entry into, affected destinations.

To test this prediction, we construct a balanced dataset at the firm–destination-group–year level, where destination groups are defined as high-risk and low-risk destinations. We estimate the following event-study specification:

$$Y_{igt} = \mu_g + \lambda_{it} + \sum_{m=-4, m\neq -1}^{5} \gamma_m \cdot \mathbf{1}\{t = 2014 + m\} \cdot \mathbf{1}\{g = \text{High-risk}\} + \varepsilon_{igt}, \qquad (5)$$

where Y_{igt} is an indicator equal to one if firm i exports to at least one destination in group g in year t, and zero otherwise. The specification includes destination-group fixed effects μ_g and firm–year fixed effects λ_{it}, which absorb all time-varying firm-level shocks affecting export participation. Identification therefore comes from within-firm changes over time in export participation across destination groups. Standard errors are clustered at the firm level. Figure 7 reports the results.

Following the implementation of Basel III, the likelihood that a firm exports to high-risk destinations declines sharply relative to low-risk destinations. Between 2013 and 2019, the probability that a firm exports to at least one high-risk destination falls by approximately 3 percentage points, corresponding to a 26 percent decline relative to the pre-reform mean. The effect is persistent and economically large.

These results reflect adjustments along the extensive margin of destination choice and are conceptually distinct from the intensive-margin responses documented earlier. They capture firms' decisions about whether to operate in high-risk destinations at all, rather than how much to sell once active.

Importantly, these effects are not driven by firms exiting export markets altogether. Online Appendix Table C.I shows that the results are robust when restricting the sample to firms that always export, as well as to firms that export continuously after 2013. More-

over, Online Appendix Figure C.1 shows that firms exposed to high-risk destinations reduce the number of destinations they serve following the implementation of Basel III, relative to firms exporting exclusively to low-risk destinations.

Our finding that a credit-cost shock affects trade through the extensive margin of destination choice complements and extends the existing literature. Paravisini et al. (2015), in their study of Peruvian exporters, find no effects on entry or exit following a credit shock, a result that is difficult to reconcile with heterogeneous-firm trade models such as Melitz (2003). Two features of our setting help explain this difference. First, Basel III represents a persistent, regulatory-driven increase in the cost of trade finance, whereas much of the existing literature focuses on temporary or transitory credit shocks. Second, our analysis spans six years after the reform, allowing sufficient time for firms to adjust destination participation decisions that may involve sunk costs, long-term relationships, or organizational restructuring. These differences suggest that extensive-margin responses to credit conditions may emerge primarily in response to permanent shocks and over longer adjustment horizons.

5.2 Product Scope: Exit Versus Within-Destination Adjustment

We next examine the second extensive margin of adjustment: the number of products a firm exports to a given destination group. The effect of Basel III on product scope is *ex ante* ambiguous because it reflects the interaction of two distinct decisions. First, firms may exit high-risk destinations altogether, mechanically reducing product scope to zero. Second, conditional on remaining active in a destination group, firms may actively adjust their product portfolios in response to higher trade-finance costs—for example, by reallocating toward products with lower working-capital requirements, as suggested by the within-firm product-mix evidence in Section 4.

To disentangle these forces, we construct a balanced dataset at the firm–destination-group–year level and study the number of products that firm i exports to destination group g in year t. Because the outcome is a count variable with a large mass at zero—reflecting firm–group pairs with no exports—we estimate an event-study specification using a Poisson model:

$$\log \mathbb{E}[Y_{igt}] = \mu_g + \lambda_{it} + \sum_{m=-4, m\neq -1}^{5} \gamma_m \cdot \mathbf{1}\{t = 2014 + m\} \cdot \mathbf{1}\{g = \text{High-risk}\}. \qquad (6)$$

Here Y_{igt} denotes the number of products exported by firm i to destinations in group g in year t. The specification includes destination-group fixed effects μ_g and firm–year

fixed effects λ_{it}, which absorb all time-varying firm-level shocks affecting overall export scope or capacity. The Poisson estimator allows us to retain zero observations and interpret coefficients as proportional changes in expected product scope. Standard errors are clustered at the firm level. Figure 8 reports the results.

We estimate equation (6) on four samples designed to separate destination exit from within-destination product-scope adjustment. We begin with the full balanced sample, which includes firm–group–year observations with zero products. We then progressively restrict attention to firm–group–year observations with (i) at least one product, (ii) more than one product, and (iii) more than five products, thereby focusing on firms that remain active and have meaningful product scope within the destination group.

The results reveal a sharp and economically informative contrast across samples. In the full balanced sample, the number of products sold to high-risk destinations declines relative to low-risk destinations after 2014. Between 2013 and 2019, the estimated decline is approximately 28 percent. This negative effect primarily reflects exit from high-risk destinations: as firms cease exporting to these destinations, product scope falls mechanically through the appearance of zeros.

By contrast, once we condition on continued participation—restricting attention to firm–group pairs with at least one product—the estimated effect reverses sign. Among firms that remain active in high-risk destinations, product scope increases relative to low-risk destinations. Moreover, the positive effect becomes larger as we restrict the sample to firms with more substantial initial scope. These findings indicate that, conditional on remaining in the market, firms actively adjust their product portfolios rather than uniformly contracting.

This interpretation is reinforced by direct evidence on product characteristics. Online Appendix Figure C.2 shows that firms operating in high-risk destinations experience a decline in their average cash conversion cycle relative to firms exporting only to low-risk destinations, where the average CCC is computed as a product-share-weighted average across exported products. Taken together, the evidence points to a two-stage adjustment: Basel III induces exit from high-risk destinations among marginal exporters, while surviving exporters adapt by expanding their product scope toward products with lower working-capital requirements.

6 Effects on Credit Conditions

The preceding sections document large and persistent effects of Basel III on firms' export behavior, consistent with an increase in the cost of bank-intermediated trade finance. In

this section, we provide direct evidence on the underlying mechanism by examining how the reform affected loan pricing, loan quantities, and credit access using matched data from the Portuguese credit registry.

6.1 Loan Pricing and Loan Amounts

The trade patterns documented above suggest that Basel III operates through tighter credit conditions for firms exposed to high-risk destinations. To test this mechanism directly, we study how the reform affected the pricing and size of short-term bank loans obtained by exporting firms. Using matched credit registry data, we compare the evolution of credit conditions for firms with high versus low exposure to high-risk destinations.

The ideal empirical design would compare loan terms for trade finance transactions associated with high-risk and low-risk destinations within the same firm–product pair, mirroring the export-level identification in Section 4. This is not feasible in practice, as we cannot directly identify trade finance loans nor allocate individual loans to specific export destinations within a firm. We therefore adopt an approach that exploits cross-sectional variation in firms' exposure to high-risk destinations.

Specifically, we classify firms as treated if their share of exports to high-risk destinations in 2013—the year prior to the implementation of Basel III—is above the cross-sectional median. Firms below the median constitute the control group.[18] The key identifying assumption is that firms with greater exposure to high-risk destinations are more likely to use short-term bank credit to finance exports to those destinations, while the probability that a given loan is related to export activity does not change discontinuously at the exposure threshold.

Our analysis uses the matched sub-sample of the Portuguese credit registry, organized at the firm–bank–loan–year level. We restrict attention to newly originated loans with maturities of at most 180 days. This restriction captures loans that are either trade finance loans or close substitutes, such as working-capital credit used to bridge production and payment delays. Including non–trade-finance loans introduces measurement error in treatment assignment, as such loans should not be differentially affected by Basel III. This misclassification biases estimates toward zero, rendering our results conservative.

We estimate the following difference-in-differences specification:

$$Y_{ikbt} = \alpha_i + \lambda_{bt} + \beta X_{ikbt} + \gamma \cdot \mathbf{1}\{t \geq 2014\} \cdot \mathbf{1}\{i \in \text{Treated}\} + \varepsilon_{ikbt}, \tag{7}$$

[18] We exclude firms that export exclusively to high-risk or exclusively to low-risk destinations. This mirrors the identifying variation in Section 4, where treatment effects are identified from firms that export to both destination types.

where Y_{ikbt} is either the logarithm of the loan amount or the interest rate of loan k obtained by firm i from bank b in year t. The specification includes firm fixed effects α_i, which absorb time-invariant firm characteristics, and bank–year fixed effects λ_{bt}, which absorb bank-specific funding conditions, regulatory responses, and aggregate credit supply shocks.

The vector X_{ikbt} includes time-varying loan- and firm-level controls: loan maturity, an indicator for collateralization, the logarithm of total sales, the sales-to-assets ratio, leverage, EBITDA-to-assets, sales growth, labor productivity, the ratio of current to total liabilities, the ratio of current to total assets, and the square of firm age. The coefficient γ captures the average effect of Basel III on credit conditions for firms more exposed to high-risk destinations. Standard errors are clustered at the firm level.

The inclusion of firm fixed effects and rich firm-level controls in equation (7) ensures that identification of the average treatment effect is driven by differential exposure to Basel III arising from firms' export portfolios, rather than from time-invariant firm characteristics or changes in overall firm scale. In addition, bank–year fixed effects absorb shocks to credit supply at the bank level, including balance-sheet adjustments, funding conditions, and other regulatory responses. This is particularly important in the Portuguese context, where the banking sector is highly concentrated and relatively weakly capitalized, implying that Basel III may have affected bank lending more broadly than through its direct impact on trade finance alone.

A remaining concern is that firms exposed to high-risk destinations may substitute away from bank credit toward alternative sources of financing that are not affected by Basel III. To assess this possibility, we examine whether the number of loans obtained by treated firms declines relative to control firms following the reform. As shown in Online Appendix Table D.I, we find no evidence of a statistically significant reduction in the number of loans. This lack of substitution is consistent with institutional features of the Portuguese economy, where bank credit represents the primary—and often only—source of external finance for the vast majority of firms. Together, these results support the interpretation that the estimated effects reflect tighter credit conditions rather than a compositional shift toward alternative financing instruments.

The results are reported in Table IV. Firms with greater exposure to high-risk destinations obtain significantly smaller loans following the implementation of Basel III. In our preferred specification (column 3), treated firms receive loans that are, on average, 7 percent smaller than those obtained by control firms.

Interest rates respond more modestly. Column (6) shows that treated firms face interest rates that are 13 basis points higher than those faced by control firms. Relative to

the average interest rate of 7.3 percent in 2013, this corresponds to an increase of approximately 1.8 percent.

The asymmetric adjustment of loan quantities and prices is consistent with standard credit-market responses to increases in regulatory capital costs. Basel III raises the cost to banks of extending short-term credit associated with high-risk destinations. Firms respond by adjusting loan sizes, while bank-level constraints, borrower selection, and credit rationing limit the extent to which higher capital costs are fully passed through to interest rates. As a result, the primary adjustment occurs along the quantity margin rather than the price margin.

Taken together, these results indicate that the export contraction documented earlier is driven by tighter credit conditions rather than weaker foreign demand. A demand-driven decline in exports would reduce firms' need for working capital, placing downward pressure on interest rates. Instead, we observe smaller loan sizes combined with higher borrowing costs, consistent with a contraction in credit supply.

6.2 Credit Rationing

Loan pricing and quantity responses capture how Basel III affected firms that continue to obtain bank financing. However, changes in regulatory capital requirements may also operate along an extensive margin of credit allocation—namely, whether firms obtain bank credit at all. This margin is particularly relevant in the presence of credit rationing (Stiglitz and Weiss, 1981), where interest rates do not fully clear the market.

Two forces imply that this margin is important in our setting. First, Basel III increases the cost of extending short-term credit associated with high-risk destinations, which can induce banks to tighten lending standards. Second, selection effects arise as firms that exit high-risk destinations or lose access to credit tend to be smaller and less productive. Because banks typically offer more favorable terms to higher-quality borrowers, this selection works against finding large increases in observed interest rates, biasing price-based estimates downward.

Both mechanisms imply a clear empirical prediction: firms with greater exposure to high-risk destinations should become less likely to obtain bank credit following the implementation of Basel III. We test this prediction by estimating:

$$\text{ReceivesLoan}_{it} = \alpha_i + \lambda_t + \beta X_{it} + \gamma \cdot \mathbf{1}\{t \geq 2014\} \cdot \mathbf{1}\{i \in \text{Treated}\} + \varepsilon_{it}, \tag{8}$$

where the dependent variable equals one if firm i obtains at least one bank loan in year t. The specification includes firm and year fixed effects and time-varying firm controls.

Standard errors are clustered at the firm level.

The results, reported in Table V, show a statistically and economically significant decline in credit access for treated firms. In our preferred specification, the probability of receiving a loan falls by 5.9 percentage points relative to control firms, corresponding to a decline of approximately 7 percent relative to the pre-reform mean.

Taken together with the evidence on loan amounts and interest rates, these findings point to a tightening of credit supply along both intensive and extensive margins. Firms exposed to high-risk destinations are less likely to obtain bank credit at all; conditional on receiving a loan, they obtain smaller amounts and face higher borrowing costs. The decline in loan incidence implies positive selection among borrowers, further dampening observed interest-rate responses and reinforcing the interpretation that Basel III operates primarily through tighter credit supply rather than changes in credit demand.

7 Conclusion

This paper studies how tighter credit conditions reshape firms' international trade decisions. Exploiting a regulatory change under Basel III that raised the cost of trade finance for exports to high-risk destinations, we provide causal evidence that credit tightening affects trade along multiple margins. Beyond large declines in export volumes, firms adjust their market participation, product scope, and access to external finance, generating effects that are economically meaningful and persistent.

Our results contribute to the literature in three main ways. First, we show that credit shocks propagate through both intensive and extensive margins of trade, including destination exit and product-scope adjustments—channels that are largely absent from existing empirical evidence. Second, by exploiting within-firm variation across destinations and products, we document active reallocation within firms' export portfolios, highlighting how financing constraints shape not only how much firms export, but also where they export and what they produce. Third, using matched credit registry data, we directly link these real adjustments to tighter credit supply, showing that exposed firms receive smaller loans, face higher borrowing costs, and are less likely to obtain bank credit altogether.

Taken together, our findings imply that macroprudential regulation can have substantial real effects beyond the banking sector, operating through firm-level financing constraints that distort trade patterns and production choices. More broadly, the results underscore the importance of credit conditions for understanding the dynamics of international trade and the long-run consequences of regulatory interventions.

References

Ahn, JaeBin, Mary Amiti, and David E Weinstein (2011) "Trade Finance and the Great Trade Collapse," *American Economic Review*, 101 (3), 298–302.

Aiyar, Shekhar, Charles W Calomiris, John Hooley, Yevgeniya Korniyenko, and Tomasz Wieladek (2014) "The International Transmission of Bank Capital Requirements: Evidence From The UK," *Journal of Financial Economics*, 113 (3), 368–382.

Amiti, Mary and David E Weinstein (2011) "Exports and Financial Shocks," *The Quarterly Journal of Economics*, 126 (4), 1841–1877.

Antràs, Pol and C Fritz Foley (2015) "Poultry In Motion: A Study of International Trade Finance Practices," *Journal of Political Economy*, 123 (4), 853–901.

Benmelech, Effi, Carola Frydman, and Dimitris Papanikolaou (2016) "Financial Frictions and Employment during the Great Depression," *Journal of Financial Economics*.

BIS (2015) "Treatment of Trade Finance Under The Basel Capital Framework," https://www.bis.org/press/p111025.htm.

Borensztein, Eduardo, Kevin Cowan, and Patricio Valenzuela (2013) "Sovereign Ceilings "Lite"? The Impact of Sovereign Ratings on Corporate Ratings," *Journal of Banking & Finance*, 37 (11), 4014–4024.

Chodorow-Reich, Gabriel (2014) "The Employment Effects of Credit Market Disruptions: Firm-level Evidence from the 2008–9 Financial Crisis," *The Quarterly Journal of Economics*, 129 (1), 1–59.

Chor, Davin (2010) "Unpacking Sources of Comparative Advantage: A Quantitative Approach," *Journal of International Economics*, 82 (2), 152–167.

Chor, Davin and Kalina Manova (2012) "Off the Cliff and Back? Credit Conditions and International Trade During the Global Financial Crisis," *Journal of International Economics*, 87 (1), 117–133.

De Loecker, Jan (2011) "Product Differentiation, Multiproduct Firms, and Estimating the Impact of Trade Liberalization on Productivity," *Econometrica*, 79 (5), 1407–1451.

Djankov, Simeon, Caroline Freund, and Cong S Pham (2010) "Trading on Time," *The Review of Economics and Statistics*, 92 (1), 166–173.

Gertler, Mark and Kenneth Rogoff (1990) "North-South Lending and Endogenous Domestic Capital Market Inefficiencies," *Journal of Monetary Economics*, 26 (2), 245–266.

Gropp, Reint, Thomas Mosk, Steven Ongena, and Carlo Wix (2019) "Banks Response to Higher Capital Requirements: Evidence from a Quasi-Natural Experiment," *The Review of Financial Studies*, 32 (1), 266–299.

Hanson, Samuel G, Anil K Kashyap, and Jeremy C Stein (2011) "A Macroprudential Approach to Financial Regulation," *Journal of economic Perspectives*, 25 (1), 3–28.

Hausmann, Ricardo, César A Hidalgo, Sebastián Bustos, Michele Coscia, and Alexander Simoes (2014) *The Atlas of Economic Complexity: Mapping Paths to Prosperity*, Mit Press.

Huber, Kilian (2018) "Disentangling the Effects of a Banking Crisis: Evidence from German Firms and Counties," *American Economic Review*, 108 (3), 868–98.

Hummels, David L and Georg Schaur (2013) "Time As A Trade Barrier," *American Economic Review*, 103 (7), 2935–59.

Kashyap, Anil K and Jeremy C Stein (2004) "Cyclical Implications of the Basel II Capital Standards," *Economic Perspectives-Federal Reserve Bank Of Chicago*, 28 (1), 18–33.

Khwaja, Asim Ijaz and Atif Mian (2008) "Tracing the Impact of Bank Liquidity Shocks: Evidence from an Emerging Market," *American Economic Review*, 98 (4), 1413–42.

Manova, Kalina (2013) "Credit Constraints, Heterogeneous Firms, and International Trade," *Review of Economic Studies*, 80 (2), 711–744.

Matsuyama, Kiminori (2005) "Credit Market Imperfections and Patterns of International Trade and Capital Flows," *Journal of the European Economic Association*, 3 (2-3), 714–723.

Mayer, Thierry, Marc J Melitz, and Gianmarco IP Ottaviano (2014) "Market Size, Competition, and the Product Mix of Exporters," *American Economic Review*, 104 (2), 495–536.

Melitz, Marc J (2003) "The impact of Trade on Intra-Industry Reallocations and Aggregate Industry Productivity," *Econometrica*, 71 (6), 1695–1725.

Minetti, Raoul and Susan Chun Zhu (2011) "Credit Constraints and Firm Export: Microeconomic Evidence from Italy," *Journal of International Economics*, 83 (2), 109–125.

Niepmann, Friederike and Tim Schmidt-Eisenlohr (2017) "International Trade, Risk and the Role of Banks," *Journal of International Economics*, 107, 111–126.

Paravisini, Daniel (2008) "Local Bank Financial Constraints and Firm Access to External Finance," *The Journal of Finance*, 63 (5), 2161–2193.

Paravisini, Daniel, Veronica Rappoport, Philipp Schnabl, and Daniel Wolfenzon (2015) "Dissecting the Effect of Credit Supply on Trade: Evidence from Matched Credit-Export Data," *Review of Economic Studies*, 82 (1), 333–359.

Pierce, Justin R. and Peter K. Schott (2009) "A Concordance Between Ten-Digit U.S. Harmonized System Codes and SIC/NAICS Product Classes and Industries," working paper.

Rajan, Raghuram and Luigi Zingales (1998) "Financial Development and Growth," *American Economic Review*, 88 (3), 559–586.

Repullo, Rafael and Javier Suarez (2013) "The Procyclical Effects of Bank Capital Regulation," *The Review of financial studies*, 26 (2), 452–490.

Schmidt-Eisenlohr, Tim (2013) "Towards a Theory of Trade Finance," *Journal of International Economics*, 91 (1), 96–112.

Stiglitz, Joseph E and Andrew Weiss (1981) "Credit Rationing in Markets with Imperfect Information," *American Economic Review*, 71 (3), 393–410.

Figures and Tables

FIGURE 1: Trade Finance

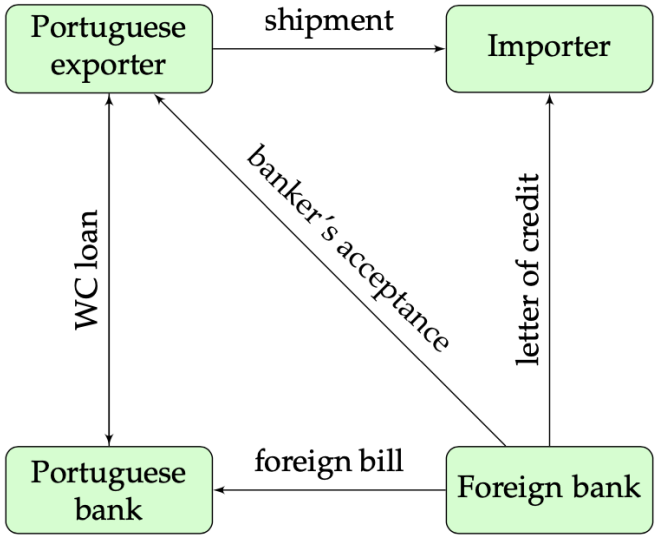
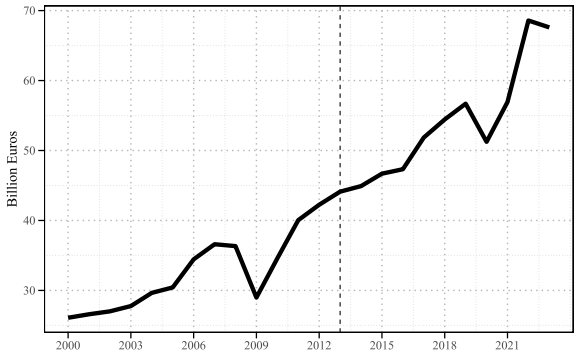


FIGURE 2: Evolution of Portuguese Exports

This figure shows the evolution of Portuguese exports. In Panel (a), we plot the value of exports in billion Euros. In Panel (b), we plot the share of exports to high-risk destinations.

(a) Total Exports



(b) Share of Exports to High-Risk Countries

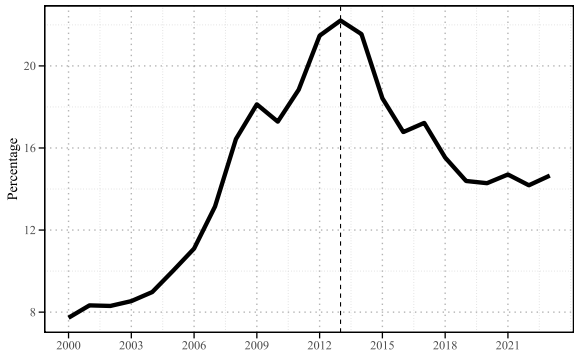
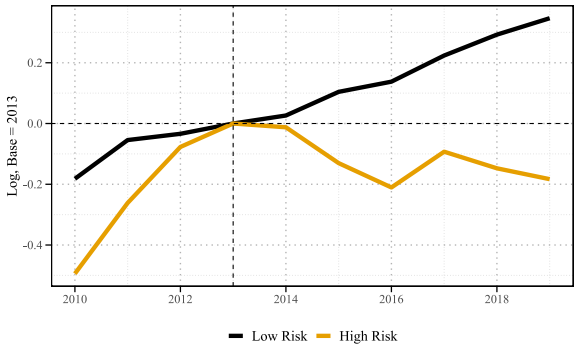


FIGURE 3: Decomposition of Portuguese Exports

This figure plots the evolution of Portuguese exports decomposed into the intensive margin in panel (a) (average exports per firm) and the extensive margin in panel (b) (number of exporters). We further decompose exports into exports to low-risk and exports into high-risk destinations. All time-series are in logs and are scaled by the 2013 value.

(a) Intensive Margin



(b) Extensive Margin

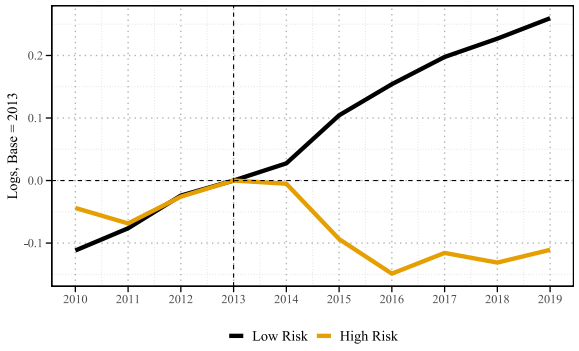


FIGURE 4: Effect on the Intensive Margin of Exports

This figure presents the results of estimating equation (1) on our full sample. The outcome variable is the logarithm of the value of exports. We include firm-product-year fixed effects and firm-product-destination fixed effects. We also include a vector of time-varying destination controls which includes the log of GDP, the log of total imports, the ratio of imports to GDP, the log of GDP per capita, the ratio of the current account to GDP, the nominal exchange rate, and the real exchange rate. The treated group contains high-risk destinations and the control group contains low-risk destinations. We present the estimates for the average treatment effects over time. Standard errors are clustered at the firm level. We present 95 percent confidence intervals.

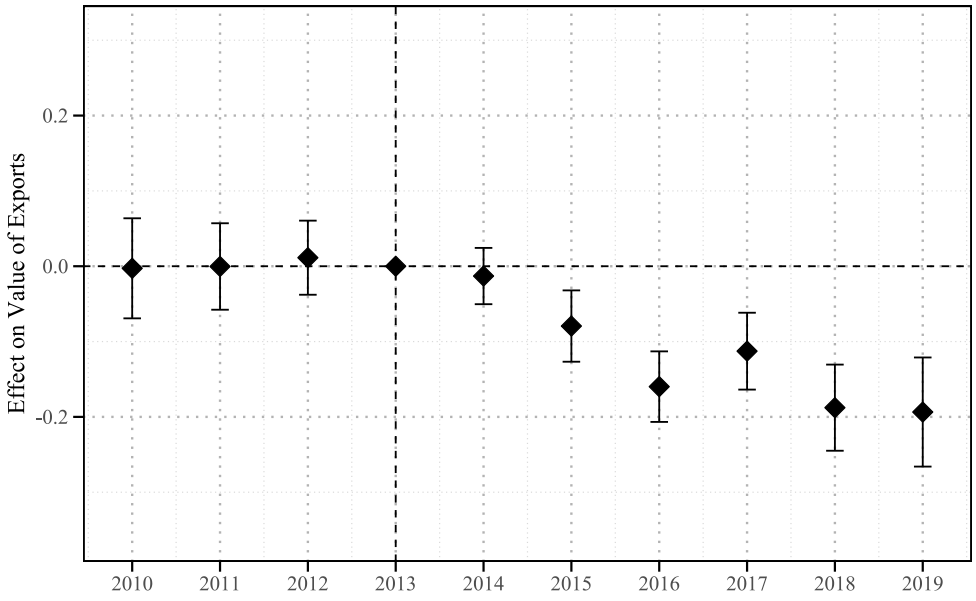


FIGURE 5: Effect on Exports to Low-Risk Destinations

This figure presents the results of estimating equation (3) including only exports to low-risk destinations. The outcome variable is the logarithm of the value of exports. We include destination-product-year fixed effects and firm-product-destination fixed effects. We also include a vector of time-varying firm controls which includes total leverage (total liabilities over total assets), financial leverage (total debt over total assets), the ratio of cash holdings to assets, the log of assets, the log of the number of workers, the share of exports in total sales, and the log of sales. The treated group contains firms that, in 2013, exported to high-risk destinations and the control group contains firms that, in 2013, did not export to high-risk destinations. We present the estimates for the average treatment effects over time. Standard errors are clustered at the firm level. We present 95 percent confidence intervals.

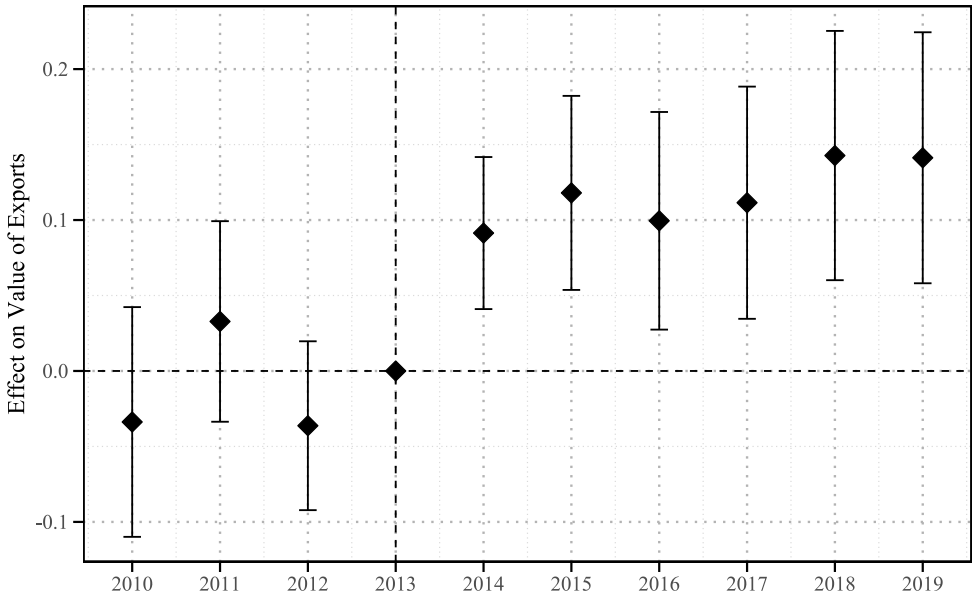
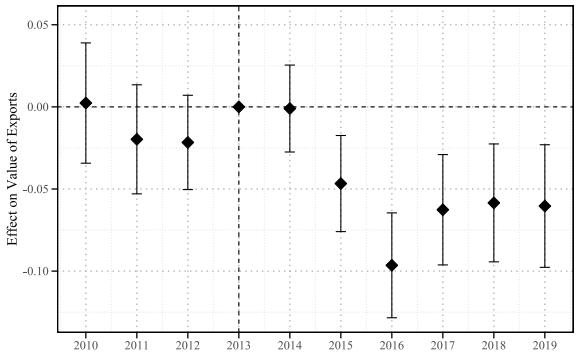


FIGURE 6: Effect on Total Sales

This figure presents the results of estimating equation (4) for two outcome variables: the logarithm of total domestic sales, and the logarithm of total firm-level sales. We include firm and year fixed effects. We also include a vector of time-varying firm controls which includes total leverage (total liabilities over total assets), financial leverage (total debt over total assets), the ratio of cash holdings to assets, the log of assets, the log of the number of workers, the share of exports in total sales, and the log of sector-level sales. The treated group contains firms that, in 2013, exported to high-risk destinations and the control group contains firms that, in 2013, did not export to high-risk destinations. We present the estimates for the average treatment effects over time. Standard errors are clustered at the firm level. We present 95 percent confidence intervals.

(a) Domestic Sales



(b) Total Sales

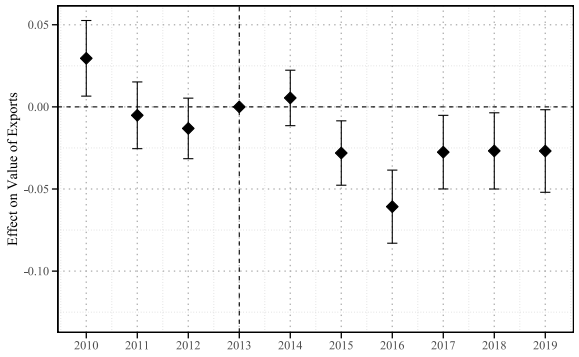


FIGURE 7: Effect on the Extensive Margin of Exports

This figure presents the results of estimating equation (5), where the outcome variable is an indicator variable which takes the value of one if the firm exports to the destination group and zero if otherwise. We consider two groups of destinations - high-risk and low-risk countries. We include destination group and firm-year fixed effects. We compare high-risk destinations (the treated group) with low-risk destinations (the control group). We present the estimates for the average treatment effects over time. Standard errors are clustered at the firm level. We present 95 percent confidence intervals.

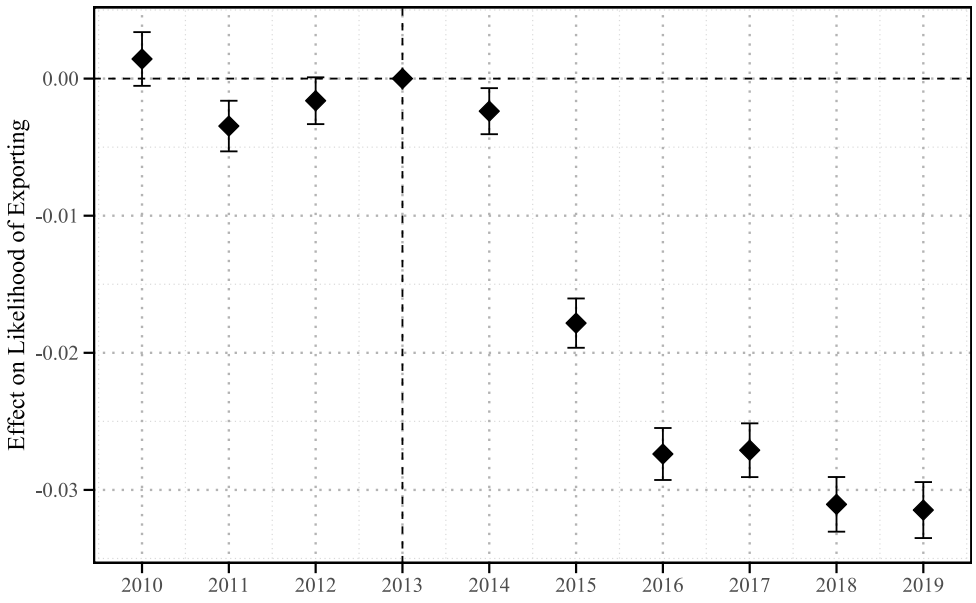


FIGURE 8: Effect on the Extensive Margin of Exports - Number of Products

This figure presents the results of estimating equation (6), where the outcome variable is the number of products sold by a firm to a destination group in a given year. We consider two groups of destinations - high-risk and low-risk countries. We include destination group and firm-year fixed effects. We compare high-risk destinations (the treated group) with low-risk destinations (the control group). We present the estimates for the average treatment effects over time. We estimate the event study for four subsamples: (1) using all observations, (2) using only observations with at least one product, (3) using only observations with more than one product, and (4) using only observations with more than five products. Standard errors are clustered at the firm level. We present 95 percent confidence intervals.

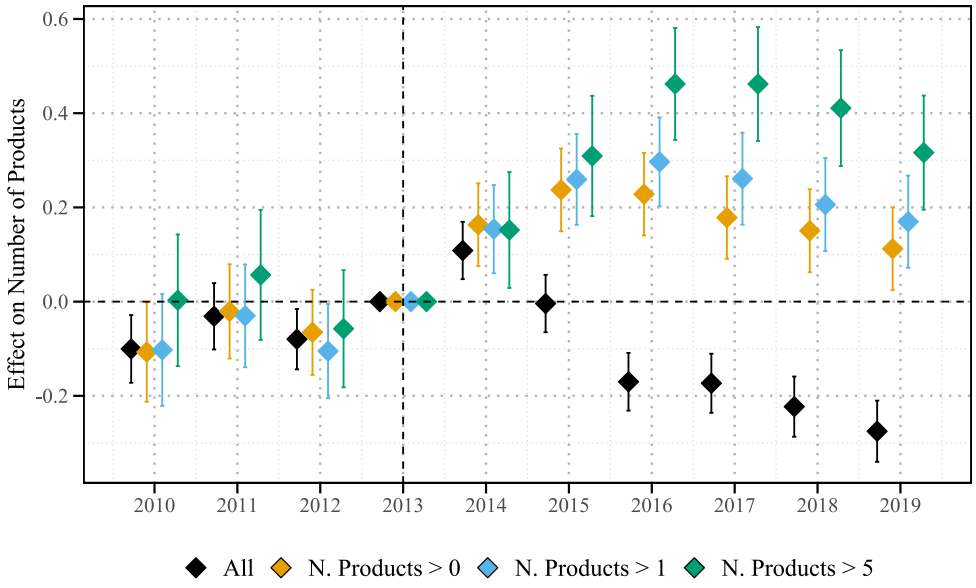


TABLE I: Summary Statistics

This table presents summary statistics for our sample in 2013. For each variable, we compute the mean, median, standard deviation, minimum and maximum across all firms. Using the full sample, we present summary statistics for the number of destinations to which a firm exports, the number of products, the average number of products per destination, the export intensity (exports as a share of total sales), the share of exports to high-risk destinations, and the average cash conversion cycle (weighted average of the cash conversion cycle of each product, where the weights are the products shares of sales for the firm). Using the sample merged with the credit registry, we present summary statistics for the number of loans the firms obtained in that year, the number of banks from which the firm borrows, and the average loan maturity.

Variable	Mean	Median	Std. Dev.	Min.	Max.	N
Number of destinations	3.30	1.00	6.04	1.00	119.00	26,369
Number of products	9.69	2.00	22.90	1.00	492.00	26,369
Avg. n. of products	5.78	2.00	13.96	1.00	366.00	26,369
Export intensity	0.25	0.08	0.31	0.00	1.00	21,832
Share of high-risk destinations	0.79	1.00	0.41	0.00	1.00	26,369
Avg. CCC	88.12	88.53	27.09	0.00	154.89	25,953
Number of loans	15.72	4.00	46.28	1.00	1,717.00	11,159
Number of banks	1.72	1.00	1.15	1.00	9.00	11,159
Loan maturity (in days)	371	92	661	1	6,995	11,159

TABLE II: Effect on the Intensive Margin of Exports

This figure presents the results of estimating equation (2) on our full sample. The outcome variable is the logarithm of the value of exports. We include firm-product-year fixed effects and firm-product-destination fixed effects. We also include a vector of time-varying destination controls which includes the log of GDP, the log of total imports, the ratio of imports to GDP, the log of GDP per capita, the ratio of the current account to GDP, the nominal exchange rate, and the real exchange rate. The treated group contains high-risk destinations and the control group contains low-risk destinations. We present the estimates for the average treatment effects. Standard errors are clustered at the firm level. ***, **, * denote significance at 1 percent, 5 percent, and 10 percent respectively.

	(1)	(2)	(3)	(4)
High-Risk x Post	-0.005	-0.067**	-0.129***	-0.110***
	(0.027)	(0.029)	(0.021)	(0.022)
Firm x Year FE	✓			
Product x Year FE	✓			
Destination FE	✓	✓		
Firm x Product x Year FE		✓	✓	✓
Firm x Destination x Product FE			✓	✓
Controls				✓
Observations	3,741,194	3,741,194	3,741,194	3,650,181
R^2	0.46	0.81	0.96	0.96

TABLE III: Effect on the Product Mix

This figure presents the results of estimating equation (2) on our full sample. The outcome variable is the logarithm of the value of exports. We include firm-product-year fixed effects and firm-product-destination fixed effects. We also include a vector of time-varying destination controls which includes the log of GDP, the log of total imports, the ratio of imports to GDP, the log of GDP per capita, the ratio of the current account to GDP, the nominal exchange rate, and the real exchange rate. The treated group contains high-risk destinations and the control group contains low-risk destinations. We present the estimates for the average treatment effects. We estimate the event study for products with a low dependence on working capital (CCC below the median) and for products with a high dependence on working capital (CCC above the median). Standard errors are clustered at the firm level. ***, **, * denote significance at 1 percent, 5 percent, and 10 percent respectively.

	(1)		(2)	
	Low CCC	High CCC	Low CCC	High CCC
High-Risk x Post	-0.126***	-0.130***	-0.081**	-0.142***
	(0.025)	(0.029)	(0.025)	(0.030)
Firm x Product x Year FE	✓	✓	✓	✓
Firm x Product x Destination FE	✓	✓	✓	✓
Controls			✓	✓
Observations	1,802,729	1,895,654	1,754,353	1,855,984
R^2	0.96	0.95	0.96	0.95

TABLE IV: Effect on Credit Conditions

This table presents the results of estimating equation (7), where the dependent variable is either the loan amount or the interest rate for loan k obtained by firm i from bank b in year t. We use individual loan data for exporters from 2013 to 2018, and consider only loans with maturities under 180 days. We include firm and bank-year fixed effects. We also include a vector of time-varying controls which includes loan maturity, an indicator variable for whether the loan is collateralized, the log of total sales, the sales-to-asset ratio, the leverage ratio, the EBITDA-to-assets ratio, the growth rate of total sales, labor productivity, the ratio of current-to-total liabilities, the ratio of current-to-total assets, and the firm's age squared. The treated group contains firms with a high exposure to high-risk destination and the control group contains firms with a low exposure to high-risk destinations. We present the estimates for the average treatment effects. Standard errors are clustered at the firm level. ***, **, * denote significance at 1 percent, 5 percent, and 10 percent respectively.

	Loan Amounts			Interest Rates		
	(1)	(2)	(3)	(4)	(5)	(6)
Treated x Post	-0.067**	-0.063**	-0.072**	0.084	0.124*	0.133*
	(0.026)	(0.028)	(0.026)	(0.064)	(0.066)	(0.062)
Firm FE	✓	✓	✓	✓	✓	✓
Year FE	✓			✓		
Bank FE	✓			✓		
Bank x Year FE		✓	✓		✓	✓
Controls	✓		✓	✓		✓
Observations	793,984	795,077	793,981	793,984	795,077	793,981

TABLE V: Effect on Likelihood of Obtaining a Loan

This table presents the results of estimating equation (7), where the dependent variable is an indicator variable that takes the value of one if the firm receives at least one bank loan in the year, and zero if otherwise. We use individual loan data for exporters from 2013 to 2018, and consider only loans with maturities under 180 days. We include firm and year fixed effects. We also include a vector of time-varying firm controls which includes the log of total sales, the sales-to-asset ratio, the leverage ratio, the EBITDA-to-assets ratio, the growth rate of total sales, labor productivity, the ratio of current-to-total liabilities, the ratio of current-to-total assets, and the firm's age squared. The treated group contains firms with a high exposure to high-risk destination and the control group contains firms with a low exposure to high-risk destinations. We present the estimates for the average treatment effects. Standard errors are clustered at the firm level. ***, **, * denote significance at 1 percent, 5 percent, and 10 percent respectively.

	(1)	(2)	(3)	(4)
Treated x Post	-0.063***	-0.064***	-0.057***	-0.059***
	(0.008)	(0.008)	(0.008)	(0.008)
Firm FE	✓	✓		✓
Year FE		✓		✓
Controls			✓	✓
Observations	66,954	66,954	61,444	61,156

Online Appendix

A Data

FIGURE A.1: High- and Low-Risk Destinations under Basel III

This Figure presents the geographic distribution of high- and low-risk countries according to the OECD classification in 2013.

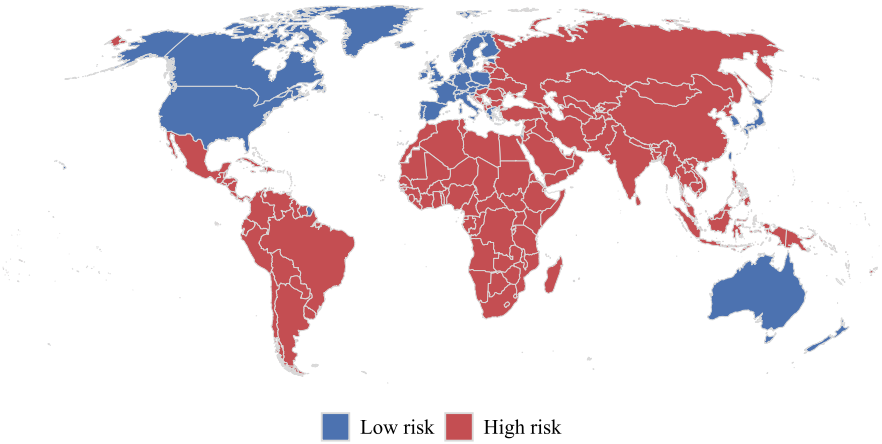


FIGURE A.2: Sovereign Risk Rating by OECD Risk Classification

This Figure presents the number decomposition of the number of countries by their OECD risk classification (low- or high-risk) and their Moody's sovereign rating in 2013. We coarsen the Moody's rating into four groups: (1) Prime Investment Grade (Aaa-Aa3), (2) Lower Investment Grade (A1-Baa3), (3) Speculative (Ba1-B3), and (4) Very High Risk (Caa1 and below).

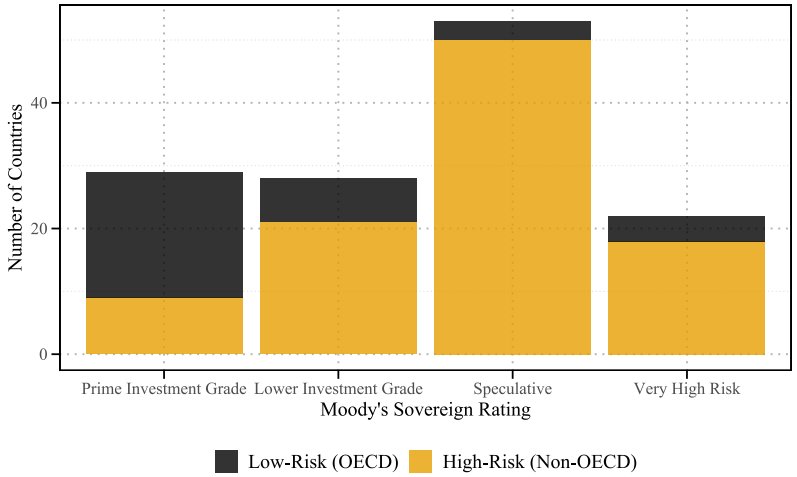


FIGURE A.3: Geographic Distribution of Portuguese Exports

This Figure presents the geographic distribution of Portuguese exports in 2013, in Euros.

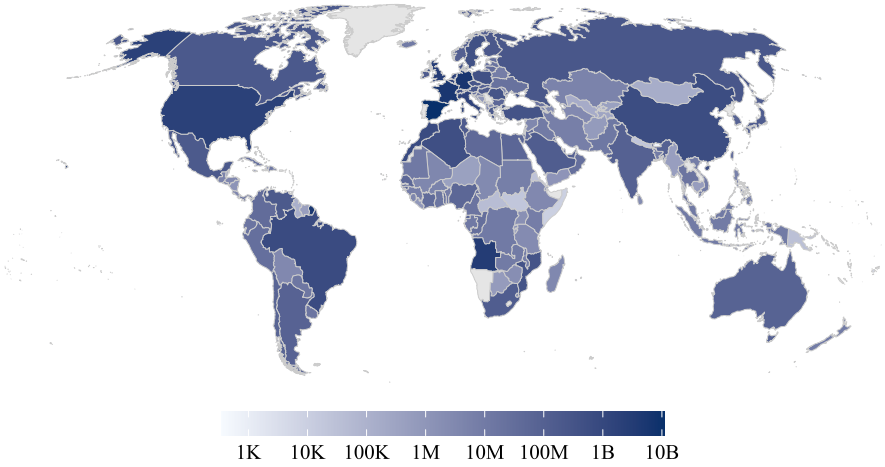
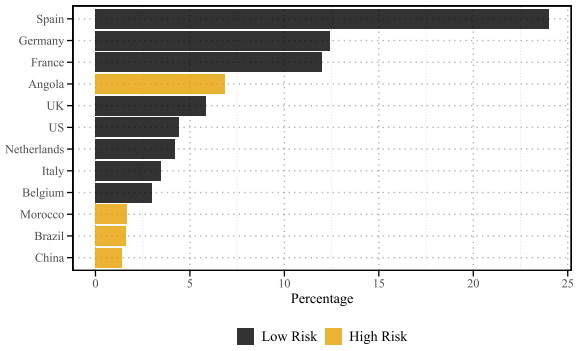


FIGURE A.4: Main Destinations and Products

This figure presents the share of the main destinations of Portuguese exports in panel (a) and, in panel (b), the share of the main products exported by Portuguese firms. In panel (a), countries are classified as high-risk or low-risk.

(a) Destinations



(b) Products

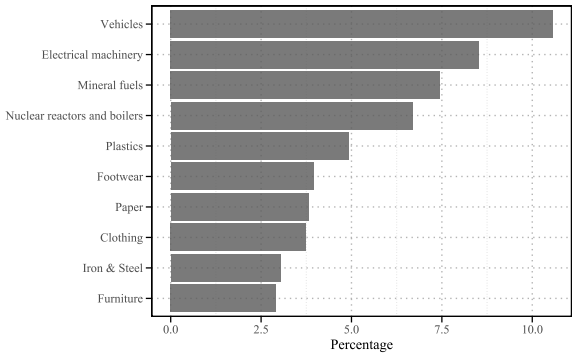


FIGURE A.5: Distribution of Cash Conversion Cycle

This Figure presents the distribution of the cash conversion cycle for each 4-digit product.

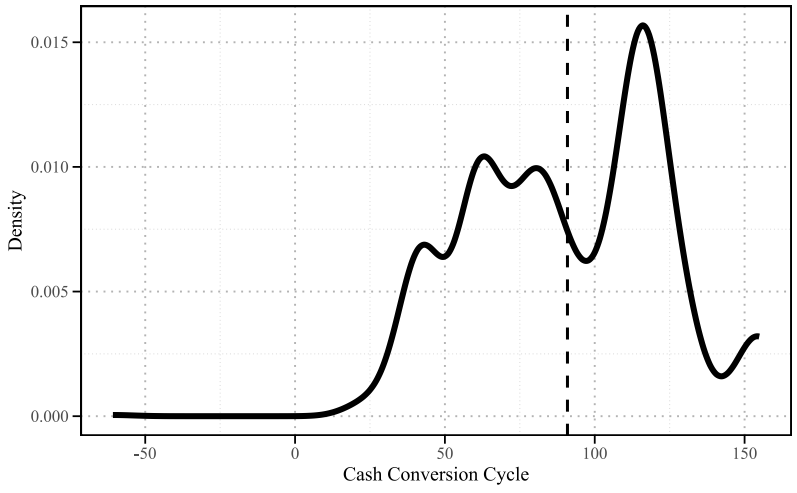


FIGURE A.6: Cash Conversion Cycle and Product Complexity

This Figure presents a binscatter plot where the horizontal axis is the measure of product complexity obtained from the Atlas of Economic Complexity and the vertical axis is the product-level cash conversion cycle.

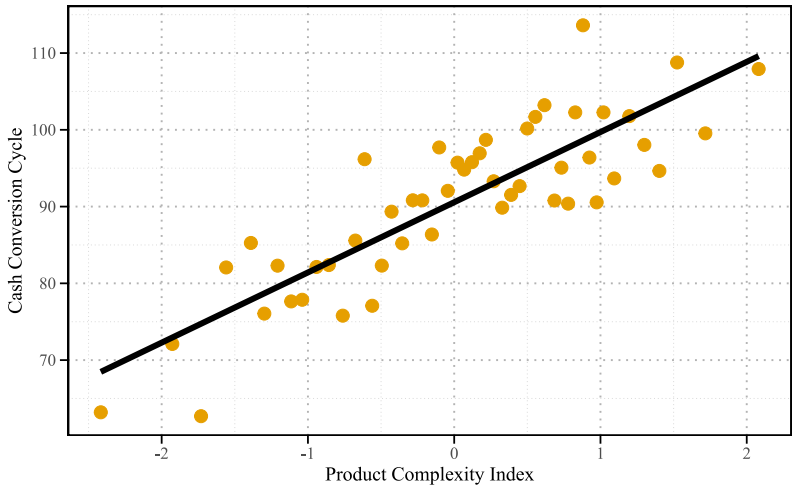


FIGURE A.7: Distribution of Elasticities - Decomposition by Product Types

This Figure presents the distribution of the elasticity of demand for each product. We present the distribution for products with a low cash conversion cycle (CCC) and a high CCC. We split products into these two groups using the 2013 cross-sectional median and the 2013 values for the CCC. The dashed lines represent the cross-sectional averages.

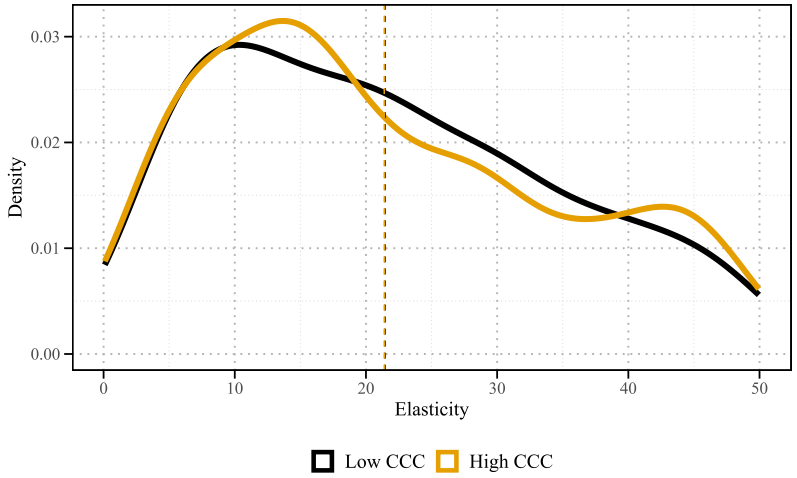


FIGURE A.8: Decomposition of Exports by Product Type

This Figure presents the share of exports of products with a high cash conversion cycle (CCC). We define products with a CCC as products with a CCC above the cross-sectional median in 2013. We present the share for exports to high- and low-risk destinations.

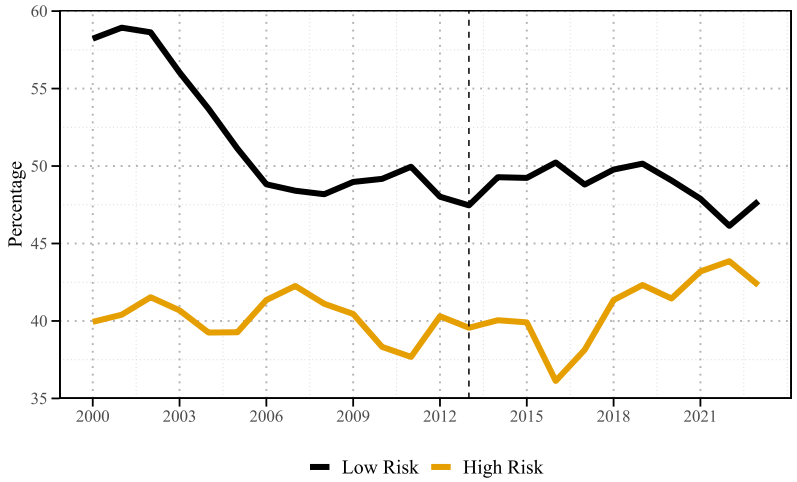


FIGURE A.9: Distribution of Firm Exposure to High-Risk Destinations

This Figure presents the distribution of the firm-level exposure to high-risk destinations in 2013. We compute firm-level exposure as the share of exports to high-risk destinations.

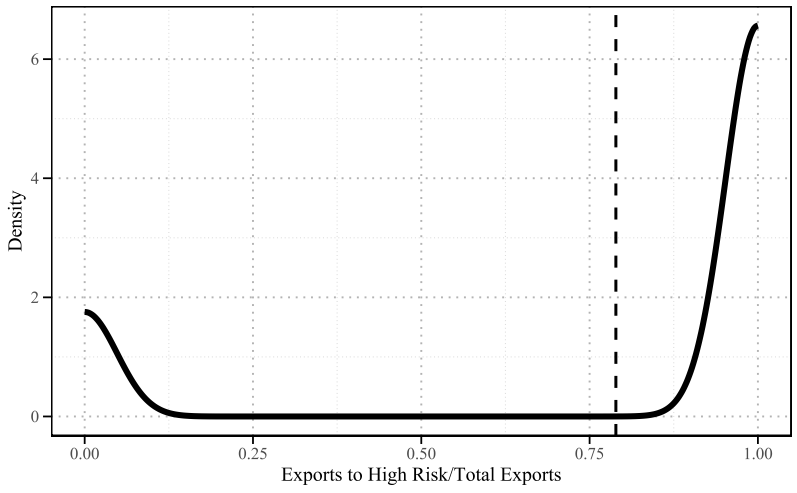
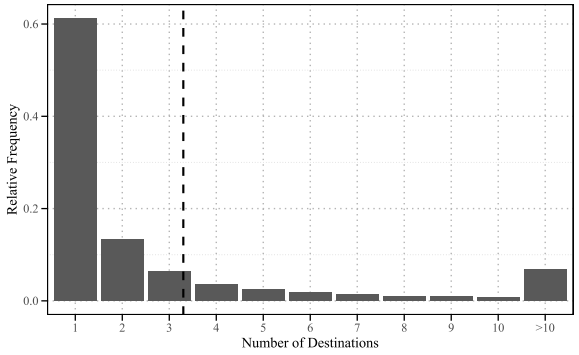


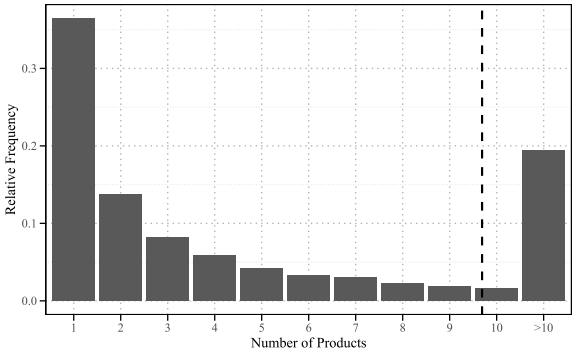
FIGURE A.10: Distribution of Number of Markets

This figure presents the distribution of the number of foreign markets in 2013 for Portuguese exporters. Panel (a) presents the distribution of the number of destinations. Panel (b) presents the distribution of the number of products. The vertical dashed lines represent the cross-sectional average.

(a) Destinations



(b) Products



B Additional Results for Intensive Margin

FIGURE B.1: Effect on the Intensive Margin of Exports - Role of Fixed Effects

This figure presents the results of estimating equation (1) on our full sample. The outcome variable is the logarithm of the value of exports. We include firm-product-year fixed effects. We also include a vector of time-varying destination controls which includes the log of GDP, the log of total imports, the ratio of imports to GDP, the log of GDP per capita, the ratio of the current account to GDP, the nominal exchange rate, and the real exchange rate. The treated group contains high-risk destinations and the control group contains low-risk destinations. We present the estimates for the average treatment effects over time. We present three specifications: (1) including also destination fixed effects, (2) including also destination-firm-product fixed effects, and (3) including also controls. Standard errors are clustered at the firm level. We present 95 percent confidence intervals.

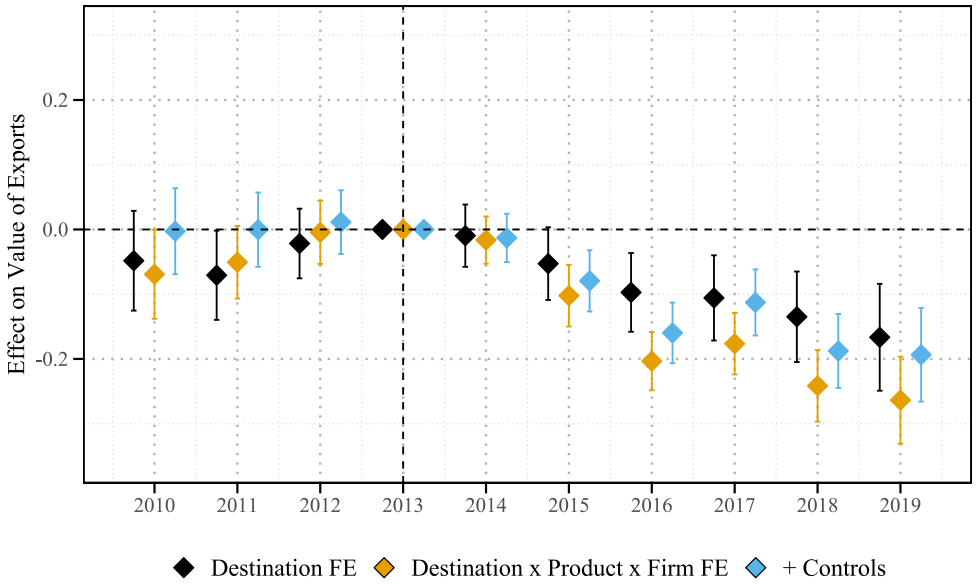


FIGURE B.2: Effect on the Intensive Margin of Exports - Role of Clustering

This figure presents the results of estimating equation (1) on our full sample. The outcome variable is the logarithm of the value of exports. We include firm-product-year fixed effects and firm-product-destination fixed effects. We also include a vector of time-varying destination controls which includes the log of GDP, the log of total imports, the ratio of imports to GDP, the log of GDP per capita, the ratio of the current account to GDP, the nominal exchange rate, and the real exchange rate. The treated group contains high-risk destinations and the control group contains low-risk destinations. We present the estimates for the average treatment effects over time. Standard errors are clustered in three ways: (1) at the firm level, (2) at the destination level, (3) and at the firm and destination level. We present 95 percent confidence intervals.

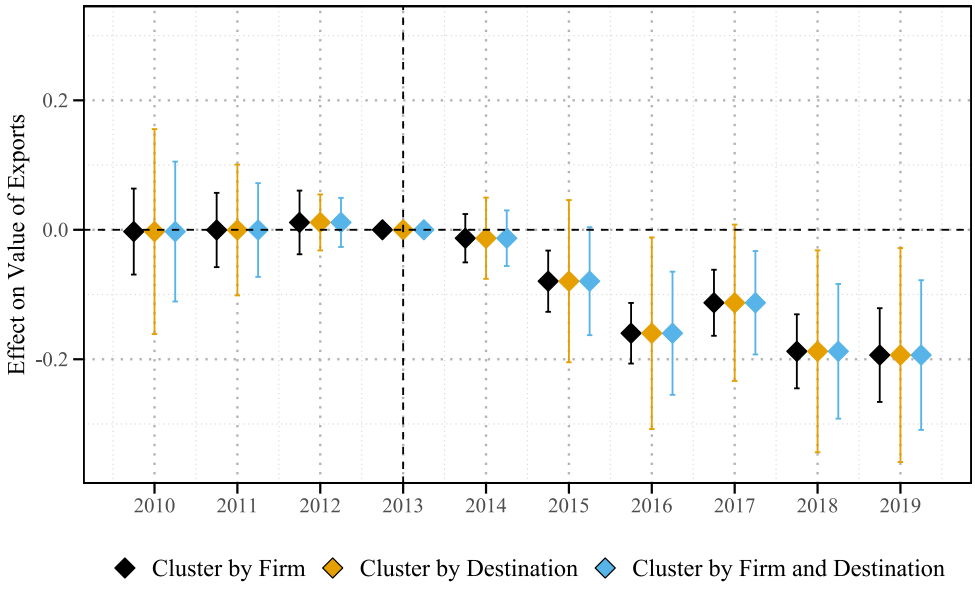


FIGURE B.3: Effect on the Intensive Margin of Exports - Role of Main Partners

This figure presents the results of estimating equation (1) on our full sample. The outcome variable is the logarithm of the value of exports. We include firm-product-year fixed effects and firm-product-destination fixed effects. We also include a vector of time-varying destination controls which includes the log of GDP, the log of total imports, the ratio of imports to GDP, the log of GDP per capita, the ratio of the current account to GDP, the nominal exchange rate, and the real exchange rate. The treated group contains high-risk destinations and the control group contains low-risk destinations. We present the estimates for the average treatment effects over time. We estimate the regression excluding China, excluding Angola, excluding Brazil, and excluding Angola and Brazil. Standard errors are clustered at the firm level. We present 95 percent confidence intervals.

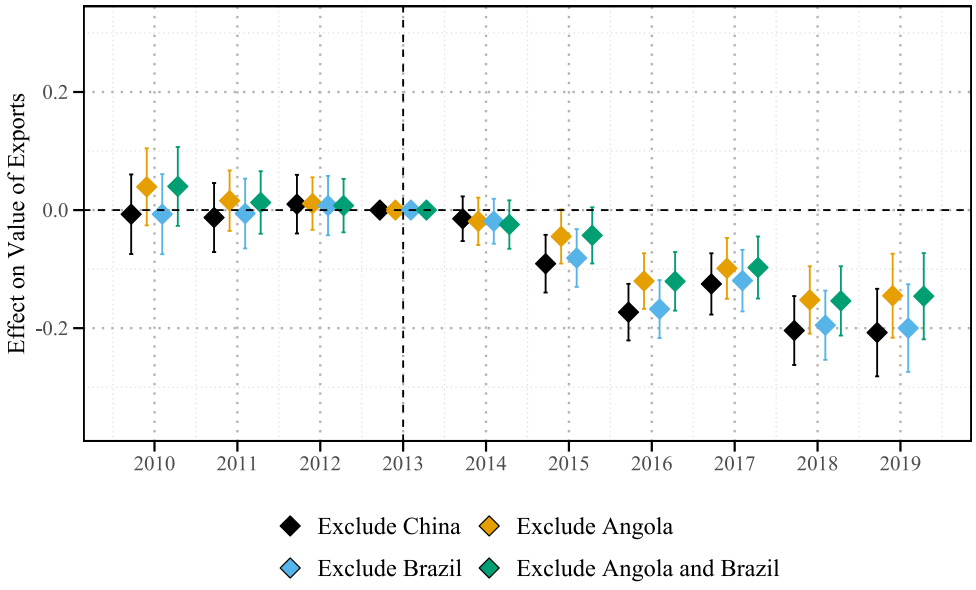


FIGURE B.4: Permutation Test for Intensive Margin Results

This figure presents the results of estimating equation (2) on our full sample. The outcome variable is the logarithm of the value of exports. We include firm-product-year fixed effects and firm-product-destination fixed effects. We also include a vector of time-varying destination controls which includes the log of GDP, the log of total imports, the ratio of imports to GDP, the log of GDP per capita, the ratio of the current account to GDP, the nominal exchange rate, and the real exchange rate. The treated group contains high-risk destinations and the control group contains low-risk destinations. We estimate the event study 500 times. In each estimation, we randomly allocate countries to the treated and control groups, keeping the share of treated countries constant. We present the distribution of the average treatment effect. The vertical dashed line is the average treatment effect we obtain using the true classification of treated and control countries.

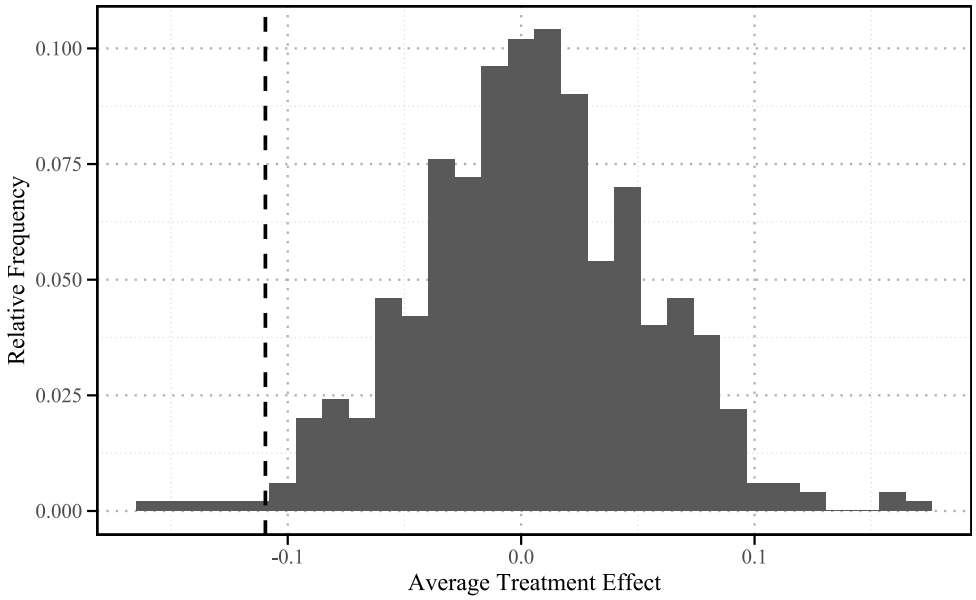


FIGURE B.5: Effect on the Intensive Margin of Exports - Excluding Outliers

This figure presents the results of estimating equation (2) on our full sample. The outcome variable is the logarithm of the value of exports. We include firm-product-year fixed effects and firm-product-destination fixed effects. We also include a vector of time-varying destination controls which includes the log of GDP, the log of total imports, the ratio of imports to GDP, the log of GDP per capita, the ratio of the current account to GDP, the nominal exchange rate, and the real exchange rate. The treated group contains high-risk destinations and the control group contains low-risk destinations. We exclude extreme values for exports by trimming the left tail, the right tail, or both tails by 1, 2.5, or 5 percent. We present the estimates for the average treatment effect. Standard errors are clustered at the firm level. We present 95 percent confidence intervals.

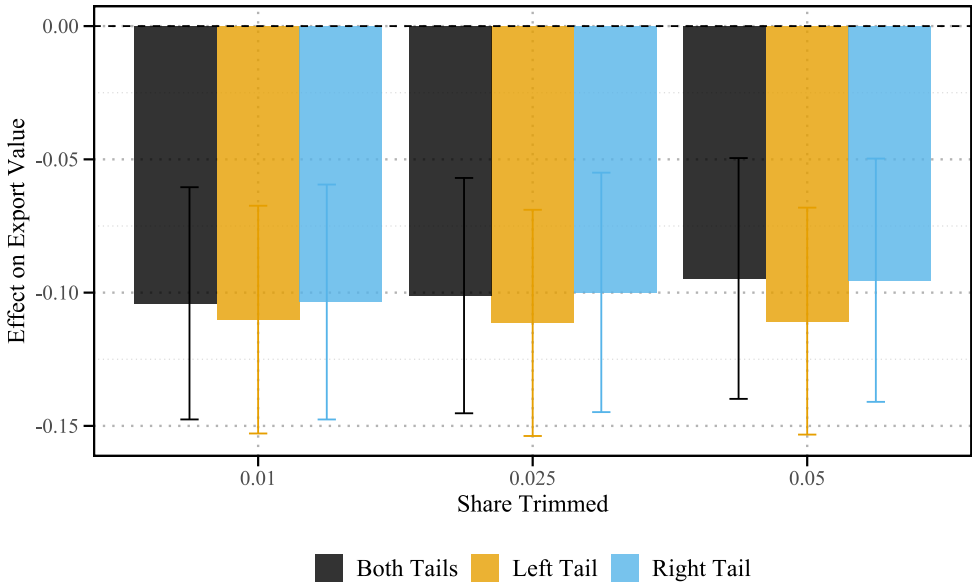


FIGURE B.6: Effect on the Intensive Margin of Exports - Excluding Small Exporters

This figure presents the results of estimating equation (2) on our full sample. The outcome variable is the logarithm of the value of exports. We include firm-product-year fixed effects and firm-product-destination fixed effects. We also include a vector of time-varying destination controls which includes the log of GDP, the log of total imports, the ratio of imports to GDP, the log of GDP per capita, the ratio of the current account to GDP, the nominal exchange rate, and the real exchange rate. The treated group contains high-risk destinations and the control group contains low-risk destinations. We exclude firms whose exports represent less than a share x of total sales. We consider the following values for x: 0 (full sample), 1 percent, 2.5 percent, 5 percent, 7.5 percent, 10 percent, 20 percent, 30 percent, and 40 percent. We present the estimates for the average treatment effect. Standard errors are clustered at the firm level. We present 95 percent confidence intervals.

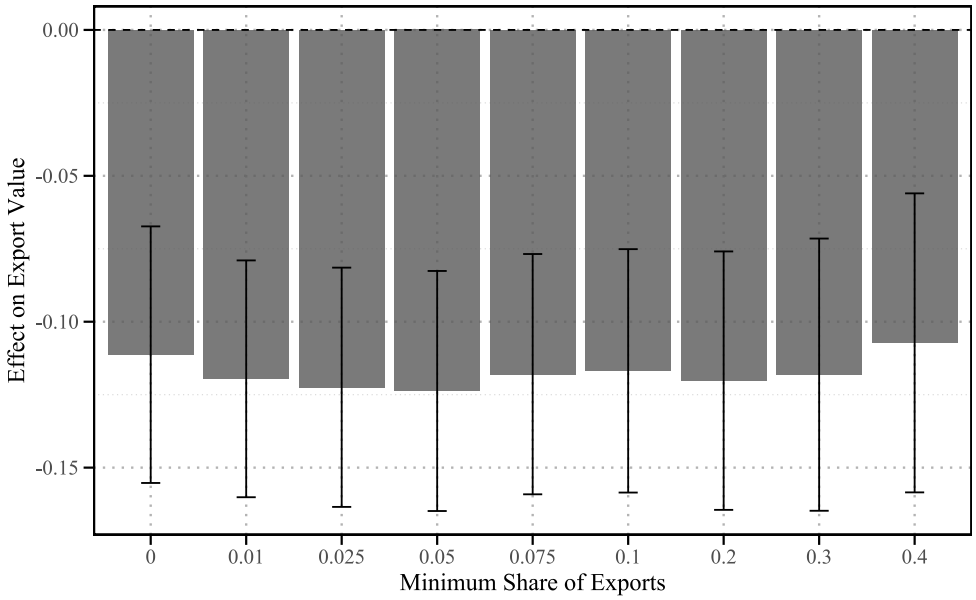


FIGURE B.7: Effect on Tariffs

This figure presents the results of estimating an event study where the outcome variable is the value of tariffs imposed on Portuguese goods. We include destination-product fixed effects and product-year fixed effects. The treated group contains high-risk destinations and the control group contains low-risk destinations. We present the estimates for the average treatment effects over time. Standard errors are clustered at the destination level. We present 95 percent confidence intervals.

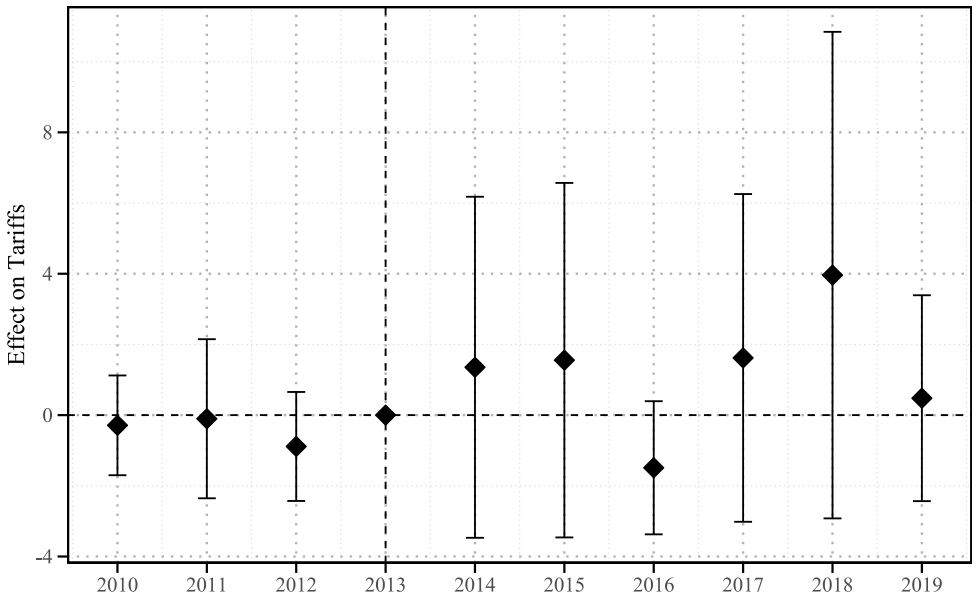


FIGURE B.8: Effect on the Intensive Margin of Exports - Aggregated at the Destination-Product Level

This figure presents the results of estimating an event study on a dataset aggregated at the destination-product-year level. The outcome variable is the logarithm of the value of exports. We include product-year and destination-product fixed effects. We also include a vector of time-varying destination controls which includes the log of GDP, the log of total imports, the ratio of imports to GDP, the log of GDP per capita, the ratio of the current account to GDP, the nominal exchange rate, and the real exchange rate. The treated group contains high-risk destinations and the control group contains low-risk destinations. We present the estimates for the average treatment effects over time. Standard errors are clustered at the destination level. We present 95 percent confidence intervals.

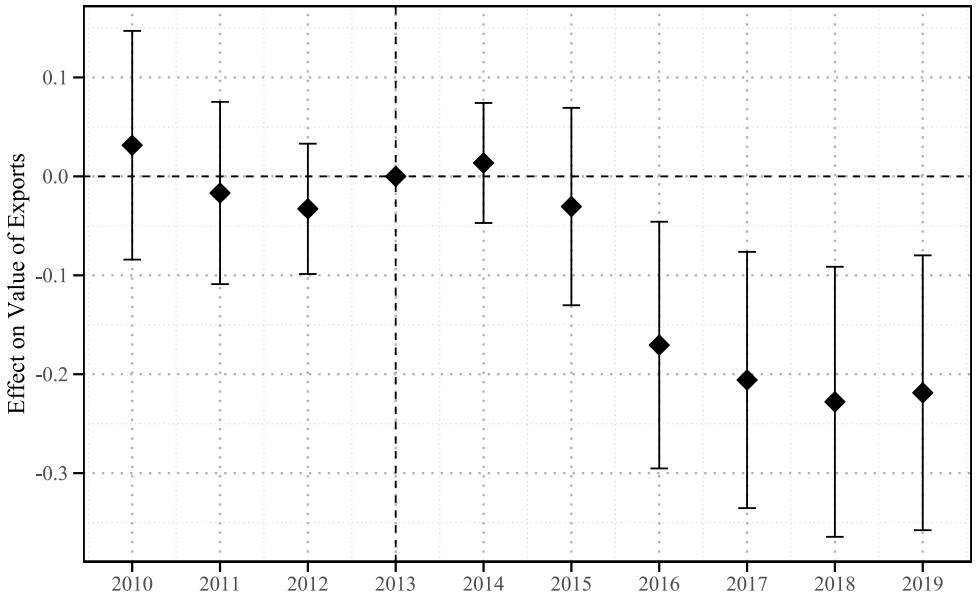


FIGURE B.9: Effect on the Intensive Margin of Exports - Aggregated at the Destination-Firm Level

This figure presents the results of estimating an event study on a dataset aggregated at the destination-firm-year level. The outcome variable is the logarithm of the value of exports. We include firm-year and destination-firm fixed effects. We also include a vector of time-varying destination controls which includes the log of GDP, the log of total imports, the ratio of imports to GDP, the log of GDP per capita, the ratio of the current account to GDP, the nominal exchange rate, and the real exchange rate. The treated group contains high-risk destinations and the control group contains low-risk destinations. We present the estimates for the average treatment effects over time. Standard errors are clustered at the firm level. We present 95 percent confidence intervals.

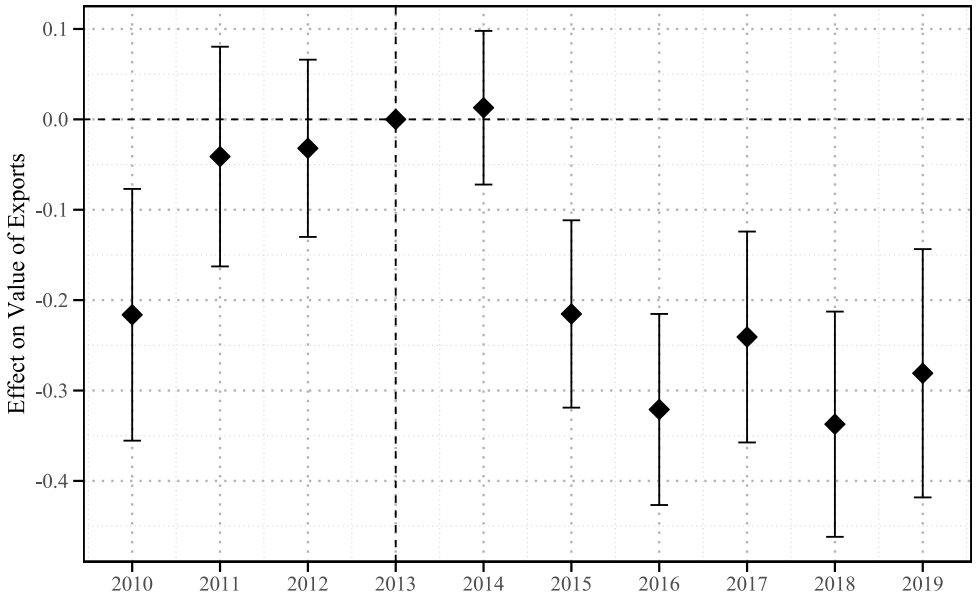


FIGURE B.10: Effect on the Intensive Margin of Exports - Aggregated at the Firm-Product Level

This figure presents the results of estimating an event study on a dataset aggregated at the firm-product-destination group-year level, where there are two destination groups (high-risk and low-risk). The outcome variable is the logarithm of the value of exports. We include firm-product-year and destination group-firm-product fixed effects. The treated group contains high-risk destinations and the control group contains low-risk destinations. We present the estimates for the average treatment effects over time. Standard errors are clustered at the firm level. We present 95 percent confidence intervals.

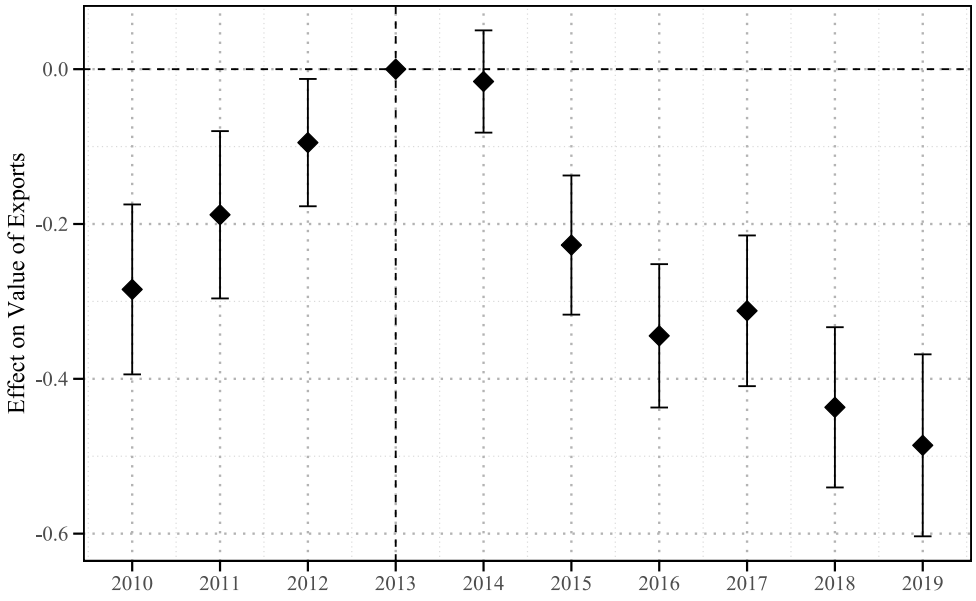


TABLE B.I: Effect on the Product Mix - Role of Core Products

This figure presents the results of estimating equation (2) on our full sample. The outcome variable is the logarithm of the value of exports. We include firm-product-year fixed effects and firm-product-destination fixed effects. We also include a vector of time-varying destination controls which includes the log of GDP, the log of total imports, the ratio of imports to GDP, the log of GDP per capita, the ratio of the current account to GDP, the nominal exchange rate, and the real exchange rate. The treated group contains high-risk destinations and the control group contains low-risk destinations. We present the estimates for the average treatment effects. We estimate the event study using only firms' core products or using all other products. We define a product as the core product if the product is the product with the largest share in total firm exports in 2013. Standard errors are clustered at the firm level. ***, **, * denote significance at 1 percent, 5 percent, and 10 percent respectively.

	(1)		(2)	
	Non-Core	Core	Non-Core	Core
High-Risk x Post	-0.178***	-0.073***	-0.144***	-0.075***
	(0.034)	(0.019)	(0.036)	(0.020)
Firm x Product x Year FE	✓	✓	✓	✓
Firm x Product x Destination FE	✓	✓	✓	✓
Controls			✓	✓
Observations	2,523,629	536,896	2,472,526	530,874
R^2	0.95	0.87	0.95	0.87

C Additional Results for Extensive Margin

FIGURE C.1: Effect on the Extensive Margin of Exports - Number of Destinations

This figure presents the results of estimating a Poisson event study on a balanced dataset at the firm-destination group-year level, where there are two destination groups (high-risk and low-risk). The outcome variable is the number of destinations within a destination group to which the firm exports in the year. We include destination group and firm-year fixed effects. The treated group contains high-risk destinations and the control group contains low-risk destinations. We present the estimates for the average treatment effects over time. Standard errors are clustered at the firm level. We present 95 percent confidence intervals.

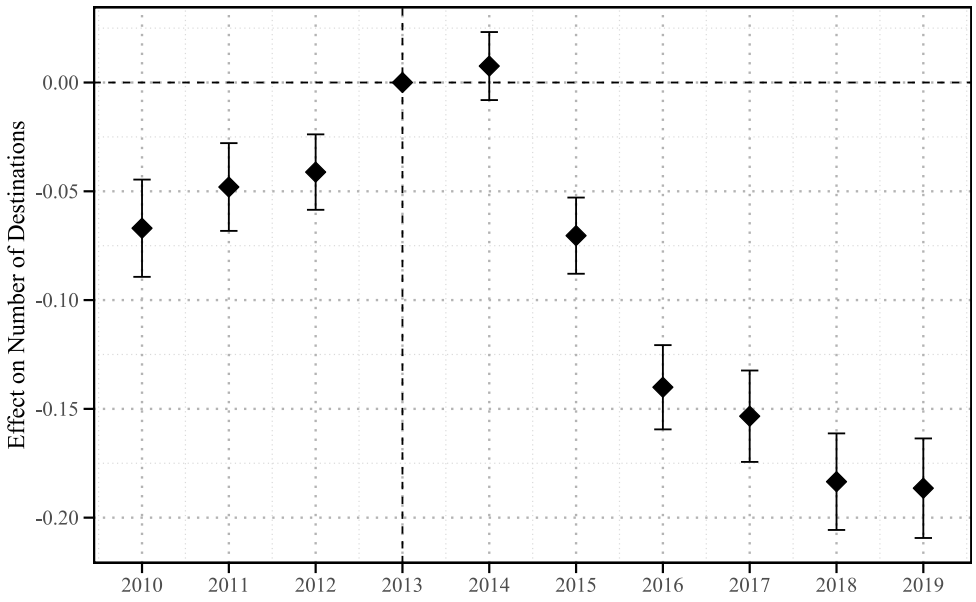


FIGURE C.2: Effect on Cash Conversion Cycle

This figure presents the results of estimating an event study on a dataset at the firm-destination group-year level, where there are two destination groups (high-risk and low-risk). The outcome variable is the average cash conversion cycle within a destination group to which the firm exports in the year. We compute the average cash conversion cycle by taking the average of the cash conversion cycle of all products a firm sells to a destination group in a given year, using the product shares as weights. We include destination group and firm-year fixed effects. The treated group contains high-risk destinations and the control group contains low-risk destinations. We present the estimates for the average treatment effects over time. Standard errors are clustered at the firm level. We present 95 percent confidence intervals.

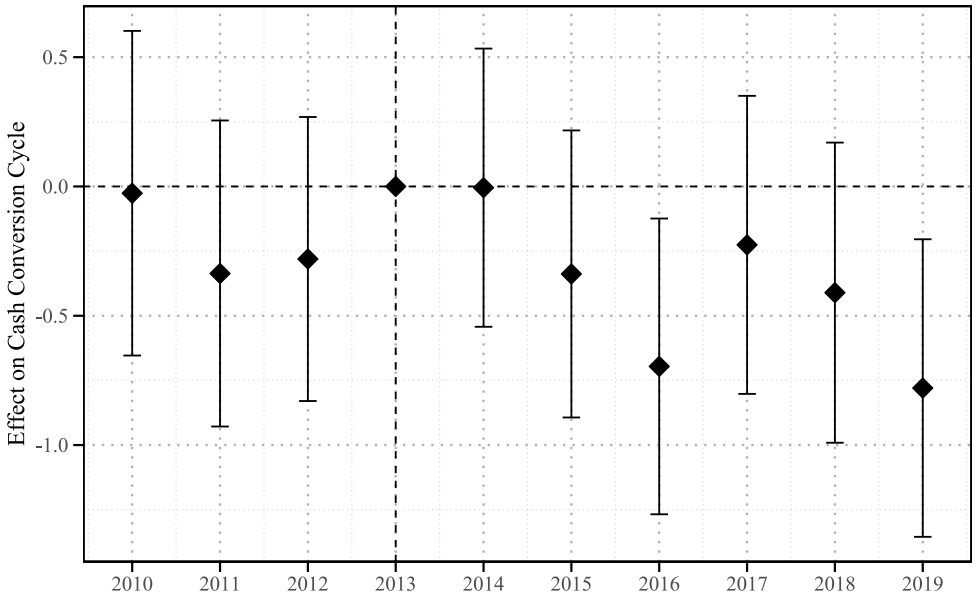


TABLE C.I: Effect on the Extensive Margin of Exports

This table presents the results of estimating a regression where the outcome variable is an indicator variable which takes the value of one if the firm exports to the destination group and zero if otherwise. We consider two groups of destinations - high-risk and low-risk countries. We include destination group and firm-year fixed effects. We compare high-risk destinations (the treated group) with low-risk destinations (the control group). We present the estimates for the average treatment effect. We estimate the average treatment effect for three samples: (1) the full sample, (2) including only firms that always export to at least one destination, and (3) including only firms that always export to at least one destination after 2013. Standard errors are clustered at the firm level. ***, **, * denote significance at 1 percent, 5 percent, and 10 percent respectively.

	All firms	Always exporters	Always exporters after 2013
High-risk x Post	-0.022***	-0.011***	-0.018***
	(0.0006)	(0.004)	(0.004)
High-risk x Firm FE	✓	✓	✓
Firm x Year FE	✓	✓	✓
Observations	3,409,080	128,580	177,220
R^2	0.64	0.34	0.39

D Additional Results on the Bank Credit

TABLE D.I: Effect on Number of Loans

This table presents the results of estimating a regression where the dependent variable is the number of loans obtained by a firm in a given year. We use individual loan data for exporters from 2013 to 2018, and consider only loans with maturities under 180 days. We include firm and year fixed effects. We also include a vector of time-varying firm controls which includes the log of total sales, the sales-to-asset ratio, the leverage ratio, the EBITDA-to-assets ratio, the growth rate of total sales, labor productivity, the ratio of current-to-total liabilities, the ratio of current-to-total assets, and the firm's age squared. The treated group contains firms with a high exposure to high-risk destination and the control group contains firms with a low exposure to high-risk destinations. We present the estimates for the average treatment effects. Standard errors are clustered at the firm level. ***, **, * denote significance at 1 percent, 5 percent, and 10 percent respectively.

	(1)	(2)	(3)	(4)
Treated x Post	-0.014	-0.012	-0.028	-0.027
	(0.026)	(0.023)	(0.026)	(0.024)
Firm FE	✓	✓		✓
Year FE		✓		✓
Controls			✓	✓
Observations	38,090	36,476	37,843	36,214