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Cross-Border Spillovers of Bank Regulations: Evidence of a Trade Channel*

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Abstract

We document a novel channel through which domestic bank regulations generate cross-border spillovers via international trade. Exploiting a 2012 Spanish reform that sharply increased loan loss provisions, we combine credit registry with customs data to show that importers relying on the most affected banks faced reduced credit supply and contracted imports. Using bilateral country–product trade data, we find that the contraction in Spanish import demand triggered a decline in partners' total exports. Spillovers were stronger in countries with less developed financial systems and higher trade costs vis-á-vis Spain, and for products that are harder to reallocate across markets.

Keywords: Bank regulations, spillovers, international trade
JEL Codes: F14, F36, F42, G21, G28.

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1 Introduction

In the aftermath of the Global Financial Crisis, a wave of regulatory reforms was introduced to mitigate systemic risk, leading to a significant tightening of banking regulations worldwide.[1] While these reforms aim to enhance financial stability, they may also generate unintended cross-border spillovers. Existing research has primarily examined *financial channels* of such spillovers, focusing on cross-border capital flows and the bank-lending activities of global banks' foreign subsidiaries.[2]

This paper identifies a novel channel for the international transmission of domestic banking regulations, which operates even in a world with limited capital market integration. We call this the *trade channel*.

A priori, it is unclear whether domestic banking regulations spill over through international trade. For example, domestic importers facing tighter credit supply may substitute toward other banks or alternative lending sources, such as trade finance. If this adjustment does not occur, less-affected domestic importers may capture the market share of more affected ones, leaving aggregate import demand largely unchanged. And if they do not, trade partners may still reallocate exports to other destinations.

To empirically assess whether domestic banking regulation can spillover on other countries via trade, we exploit a 2012 reform in Spain and administrative data over the period 2009–2013. This reform required banks to sharply increase loan loss provisions for real estate and construction loans (Jiménez et al., 2017). Importantly for our empirical design, the increase in loan loss provisions targeted a non-tradable sector–plausibly exogenous to the global economy–and was sizable, accounting for roughly 8.5% of Spain's GDP.

The paper is structured in two parts. First, using variation in banks' pre-policy exposure to the construction and real estate sectors, together with granular credit registry and trade data, we show that the contraction in credit supply induced by the regulation reduced imports for Spanish firms reliant on the most affected banks. Second, using BACI bilateral country-product trade data, we show that Spanish imports declined more sharply in country-product pairs where Spanish

[1] See Basel Committee on Banking Supervision (2011)

[2] For instance, Aiyar et al. (2014); Bahaj and Malherbe (2024); Buch and Goldberg (2017); Tripathy (2020).

importers were more exposed to the affected banks, thereby generating cross-border spillovers through a reduction in the total exports of Spain's trade partners. We then examine the conditions that mitigate these cross-border transmission effects.

We start by using bank-firm level data from the Spanish Central Credit Register (CIR) to show that importing firms experienced a contraction in credit supply after the 2012 increase in loan loss provisions. We find that a one standard deviation increase in a bank's exposure to the policy–measured as the pre-policy share of outstanding credit to the real estate and construction sectors–reduces credit supply to non-financial importing firms by approximately 3%.

Importing firms were unable to mitigate the credit contraction by borrowing from less-affected banks, as firm's total bank debt decreased by 2.8%. Complementing this evidence with firm-level financial statements, we find that importers' overall financing–including non-bank debt and equity–fell by 1.5%, underscoring their limited ability to offset the credit shock.[3]

Further checks show that our results are driven by the domestic regulatory shock rather than by foreign factors. First, bank specialization in foreign markets does not explain our results. Second, credit effects are similar for tradable and non-tradable firms. Third, more exposed importers reduced employment and investment, consistent with a credit contraction.

We then employ transaction-level Balance of Payments data–disaggregated by firm, product (based on 2-digit Harmonized System codes), country, and year–to assess the impact of the regulation on domestic trade flows. Using a difference-in-differences approach with rich fixed effects, as in Paravisini et al. (2014), we find that exposed firms reduce imports by 3.6%. At the extensive margin, more exposed importers sourced from fewer countries, indicating a decline in diversification.[4]

The decline on imports is heterogeneous across firms. The effects are more pronounced for riskier importers, those with weaker lending relationships, and those with limited access to credit lines–underscoring the importance of banking ties in buffering adverse shocks (Bolton et al., 2016). Moreover, importers that relied more heavily on supplier-provided trade credit before the policy

[3]Conversely, for exporters, the decline in bank credit was smaller (1.6%), and their overall financing remained broadly unaffected.

[4]By contrast, the effect on exporters was small: average firm-level exports declined by about 2%, with the impact concentrated among smaller firms and negligible at the aggregate level.

were better able to smooth the credit contraction, suggesting that foreign suppliers played a role in alleviating the financial shock. These patterns align with a trade finance channel of domestic bank shocks (Amiti and Weinstein, 2011; Paravisini et al., 2014; Xu, 2022; Matray et al., 2024).

Overall, the regulatory intervention led to a credit contraction among the most affected banks, causing importing firms that were more dependent on those banks to reduce their purchases abroad.

In the second part of the paper, we estimate whether this credit-induced reduction in firm-level imports aggregates up and is transmitted to other countries, or whether, alternatively, less exposed Spanish importers take over the market share of highly exposed ones (*business stealing*) leaving aggregate Spanish imports unchanged. To do so, we use BACI data, which provides bilateral trade flows at the origin, destination, and product levels. This level of aggregation is necessary to test for potential business stealing across Spanish importers, which could suppress any cross-border transmission (Matray et al. 2024; Beaumont et al. 2025). We construct a measure of exposure to the policy at the product–country-of-origin level, capturing the extent to which Spanish importers of a given pair rely on funding from exposed banks. For example, if Spanish importers of textiles from India depend heavily on financing from highly exposed banks, then Indian textiles are highly exposed to the regulation.

To estimate the regulation's impact on Spain's total imports (equivalently, other countries' exports to Spain), we employ a triple difference-in-differences approach. Specifically, we compare the evolution of exports to Spain from highly versus less exposed product-origin pairs, relative to exports of the same pairs to other destinations, before and after the policy. For instance, we compare how the difference between Indian exports of textiles and avocados to Spain evolves before and after the policy, relative to the same difference when the destination is France. This specification allows us to control for product-time, origin-time, and importer-time fixed effects. The former two control for unobserved time-varying shocks at the exporter and product level, mitigating concerns that our exposure measure is confounded by product-specific foreign supply shocks, while the later account for country-specific demand shocks that may coincide with the Spanish regulation.

Our findings indicate that business stealing across Spanish firms is limited. Specifically, after the regulation, a one standard deviation increase in exposure results in a significant 2.1% decline in

exports to Spain relative to exports to other destinations of the same product and from the same origin, with no evidence of pre-trends. These estimates remain robust when restricting the counterfactual set of destination countries in the triple-difference to European and other high-income countries comparable to Spain. Results are also largely unchanged when excluding GIIP exporters, addressing potential identification concerns related to the European sovereign debt crisis.[5] Further, to address concerns that our results may be driven by destinations with negligible trade volumes, we aggregate the data across destinations other than Spain, and estimate a standard difference-in-differences specification separately, for exports to Spain and, as a placebo, for exports to the rest of the world. The results are consistent with our baseline triple-difference estimates.

Since we find no evidence of complete reallocation of imports within Spain, we proceed to examine how Spain's trade partners reacted to the import demand contraction. First, exporters can mitigate a credit supply shock affecting their clients–Spanish importers–by providing financial support through more favorable trade finance terms, such as longer payment periods. To test this mechanism, we study the role of financial development by assessing whether exporters operating in countries with more developed financial sectors–proxied by private credit to GDP–are better equipped to offer favorable trade finance terms.[6] Our results show that exporters operating in highly developed financial systems fully offset the Spanish credit contraction, leaving their exports to Spain unaffected. By contrast, for exporters in countries with weaker financial development, exports to Spain shrink by 3.3%.

We next exploit variation in exporters' trade costs to Spain to examine how these costs shape the ability of exporters in low-financially developed countries to attenuate the shock. Higher trade costs raise exporters' reliance on external financing (Xu 2022), limiting their capacity to extend trade credit.[7] To test this mechanism, we divide the sample of low-financially developed countries by geographic distance to Spain and common language, and assess where the shock generates stronger contractions in exports to Spain. We find no significant effects for countries geographically

[5] GIIP denotes Greece, Ireland, Italy, and Portugal.

[6] See, for example, Manova (2013) and Chan and Manova (2015), who study the role of financial development in international trade.

[7] For example, exporters located farther from Spain face higher variable costs due to longer shipping times, while exporters from non-Spanish-speaking countries incur higher fixed costs from overcoming language barriers.

close to Spain or for Spanish-speaking countries. By contrast, a one standard deviation increase in regulatory exposure leads to a 3.6% decline in exports from distant countries, and a 3.9% decline from countries that are both distant and non-Spanish-speaking. These findings indicate that higher trade costs exacerbate exporters' difficulties in attenuating the contraction in Spanish import demand.

Since Spanish banks operate abroad and finance firms engaged in international trade, a potential concern is that our results could be confounded by their international lending activities. For example, if Spanish banks are particularly specialized in financing firms that export to Spain, the impact of the policy could be amplified. To test this channel, we use BankFocus data to estimate the effect of the regulation on exports from countries without Spanish bank presence, and find no meaningful deviation from our baseline results. Thus, our documented cross-border effects operate primarily through trade linkages and financial development in origin countries rather than through the internal capital markets of Spanish global banks.

Spain's trade partners may also respond to the contraction in Spanish import demand by reallocating sales to other destinations. The exposure of their total exports to the regulation depends not only on our product-origin measure of regulatory exposure, but also on the share of Spanish purchases within each product-origin pair. To isolate the policy effect, we therefore compare product-origin pairs with similar levels of dependence on Spain, measured by the share of their exports directed to Spain. On average, we find no evidence of reallocation. Moreover, in pairs where Spain is a major buyer, a one standard deviation increase in product-origin exposure leads to a significant 2.8% reduction in total exports–a contraction driven entirely by lower exports to Spain, as exports to other destinations remain largely unchanged.

We then explore whether product-specific attributes shape the reallocation of trade flows. Exporters may find it harder to redirect sales of highly heterogeneous products–those characterized by greater variety–away from Spain. To measure product heterogeneity, we compute the price at which each HS 6-digit product is sold by each country and calculate the variance of these prices at the HS 2-digit product level. Products falling within the top three quartiles of price dispersion are classified as heterogeneous. Our results show that for these products, total exports fall by 9%,

entirely driven by a 16% contraction in exports to Spain. By contrast, total exports of relatively homogeneous products remain unaffected, as the decline in sales to Spain is fully offset by a significant increase in exports to other destinations. These findings highlight that product differentiation frictions constrain exporters' ability to reallocate trade flows after a demand shock.

Overall, our findings suggest that tightening financial regulation–even when aimed at addressing domestic vulnerabilities–can propagate internationally by contracting import demand. Spain's trade partners face two types of frictions in responding to demand shocks: attenuation frictions–which arise in financially less developed countries and are exacerbated by high trade costs vis-á-vis Spain–and reallocation frictions–which stem from product differentiation and limit the redirection of heterogeneous products to alternative destinations. These results highlight international trade as a central channel of regulatory spillovers–and domestic shocks more broadly–and underscore the need for both stronger financial development and cross-border coordination in prudential regulation design to minimize unintended disruptions to global trade.

Contribution to the literature. This paper contributes to the literature estimating the cross-border effects of financial shocks. Traditional channels emphasize the role of global banks' internal capital markets in the transmission of funding shocks (Bruno and Shin 2014; Hale et al. 2019; Bolton and Oehmke 2018), bank regulations (Bahaj and Malherbe 2024; Aiyar et al. 2014; Buch and Goldberg 2017; Baskaya et al. 2017; Tripathy 2020), and monetary policy (Cetorelli and Goldberg 2012; Buch et al. 2019; Morais et al. 2019; Brauning and Ivashina 2020). We contribute by identifying a novel international trade channel through which domestic banking regulations can propagate internationally, specifically by contracting domestic import demand. We document that this channel operates independently of global banks' presence and is instead driven by characteristics of trade linkages, such as financial sector development in exporting countries and trade costs.

Second, our paper relates to the literature studying the role of input-output linkages in mediating the transmission of shocks within the domestic economy (Carvalho et al. 2020; Costello 2020; Alfaro et al. 2021; Huremovic et al. 2025) and across borders (Burstein et al. 2008; Richmond 2019; Di Giovanni and Hale 2022; Brauning and Sheremirov 2023; Auer et al. 2019; Boehm et al. 2019; Adelino et al. 2022; Romero 2025). We show that input-output linkages built through international

trade operations transmit domestic regulatory shocks to foreign countries. Exporters (suppliers) can partially attenuate the transmission of these shocks when trade credit is available and when they are located in financially developed countries. By examining international trade linkages, we document that the costs associated with maintaining the buyer-supplier relationship–such as trade costs captured by distance and language–play a key role in amplifying the transmission when suppliers are unable to absorb the shock.

Third, our paper contributes to the literature on export dynamics documenting cross-market interdependencies (Xu 2022; Almunia et al. 2021; Jiao et al. 2024; Ding 2024; Almeida et al. 2025). We find that after a contraction in Spanish demand, exporters reallocate sales towards other destinations and provide evidence that such reallocation is feasible when products are more homogeneous. In this line, we add to recent papers showing how international trade is reallocated during high-uncertainty periods, such as the current trade war (Alfaro and Chor 2023; Benguria and Saffie 2024; Gopinath et al. 2025).

Finally, we contribute to the well-established literature on trade finance (Amiti and Weinstein, 2011; Chor and Manova, 2012; Manova, 2013; Del Prete and Federico, 2014; Paravisini et al., 2014; Demir et al., 2017; Niepmann and Schmidt-Eisenlohr, 2017; Ahn and Sarmiento, 2019; Xu, 2022; Borchert et al., 2023; Moreira and Monteiro, 2023; Dogan and Hjortso, 2024; Matray et al., 2024; Beaumont and Lenoir, 2025). In particular, we contribute in two key directions. First, we examine not only exports but also imports, showing that credit supply shocks affect both sides of trade activity. Second, we uncover a novel spillover effect: the contraction in Spanish import demand, triggered by tighter credit conditions, leads to reduced exports from foreign trade partners–particularly when they operate in countries with low financial development, face higher trade costs, or trade products that are less substitutable and difficult to reallocate. This highlights a novel mechanism through which domestic bank shocks can generate cross-border real effects.[8]

The rest of the paper is organized as follows: Section 2 provides institutional details of the policy intervention. Section 3 outlines the conceptual mechanism linking the regulatory shock to

[8]See Table A.1 for a summary comparison with two directly related studies, Paravisini et al. (2014) and Tripathy (2020).

international trade flows. Section 4 describes the data. Section 5 presents the empirical strategy and main results. Finally, Section 6 concludes.

2 Institutional background

In early 2012, the Spanish government imposed a one-time, two-phase increase in provisioning requirements for banks' exposures to the construction and real estate sectors, based on outstanding loans as of late 2011. The policy aimed to reduce uncertainty around asset valuations still distressed after the 2008 Global Financial Crisis.

In the first phase (February), banks were required to provision 7% for all performing loans in the targeted sectors. In the second phase (May), provisioning was differentiated by loan type: an additional 45% for land, 7% for completed properties, and 22% for real estate projects in progress. Provisions for non-performing loans were also raised, and all requirements had to be met by year-end 2012.

This ad hoc policy represented a substantial shock. Banks' provision buffers had already been depleted by the global crisis, leaving them unable to meet the new requirements without sharply increasing provisions–by approximately $85 billion (8.5% of GDP), as documented by Jiménez et al. (2017). This severely affected bank profitability in 2012.

Following Jiménez et al. (2017), we measure banks' exposure to the policy using the share of their corporate lending to construction and real estate firms before the reform. While their analysis documents a reduction in credit supply to corporate borrowers by highly exposed banks, we focus on the implications for non-financial firms engaged in international trade, and the resulting effects on trade flows and cross-border spillovers.

Among the 83 banking groups lending to exporters and importers, exposure to construction and real estate sectors varied widely. At the 25th, 50th, and 75th percentiles, banks allocated 26.5%, 34.9%, and 47.0% of corporate credit to these sectors, respectively (see Panel C of Table 1). Figure 2 illustrates the distribution of bank exposure.

3 Conceptual Framework

In this section, we outline the theoretical mechanism through which the regulatory shock generates cross-border effects via international trade (see Figure 1).

3.1 Bank lending

Numerous studies show that shocks to bank balance sheets influence how banks supply credit to the economy (e.g. Bottero et al. 2020, Kapan and Minoiu 2018). Due to financial frictions, banks are often unable to absorb these shocks by raising capital (Hanson et al., 2011) contracting lending instead (Gropp et al., 2019). Thus, following prior research (Khwaja and Mian 2008; Jiménez et al. 2017), we compare lending to the same firm across banks with varying levels of exposure to the regulatory shock–specifically, banks with different pre-regulation exposure to the construction and real estate sectors. The differential response between more and less exposed banks enables us to isolate the regulation's impact on credit supply. In addition, firms may be able to substitute borrowing from more exposed banks with credit from less affected institutions or alternative funding sources. Therefore, we further examine whether firms with stronger ties to the most affected banks were able to mitigate the decline in lending (Jiménez et al., 2020).

3.2 Spanish trade flows

Following a reduction in funding sources, we examine whether firms that were more dependent on lending from affected banks adjusted their international purchases and sales, as suggested by previous literature indicating adverse firm outcomes following a credit crunch (e.g. Paravisini et al. 2014; Xu 2022; Matray et al. 2024). Particularly, using granular Balance of Payment data, we test whether more exposed firms reduce imports from–or exports to–a given country and product, relative to other firms buying–or selling–the same product from the same country, following the implementation of the regulation.

Before examining cross-border spillovers, we first test whether the bank regulation led to a reduction in Spain's aggregate trade flows. While firm-level comparisons of differentially exposed

firms are useful for identifying credit supply effects, they may not capture *business stealing* as a key general equilibrium adjustment: less-exposed firms could expand their trade activities to compensate for the decline among highly exposed firms, leaving aggregate trade flows unchanged (Matray et al. 2024; Beaumont et al. 2025). To assess this, we employ a triple difference-in-differences strategy using a panel of bilateral trade flows, disaggregated by origin country, destination, and product. In particular, we compare Spanish trade flows from highly treated product–country pairs, i.e. those composed of firms heavily reliant on financing from highly exposed banks, with Spanish trade flows from less treated pairs, relative to other countries' trade flows from the same corresponding pairs, before and after the implementation of the regulation.

3.3 Spanish trade partners: Attenuation

In the case of a contraction in Spanish import demand due to tighter bank regulation,[9] trade partners may mitigate the decline in Spanish importers' access to domestic bank credit by offering more favorable trade terms–such as extending repayment deadlines. The capacity of exporters to provide such trade credit depends on two key factors. First, the level of financial development in the exporting country (Beck 2002, 2003; Manova 2013; Chan and Manova 2015). Exporters based in financially developed economies are better positioned to absorb credit supply shocks in destination markets. Second, the trade costs associated with exporting to Spain. Higher trade costs–such as greater geographical distance or language barriers–increase exporters' external financing needs (Schmidt-Eisenlohr 2013; Antràs and Foley 2015), thereby limiting their ability to extend more trade credit after a demand shock in the destination country. We therefore test whether a contraction in exports to Spain (equivalently, Spanish imports) is more pronounced when exporters operate in countries with less developed financial systems and whether higher trade costs further exacerbate this contraction.

[9] As we will show in the empirical section, Spanish exports remained largely unaffected, as large exporters were able to substitute bank credit with alternative sources of non-bank financing. By contrast, importers faced binding financial constraints, making the contraction in import demand the key channel of cross-border transmission.

3.4 Spanish trade partners: Reallocation

When exporters cannot attenuate a Spanish demand shock through trade credit, reallocation to alternative markets becomes a critical adjustment margin (Almunia et al. 2021; Jiao et al. 2024; Benguria and Saffie 2024). However, this reallocation is costly, as it often requires product customization to meet the specific requirements of new destinations.

We examine two determinants of this adjustment. First, the need for reallocation. Exporters facing greater constraints in attenuating a decline in Spanish imports have stronger incentives to reallocate. Second, the cost of reallocation. Reallocation speed depends on product heterogeneity. Homogeneous goods–such as commodities like copper–can be redirected with minimal adjustments, whereas differentiated goods–such as manufactured products–require destination-specific adaptations to comply with regulations and meet consumer preferences. Therefore, we test whether exports to destinations other than Spain increase more for homogenous products, when exporters operate in countries with less developed financial systems and higher trade costs to Spain.

4 Data

Our analysis relies on three primary datasets: (i) the Spanish Central Credit Register (CIR), a dataset from the Bank of Spain; (ii) Spain's Balance of Payments data, used to compile the Bank of Spain's official statistics; and (iii) international trade data from BACI (Gaulier and Zignago, 2010), which provides comprehensive bilateral trade flows at the country-product level.

4.1 Credit Register (CIR)

To examine the bank lending channel of the regulation, we use quarterly bank-firm credit data from the CIR, a comprehensive database from the Bank of Spain. The CIR provides detailed information on all loan commitments exceeding €6,000 granted to non-financial firms by any credit institution operating in Spain. It includes information on loan type, drawn and undrawn amounts, collateral status, maturity, currency, past-due status, as well as lender and borrower identities. Additionally, the dataset contains firm-specific information, such as industry classification and

geographic location. To enhance our analysis, we combine CIR data with supervisory bank balance sheets and Balance of Payments data. This allows us to capture bank characteristics alongside firms' import and export activities, enabling us to focus on firms engaged in international trade. Moreover, it allows us to link the bank supplying the credit with its exposure to the policy–captured by its share of credit granted to the construction and real estate industries. Our dataset includes credit information for 33,361 non-financial firms engaged in international trade, provided by 83 banking institutions from 2011Q1 to 2013Q2, yielding a total of 1,288,007 observations.[10] Descriptive statistics for the variables used in this analysis are presented in Panel A of Table 1, while variable definitions can be found in Appendix B. Specifically, the first variable–the logarithm of committed credit–captures the dependent variable used in the first-step estimates of the bank lending channel of the regulation at the intensive margin. Additionally, we use a termination dummy for our extensive margin analysis–a binary indicator that takes the value of one if a bank-firm relationship is terminated at the onset of the policy, conditional on the existence of this relationship as of the end of 2011Q4. The remaining variables serve as controls in our baseline bank-firm level specification.

4.2 Balance of payment data

Our analysis of firms' international trade outcomes relies on confidential transaction-level import and export records. This unique administrative dataset is one of the sources used by the Bank of Spain to compile Spain's official Balance of Payments. It captures the majority of trade flows in and out of Spain and provides detailed information for each importer and exporter, including the product code (based on 2-digit Harmonized System (HS) codes), the trading partner country, and the transaction year.[11]

Our analysis covers the period from 2009 to 2013, during which all transactions exceeding €50,000 were subject to mandatory reporting. Despite this reporting threshold, the dataset offers extensive coverage, capturing 91.3% of total trade flows relative to official trade statistics reported

[10] We control for bank mergers by considering the industry structure as of the end of our period of analysis. That is, we assume that new consolidated banks operate as a single entity within our period of analysis.

[11] Balance of Payments transactional data are reported either by banks on behalf of their clients or directly by firms to the Bank of Spain if they hold their own accounts.

by Customs (see Almunia et al. 2021, Prades and Villegas-Sánchez 2022, and Gutiérrez and Moral-Benito 2024 for further details).

Between 2009 and 2013, our data record 566,170 import observations (23,029 firms) and 659,910 export observations (25,173 firms) across 99 products, 167 import origins, and 189 export destinations. Firms in our sample frequently enter and exit trade markets. For instance, among firms already present in a market, the exit rate was about 35%, while among firms not initially active, the entry rate into that market was also roughly 35% over the same period (see Panel C of Table 1).

4.3 BACI data

To assess international spillover effects, we use international trade data from BACI (Gaulier and Zignago, 2010), an annual panel of bilateral trade flows at the origin-destination-product level, which we merge with a measure of exposure to the policy at the product–country-of-origin level, constructed using Balance of Payments and CIR data.[12] To enrich our dataset, we incorporate information from Moody's Analytics BankFocus, which provides annual balance sheet information on over 38,000 banks worldwide, allowing us to assess the participation of Spanish bank subsidiaries in the banking systems of Spain's trade partners. Additionally, we use the CEPII Gravity database, which offers country-pair-specific characteristics that shape trade costs, such as geographical distance, trade agreements, and common language.

Our trade data includes 3,141,210 trade flows observations between 190 countries (origin and destination) and 5,216 HS 6-digit products grouped in 96 HS 2-digit goods between 2009 and 2013. The average trade flow is USD 23 million and the median USD 43 thousand. We aggregate BACI data to estimate the impact of Spanish loan loss provisions on other countries exports. The average export flow is USD 2,9 billion and the median USD 227 million. (see Panel D of Table 1).

5 Empirical strategy and results

Our study focuses on assessing whether bank regulations implemented in one country can gener-

[12] For the years 2005–2013, Spanish import flows obtained from Balance of Payments data at the 2-digit product-country level represent approximately 90% of BACI data.

ate cross-border effects through international trade linkages, which can be empirically challenging. First, external macroeconomic conditions may lead to prudential policy interventions in the banking system, making it difficult to identify a causal effect of such interventions. Second, disentangling shocks in destination and origin countries–supply shocks for imports or demand shocks for exports–from the effect of the policy intervention poses additional challenges.

Our identification strategy addresses these concerns by exploiting two key elements: (i) an unexpected regulatory shock targeting banks exposed to the real estate and construction sectors–non-tradable industries arguably exogenous to global economic conditions–; and (ii) rich databases that enable us to control for a wide range of observed and unobserved factors affecting international trade.

Our analysis proceeds in two steps. First, we use bank-firm-level and firm-product-country-year data to examine how the policy reduced credit to firms engaged in international trade and their trade flows. Second, using a country-product-year panel of trade flows, we estimate the broader spillover effects on Spain's trade partners.

5.1 Effect on credit supply and firm-level trade flows

5.1.1 Credit channel

We begin our analysis by examining whether banks reduced credit supply to firms engaged in international trade following the increase in provisions. Specifically, we use bank-firm credit data from before and after the policy intervention to assess whether more exposed banks provided credit at a slower pace.[13] Specifically, we estimate the following model over the period from 2011Q1 to 2013Q2:

$$\log y_{f,b,t} = \theta \times Exposure_b \times Policy_t + controls_{b,f,t} + \alpha_{f,t} + \alpha_{f,b} + \varepsilon_{f,b,t}. \quad (1)$$

The dependent variable is the logarithm of the committed credit granted by bank b to firm f in quarter t. *Exposure* represents the exposure of bank b to the policy, measured as the ratio of construction and real estate lending to its total corporate lending as of the end of 2011. *Policy*

[13] Our analysis excludes exporters and importers operating in the construction and real estate sectors.

is a dummy variable that takes the value of one starting from 2012Q1, marking the post-policy period, and zero otherwise. Additionally, we control for various bank and bank-firm characteristics measured as of the end of 2011. Specifically, we interact quarter dummies with bank-firm characteristics, including the collateralization rate, the ratio of long-term lending, the share of firm f's NPLs with bank b, and the share of total lending that firm f receives from bank b. Furthermore, we include the interaction of quarter dummies with two sets of bank bins. These bank bins are defined by quartiles of bank size, measured by total assets, and by banks' exposure to firms engaged in international trade, measured as the share of lending to imporers and exporters relative to lending to the corporate sector. Importantly, our balance-of-covariates analysis indicates that, after controlling for these bank bins, the bank exposure measure is statistically orthogonal to other key bank characteristics, such as ROA, NPLs, liquidity, and capital ratios (see Figure 3).

Finally, we control for firm credit demand by adding firm-time fixed effects, restricting our sample to firms borrowing from multiple banks (Khwaja and Mian, 2008).[14] To aid in the interpretation of our coefficient of interest, θ, we standardized banks' exposure. Consequently, θ measures how a one standard deviation increase in bank b's dependence on the construction and real estate industries affects firm f's credit growth relative to its other lenders following the policy implementation.

Additionally, we measure the effect of the policy on firms' total debt. In particular, firms could have substituted credit from more affected towards less affected banks, lessening the impact of the policy on their total credit. As firms engaged in international trade are typically larger and have more lending relationships, they could have smoothed the impact of the regulatory shock and limited its effects on real outcomes–such as purchases or sales abroad. We explore such a possibility by estimating the next equation:

$$\log y_{f,t} = \theta \times Exposure_f \times Policy_t + controls_{f,t} + \hat{\alpha}_{f,t} + \alpha_f + \varepsilon_{f,t}, \tag{2}$$

The dependent variable is the logarithm of total bank credit to firm f. To calculate the firm-level

[14] In our data, firms engaged in international trade typically borrow from multiple banks. In particular, around 30% of firms engaged in international trade borrowing from a bank in 2011 were with a single bank.

exposure to the policy, we compute the average exposure of the banks lending to firm f, weighted by the outstanding credit as of the end of 2011 from each bank. As controls, we include interactions of quarter dummies with firm-level variables, which are derived by averaging the controls used in specification (1), weighted by each bank's outstanding credit to the firm. Additionally, we incorporate province and industry indicators. To account for demand shocks, we include the estimated firm-quarter fixed effects from specification (1), $\hat{\alpha}_{f,t}$, following the approach in Abowd et al. (1999) and Bonaccorsi di Patti and Sette (2016). Therefore, θ measures the impact of the policy on firms' total debt. A negative and significant coefficient would suggest that firms more dependent on exposed banks were unable to offset the negative supply shock by leveraging their multiple bank relationships.

[Table 2]

We present our results in Table 2, focusing on importers (columns 1-2) and showing exporters (columns 3-4) for comparison. Panel A reports the regression results from equation (1). A one standard deviation increase in bank exposure (about 16 percentage points) is associated with a 3.1% reduction in credit supplied to importers, relative to other banks lending to the same firm. Exporters are also affected to a similar extent. These estimates are sizable when benchmarked against the average quarterly credit growth rate of -2.6% observed in the pre-treatment period.

Panel B of Table 2 examines the extensive margin, showing that higher bank exposure is associated with a greater likelihood of terminating lending relationships. Following the policy, more exposed banks were 1.9 percentage points more likely to terminate relationships with importers, an effect that is statistically significant in our preferred specification (column 2). For exporters, the corresponding effect is smaller–about 1.5 percentage points–and not statistically significant.

[Figure 4]

Additionally, Figure 4 provides further evidence that banks tightened their credit supply in response to the shift in provisions. Specifically, we estimate a modified version of specification (1), where we replace *Policy* with quarter dummies. The dashed lines represent the 2.5%–97.5%

confidence interval, with standard errors double-clustered at the bank and firm levels. Notably, before the policy intervention, the most affected banks did not reduce lending to importers (or exporters) more than other banks. After the increase in provisioning, these banks sharply reduced credit supply, with no evidence of pre-trends.

[Table 3]

[Figure 5]

In Table 3, we present results from specification (2) to assess whether firms were able to mitigate the credit supply shock by borrowing from less affected banks. The findings indicate that the policy led to a decline in total bank debt, with importers experiencing the sharpest contraction. Column (2) shows that a one standard deviation increase in the exposure of all banks lending to an importer reduced their total bank debt by 2.8 after the policy, while the corresponding decline for exporters was smaller, about 1.6 (column 4).

The absence of pre-trends, as illustrated in Figure 5, supports a causal interpretation, with negative and significant effects emerging only after the policy implementation. Importers display a more pronounced and persistent decline in total debt, whereas exporters appear better able to rely on multiple banking relationships to partially cushion the shock.

Overall, our results suggest that Spanish firms engaged in international trade could not fully offset the contraction by borrowing from less exposed banks. This limitation is stronger for importers, while exporters were able to mitigate roughly half of the impact.[15]

Additional checks. To further support the interpretation that our results are driven by the domestic regulatory shock, rather than by shocks to firms' trade partners, we conduct three additional tests. First, following Paravisini et al. (2023), we account for potential bank specialization by augmenting specification (1) with interactions between the *Policy* dummy and indicators cap-

[15] Our baseline classification of importers and exporters allows for overlap–some importers also export, and vice versa. Table A.2 in the Appendix reports results separately for firms that are only importers, only exporters, and both. The findings reinforce our main conclusion: firms that are exclusively importers experience the strongest and most persistent declines in credit, whereas firms that are exclusively exporters are better able to exploit multiple banking relationships to cushion the impact.

turing whether a bank specializes in countries from (or to) which the firm imports (or exports).[16] As shown in Table A.3, the coefficient on the $Exposure \times Policy$ interaction remains statistically significant and stable, indicating that bank specialization does not drive our main results. Second, we include non-tradable firms in the analysis and find no differential effect relative to tradable firms (Table A.4), suggesting that foreign demand shocks are not behind the observed credit effects. Third, we assess firms' ability to substitute bank credit with non-bank financing. As shown in Panel A of Table A.5, importers exposed to more affected banks experienced a decline in total debt (including non-bank debt and equity), as well as in investment and employment, indicating limited substitution through alternative funding sources and reinforcing the real effects of the policy. In contrast, exporters' overall debt levels remain unaffected (Panel B).[17]

5.1.2 Effect on trade flows

Next, we examine whether the increase in provisioning requirements affected the trade flows for firms more dependent on banks heavily impacted by the policy. We use Balance of Payments trade flow data, which provide firm-level information by partner country, 2-digit product category, and year. This granularity allows us to estimate the policy's impact on firms' trade performance while including a rich set of fixed effects and controlling for shocks in foreign markets.

In particular, we estimate the following equation:

$$y_{f,c,g,t} = \alpha_{f,c,g} + \alpha_{c,g,t} + \alpha_{p(f),i(f),t} + \theta \times Exposure_f \times Policy_t + \varepsilon_{f,c,g,t}, \tag{4}$$

where our dependent variable is the mid-point growth rate of firm f's imports (exports) of product

[16] The specialization measure of bank b in country c is constructed for the 50 main destinations of Spanish exports, as:

$$S_b^c = \frac{\sum_f C_{f,b} \times X_{f,c}}{\sum_j \sum_f C_{f,b} \times X_{f,c}}. \tag{3}$$

The numerator is the sum, across all exporting firms served by bank b, of the outstanding credit of firm f with bank b as of 2011 ($C_{f,b}$), multiplied by the shipped value of exports of firm f to country c ($X_{f,c}$) over the period 2009 to 2013. The denominator is the sum of this term over all destination countries.

[17] This finding is consistent with our descriptive statistics in Tables A.6 and A.7, which show that the average exporter is larger, more established, and financially stronger than the average importer, carrying greater bank debt and total debt, a higher share of collateralized debt, more tangible assets, and a larger proportion of long-term financing.

g from (to) country c in year t, relative to the five-year average of imports (exports) of that product from (to) the same country during 2009-2013.[18] Notably, this dependent variable enables us to capture market entries and exits, which are indicated by a zero value in exports or imports (Fonseca and Matray, 2024; Matray et al., 2024; Beaumont et al., 2025).[19] *Exposure* is defined as in equation (2), and *Policy* is a dummy variable that takes the value one in 2012 and 2013, and zero otherwise. Furthermore, we include a rich set of fixed effects following Paravisini et al. (2014). First, we include firm-country-product fixed effects to account for unobserved factors that do not vary over time, such as the firm's specific knowledge of the market for product g in country c. Second, we introduce country-product-year fixed effects. For imports, they account for supply shocks in the country of origin c, such as production disruptions, or changes in trade costs that affect the availability or price of product g sourced from country c. While for exports, these fixed effects capture demand shocks for product g in the destination country c, such as fluctuations in consumer demand or changes in local regulations affecting product g in country c at time t. This specification allows us to compare the import (export) value of product g from (to) country c across firms trading the same product in the same foreign market. We further augment the regression with province-industry-year fixed effects to account for local economic conditions, for example, regional demand for imported goods or supply capacity for exports within a given sector and year. This ensures that we are comparing firms operating in the same geographic and sectoral environment. Standard errors are double-clustered at both the firm level and the firm's main bank level. [20]

[Table 4]

The results of this analysis are reported in Table 4. In columns (1) and (2), we use the mid-point

[18] Specifically,

$$y_{f,c,g,t} = \frac{Z_{f,c,g,t} - \overline{Z}_{f,c,g}}{1/2(Z_{f,c,g,t} + \overline{Z}_{f,c,g})},$$

where $\overline{Z}_{f,c,g} = 1/5 \sum_{t=2009}^{2013} Z_{f,c,g,t}$ for Z = Imports, Exports.

[19] Given the granularity of our trade-flows data, which results in numerous zero observations in certain periods, our preferred specification employs the mid-point growth rate. This approach mitigates volatility in our dependent variables by reducing the influence of extreme values and ensures bounded growth rates, particularly in the presence of firm entry and exit. Our main results are qualitatively robust at the intensive margin when we use the logarithm of trade flows as the dependent variable; these alternative estimates are available upon request.

[20] Given the granularity of our data, we exclude the smallest transactions in the sample–those representing less than 1% of total import (35,000 euros) or export value (29,000 euros) between 2009 and 2013. This restriction helps ensure that our results are not driven by very small or highly volatile trade flows.

growth rate as the dependent variable, capturing both intensive and extensive margins. Columns (3) to (6) disentangle the policy effect along the extensive margin using binary indicators of market entry and exit. Specifically, *Entry* equals one if firm i's imports (exports) of product g from (to) country c are strictly positive at time t, given zero in the previous period. Conversely, *Exit* equals one if these flows are zero at time t, given they were strictly positive in the previous period.

The results show that the increase in provisioning requirements significantly reduced trade flows, with the strongest effects on imports. Column (1) indicates that a one standard deviation increase in exposure to banks heavily involved in the construction and real estate sectors is associated with a 3.6% decline in imports, while the corresponding decline for exports is smaller, about 2% (column 2). These magnitudes are economically meaningful, representing roughly 14% and 10% of the year-on-year growth rates of imports and exports, respectively, in the year prior to the policy.

We also find significant effects along the extensive margin. Firms with one standard deviation higher exposure were 1.4% more likely to exit import markets and 0.9% more likely to exit export markets (columns 5-6 of Table 4). On the entry side, the effect appears only for imports: more exposed firms were 0.7% less likely to enter new import markets after the policy shock (column 3 of Table 4).[21]

[Figure 6]

Figure 6 illustrates dynamic effects of the policy on firm-country-product trade growth by interacting exposure with year dummies (relative to 2011). We find no evidence of pre-trends. Import growth declines sharply after the policy, while export growth also falls but shows partial recovery by 2013.

Our credit channel estimates suggest that importers were less able than exporters–who often had access to alternative bank and non-bank financing–to offset the impact of the policy on total credit. To validate the consistency of this finding with our trade flow results, we conduct several additional tests. First, we re-estimate our firm-country-product specification using trade-weighted regressions (Table A.9). The effect on exporters' trade flows becomes statistically insignificant, while the

[21] Additional results show that more exposed exporters reduced the number of destination countries and products shipped, while importers contracted the number of origin countries; see Table A.8.

impact on import flows remains robust and significant. Second, Table A.10 shows that the policy's effect on exports is concentrated among small exporters (bottom 25% by export value), with no significant impact on larger exporters, who account for 75% of total export value. By contrast, the impact on imports is consistent across firm groups, pointing to a broad-based contraction in import demand.

Beyond bank financing, importers can also rely on direct financing from suppliers. In Table 5, we examine the role of trade credit in shaping the impact of the financial shock. We find that firms that relied more heavily on supplier-provided trade credit–measured as the share of total debt prior to the policy–were better able to attenuate the negative effects of the credit contraction. While we cannot identify whether trade credit counterparties are foreign or domestic, Figure A.1 shows that firms more reliant on imports are also more likely to depend on supplier-provided credit. To account for this correlation, we control for fixed effects by quintiles of the share of imports in total purchases, interacted with time dummies (column 3). Overall, the evidence suggests that foreign suppliers may have played an important role in alleviating the financial shock for importers, a mechanism we explore further in the next section.

Taken together, these results confirm that the credit channel estimates and the trade flow patterns are fully aligned: exporters, particularly larger ones, were better able to insulate themselves from the shock, while importers faced widespread and persistent declines. Accordingly, in the next section we concentrate on the contraction in Spanish import demand as the dominant transmission channel of the policy's cross-border effects through trade linkages.

Additional checks. To reinforce that our trade-flow results are driven by domestic financial conditions rather than foreign shocks or other macroeconomic factors, we conduct several robustness checks. Table A.11 in the Appendix shows that importers more dependent on a single bank were less affected than those borrowing from multiple banks lending relatively smaller amounts, consistent with the notion that relationship banks protect their clients in downturns (Bolton et al., 2016). Importers with greater credit line availability also experienced smaller trade contractions, while those with more non-performing loans were more adversely affected. For exporters, the effects are mostly not statistically significant. These findings underscore that liquidity and strong banking

relationships helped buffer the financial shock, while higher firm risk amplified it.

Third, we perform sensitivity analyses excluding sequentially each of the top 10 origin countries (for imports), destinations (for exports), and product categories to ensure our results are not driven by any single country or product group. Figure A.2 and Figure A.3 show that the estimated coefficients remain statistically significant and stable. Additionally, to rule out confounding effects from the sovereign debt crisis, we exclude firms highly exposed to GIIP countries.[22] Table A.12 shows that results remain barely unchanged.

Finally, one potential concern is that our results are confounded by the export boom documented by Almunia et al. (2021). They show that, following the Great Recession in Spain (2009–2013), local firms experienced a decline in marginal production costs, which translated into competitiveness gains that contributed to an unprecedented 31% increase in exports over this period. This could, in principle, explain the muted impact we find on exports. We argue that this is unlikely for two reasons. First, our specification includes province- and industry-year fixed effects, which absorb the local demand shocks identified by Almunia et al. (2021). Second, we find no evidence of geographic sorting in bank exposure: provinces that experienced larger domestic sales drops did not rely disproportionately on more affected banks (Figure A.4).[23]

5.2 Cross-Border Spillovers

5.2.1 Effect on other countries' exports to Spain

In this section, we estimate the extent to which Spain's trade partners were affected by the increase in Spanish banks' loan loss provisions through international trade linkages. As previously noted, the decline in imports among Spanish firms highly exposed to the policy–through their relationships with the most affected banks–does not necessarily imply a contraction in Spain's aggregate imports. For example, reduced demand for machinery from highly exposed firms in the wine industry could, in equilibrium, be offset by increased demand from less exposed firms whose banks were less affected

[22] Exposure is measured using 2006 data (prior to the 2008 GFC) as the share of trade with Greece, Italy, Portugal, and Ireland. We drop firms in the top quartile of this distribution.

[23] Since we do not have direct access to the authors' data, we derived the provincial classifications by reverse-engineering the information presented in Figure 3 of Almunia et al. (2021).

by the policy.[24] Thus, a small or even null response in total Spanish imports would still be consistent with our firm-level findings. Furthermore, even if total Spanish imports exhibit a significant decline after the regulation, foreign exporters may still reallocate shipments to alternative destinations.[25]

To test the role of these general equilibrium forces in shaping the cross-border effects of domestic bank regulations, we use BACI data, which report the value of trade flows by country of origin, destination, and product (defined at the 2002 Harmonized System level). The dataset is annual, and we focus on the period 2009-2013. Then, we construct a measure of exposure to the policy defined at the product–country-of-origin level as follows:

$$\text{Exposure}_{go} = \sum_b w_b^{go} \times \text{Exposure}_b \,, \qquad \text{where} \qquad w_b^{go} = \frac{\sum_f L_{fb} \times M_f^{go}}{\sum_b \sum_f L_{fb} \times M_f^{go}} \tag{5}$$

and L_{fb} represents the outstanding debt that firm f holds with bank b, and M_f^{go} denotes firm f's imports of product g from country o. This measure represents the weighted average exposure of banks, where the weights w_b^{go} capture each bank's relative importance in financing imports of good g from country o. To construct this measure, we use information from the end of 2006–three years prior to the start of our sample period.[26] A product–country-of-origin pair is considered as highly exposed to the policy if exports from that pair to Spain are primarily purchased by importers relying more heavily on banks most exposed to the regulation. For example, if Spanish importers of textiles from India depend heavily on financing from highly exposed banks, then Indian textiles are highly exposed to the regulation. The distribution of this exposure measure, shown in Figure 7, reveals substantial variation across pairs.

[Figure 7]

We begin by estimating the regulation's impact on Spain's total imports (equivalently, other

[24] Business stealing is particularly relevant for firms engaged in international trade. Since they are typically large, they can capture the market share from competitors facing negative shocks (Matray et al. 2024; Beaumont et al. 2025).

[25] This section focuses exclusively on the impact of the policy-driven contraction in import demand, since Spanish exports remain largely unaffected; see Section 5.1.2.

[26] From 2008 onward, the representativeness of the Balance of Payments data by country and product declines due to a change in reporting procedures; see Prades and Villegas-Sánchez (2022) for details. We therefore use 2006 as the baseline year to compute foreign exporters' exposure and match it with BACI trade flows. For all other exposure measures–bank-level and firm-level–we employ end-of-year 2011 data.

countries' exports to Spain). Specifically, we compare how exports to Spain evolved across product-origin pairs with different exposure levels, relative to the exports from the same pairs to other destinations, before and after the policy. Formally, we implement a triple difference-in-differences design:

$$\frac{X_{godt} - \overline{X}_{god}}{(X_{godt} + \overline{X}_{god})/2} = \gamma \times \text{Exposure}_{go} \times \mathbb{1}[d = \text{Spain}] \times Post_t + \delta_{god} + \delta_{gt} + \delta_{ot} + \delta_{dt} + u_{godt}, \quad (6)$$

where X_{godt} denotes exports of product g from country-of-origin o to country-of-destination d in year t. Thus, our dependent variable is a mid-point growth rate relative to the corresponding average value in the sample period. $Exposure_{go}$ is defined as in equation (5) and is multiplied by an indicator equal to one when Spain is the importing country and by $Post_t$, which is a dummy that takes the value of one in the years after the policy implementation–2012 and 2013. We include time-invariant product×origin×destination fixed effects denoted by δ_{god}, and time-varying fixed effects at the product, origin, and destination level, denoted by δ_{gt}, δ_{ot}, and δ_{dt}, respectively. Given the granularity of our data, we trim extreme values of Spanish participation by excluding product-country pairs where Spanish purchases represent less than 1.1 percent (the median). After this trimming, the sample covers 91 percent of Spain's total purchases.

Our parameter of interest, γ, captures the impact of Spanish loan loss provisions on exports to Spain relative to exports destined to other countries. If there is business stealing across Spanish firms, total exports to Spain will not differentially respond to our product–country-of-origin level exposure after the policy, and γ will be zero. We identify this parameter using a triple-differences approach that flexibly controls for product- and origin-specific shocks through time-varying fixed effects, thereby relaxing the identifying assumption. This specification addresses the concern that our measure of exposure to the Spanish regulation defined in equation (5) could be correlated with product- or exporter-specific trends coinciding with the increase in loan loss provisions. In addition, by including destination×year fixed effects, we account for demand shocks occurring simultaneously with the policy. Thus, our identifying assumption is that, absent the policy, the difference in exports to Spain from high- relative to low-exposed country-product pairs, would have evolved similarly to

the corresponding difference in other importing countries.

As a robustness, we re-estimate the triple-differences specification replacing destination×year fixed effects with a restricted set of importers comparable to Spain. Specifically, we consider EU members and other advanced economies as defined by Autor et al. (2013).[27] Additionally, we exclude Greece, Italy, Ireland, and Portugal (GIIP) from the set of exporters to address potential identification concerns related to the decline in their exports to Spain during the European sovereign debt crisis.

[Table 6]

We report our results in Table 6. Column (1) shows that one standard deviation higher exposure is associated with a 3.2 percent decline in exports to Spain relative to exports to other countries in a naive specification with exporter-destination and destination-year fixed effects. Column (2) reports a similar effect in a more saturated specification that includes time-varying product fixed effects. Our benchmark specification in Column (3) adds time-varying origin fixed effects to control for supply shocks and indicates that a one standard deviation increase in product-origin exposure reduces exports to Spain by 2.1 percent after the policy, relative to the same product-origin pair's exports to other destinations in the same period. Column (4) shows similar results when restricting the sample of destination countries to EU founders and other advanced economies that are likely to face demand patterns comparable to Spain. Finally, Column (5) finds consistent effects when excluding GIIP exporters from the sample.

[Figure 8]

Figure 8 presents the event-study graph corresponding to our benchmark specification. We find no statistically significant effect of our measure of exposure on exports to Spain prior to the policy, consistent with our identifying assumption. After the policy, however, exports to Spain from highly exposed origin-product pairs decline persistently relative to exports to other destinations of

[27] This is, high-income countries with comparable trade data: Australia, Belgium, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Japan, Luxembourg, Netherlands, New Zealand, Portugal, Spain, Switzerland, and the United States.

the same product. Overall, these results confirm that business stealing across Spanish importing firms was limited: the firm-level decline in imports documented in Section 5.1.2 translated into an aggregate contraction in Spain's import demand.

Despite the advantages of our triple-differences specification in controlling for multiple demand and supply shocks beyond the increase in Spanish loan loss provisions, the narrow level of disaggregation in our data raises the concern that results may be disproportionately driven by small destinations (i.e. partners with negligible trade volumes), which could follow different dynamics than larger ones. To address this, we complement our analysis by aggregating the data and estimating the following standard difference-in-differences specification separately for exports to Spain and to the rest of the world:[28]

$$\frac{X_{got} - \overline{X}_{go}}{(X_{got} + \overline{X}_{go})/2} = \beta \times \text{Exposure}_{go} \times Post_t + \delta_{go} + \delta_{x(g)t} + \delta_{x(o)t} + \delta_{x(o,g)t} + u_{got}, \tag{7}$$

where X_{got} denotes exports of product g from country o either to Spain or the rest of the world in year t. In this aggregate analysis, we cannot saturate the model with high-dimensional fixed effects. Instead, we include time-varying fixed effects for different categories of exporters and products: $\delta_{x(o)t}$ captures exporter characteristics such as distance to Spain and official language, while $\delta_{x(g)t}$ accounts for product differentiation.[29] Finally, we include product–country-of-origin level time-varying fixed effects by deciles of Spanish participation, $\delta_{x(o,g)t}$ to control for Spain's relative importance in a given market.

[Table 7]

Our results are consistent with our triple difference-in-differences specification. Our benchmark specification reported in column (3) of Table 7 shows a decline of 2.7 percent in exports to Spain. As a placebo test, column (7) shows an insignificant response of aggregate exports to other countries, confirming that the shock was specific to Spain. Results remain statistically unchanged when

[28] This latter specification acts as a placebo test, since the credit shock originated in Spain and should not systematically affect exports to other destinations.

[29] As we explain below, we build quartiles of price dispersion within product categories to measure product differentiation.

excluding GIIP exporters in columns (4) and (8). Figure 9 shows the event-study graph associated with our average effects reported in column (3). We can observe a decline in exports to Spain after the increase in loan loss provisions to Spanish banks, with no evidence of pre-trends. Overall, our results are similar to those reported in Table 6.

[Figure 9]

5.2.2 Attenuation of Spanish shock

Having established that Spanish import demand declined as a result of the policy, we now explore how foreign exporters–i.e., Spain's trade partners–responded to this contraction. Exporters can attenuate the credit-driven decline in Spanish demand by offering more favorable trade finance terms to Spanish importers. For example, exporters can offer longer repayment periods through trade credit, which can help alleviate the credit constraints faced by Spanish firms.

We begin by examining the role of financial development in origin countries and test the hypothesis that exporters with access to more developed financial sectors are more likely to offer favorable trade finance terms.[30]

[Table 8]

Our results in Table 8, where we estimate equation (7) with exports to Spain as the dependent variable, show how financial development shapes the attenuation of the decline in Spanish demand. Column (1) shows that exporters in highly financially developed countries–defined as those in the top quartile of the private credit-to-GDP ratio distribution–fully offset the Spanish credit contraction, leaving exports to Spain unaffected. By contrast, Column (2) indicates that a one standard deviation increase in product-origin exposure reduces exports to Spain by 3.3 percent when exporters belong to countries with weaker financial development.[31] These results support our hypothesis that exporters in deeper financial systems are better able to absorb credit-driven

[30] It is well established that countries with more developed financial markets export more, particularly in industries that rely heavily on external financing (Beck 2002, 2003; Chan and Manova 2015).

[31] Figure 10 plots the density of product-origin exposure by financial development group and shows that the distributions are similar, addressing concerns that our findings may be driven by a negative correlation between exposure and financial development.

demand shocks by extending more favorable trade finance conditions to importers. They are also consistent with our firm-level evidence showing that Spanish importers with established trade credit relationships with suppliers experienced smaller import declines (Section 5.1.2). Taken together, this evidence underscores financial development as a key factor in containing cross-border spillovers of bank regulatory shocks through international trade linkages.

Then, we explore how country-specific characteristics that are associated with trade costs interact with financial development. Higher trade costs create a stronger need for external financing, thereby limiting exporters' ability to offer more favorable trade credit terms. For instance, exporters located farther from Spain face higher variable trade costs, as longer shipment times intensify liquidity needs. Likewise, exporters from non-Spanish-speaking countries may face higher fixed trade costs, as exporting to Spain often requires investments to overcome language barriers.

Our results are reported in Table 8. The decline in exports from less financially developed countries is concentrated among those that are geographically distant from Spain and do not share a common language. Columns (3) and (4) show that a one standard deviation increase in exposure leads to a statistically insignificant 2.2 percent decline for exporters located close to Spain (in the bottom quartile of the distance distribution), but a significant 3.6 percent decline for those farther away. Similarly, columns (5) and (6) indicate no effect for Spanish-speaking countries, while the effect is significantly negative for non-Spanish-speaking countries.[32] Finally, column (8) shows a significant 3.9 percent contraction in exports for countries that are both distant and non-Spanish-speaking, whereas column (7) reveals a negative, albeit not statistically significant effect for countries that are either close to Spain or Spanish-speaking.

Table 9 reports results from the same analysis but using exports to destinations other than Spain as the dependent variable. This serves as a placebo test: since the credit shock originated in Spain, we should not expect financial development or trade costs to play a significant role for other destinations–and indeed, we find no such effects. Taken together, these results confirm that financial underdevelopment and trade costs–stemming from greater distance and language barriers–amplify spillovers specifically by constraining exporters' ability to attenuate the contraction in Spanish

[32] Figure 11 plots the density of product-origin exposure across country groups defined by trade costs and shows that the distributions are similar.

import demand.

The role of Spanish global banks. Spanish banks operate across multiple countries and provide financing to firms engaged in international trade. One concern, therefore, is that our estimates might partly reflect a reduction in business loans by Spanish banks abroad, similar to the mechanism documented by Tripathy (2020). However, our results remain robust to the inclusion of exporter-year fixed effects, which already account for the presence of Spanish banks in foreign countries. That said, the trade channel could still be amplified by the Spanish banking footprint in foreign markets, for instance, if Spanish banks are specialized in financing firms that export to Spain (Paravisini et al., 2023).

To assess whether this financial channel drives our results, we use BankFocus data to map the footprint of Spanish banks across foreign countries. We then compare exports from countries without a Spanish bank presence–which account for 75 percent of our observations and 80 percent of Spanish purchases–to those from countries where Spanish banks operate.

[Table 10]

Our results in Table 10 show that the presence of Spanish banks does not alter the response of other countries' exports to Spain. Columns (1)-(2) indicate that exports from financially developed countries remain unaffected by the regulatory shock, regardless of Spanish bank presence. Likewise, the decline in exports from less financially developed countries does not differ significantly depending on whether Spanish banks operate locally. We also find no evidence that Spanish bank operations interact with trade costs. These results suggest that, while multinational banking networks may play a role in shaping international capital flows, they do not drive of our estimated spillovers. Instead, the cross-border effects we document arise primarily through international trade linkages, with financial development and trade costs in origin countries acting as key amplifiers.

5.2.3 Aggregate effects on Spain's trade partners and export reallocation

We now examine the implications of the documented decline in Spanish imports for trade partners' aggregate exports. The effect of our treatment measure, defined in equation (5), on total exports

may be amplified or dampened by a product-origin pair's reliance on Spanish demand. For instance, a pair may appear highly exposed if its Spanish importers rely heavily on treated banks, but if Spain represents only a small share of its overall exports, the aggregate exposure is effectively low. In such cases, reallocation may be economically unfeasible, as the costs of redirecting sales to new destinations could outweigh the benefits. To account for this, we construct the following measure of exporter exposure to the regulation in Spain, which weights our product-origin exposure by the share of each pair's exports directed to Spain:

$$\text{Aggregate Exposure}_{go} = \frac{X_{go\,\text{Spain}}}{X_{go}} \times \text{Exposure}_{go}. \tag{8}$$

Where $\frac{X_{go:\text{Spain}}}{X_{go}}$ denotes Spain's share of country o's exports of product g prior to the policy.[33] Under this definition, a foreign exporter o of product g is highly exposed when Spanish importers of g rely heavily on treated banks and Spain represents a substantial share of o's exports of that product. We then re-estimate the difference-in-differences equation (7), using this new exposure measure as the independent variable and total exports to all destinations for each product-origin pair as the dependent variable:

$$\frac{X_{got} - \overline{X}_{go}}{(X_{got} + \overline{X}_{go})/2} = \rho \times \text{Aggregate Exposure}_{go} \times Post_t + \delta_{go} + \delta_{x(g)t} + \delta_{x(o)t} + u_{got}, \tag{9}$$

Thus, our parameter of interest, ρ, measures the cross-border effects of Spanish loan loss provisions and is identified by comparing total sales from highly exposed exporters to those from less exposed ones, before and after the regulation. If Spain's trade partners faced no frictions in reallocating sales away from Spain, our exposure measure would have no effect on foreign countries' total exports. Conversely, we would observe a significant decline in trade partners' total exports.

[Table 11]

We report our results in Table 11. Column (1) shows that a one-standard deviation higher aggregate exposure is associated with a 1.6 percent decline in total exports after the policy. Although

[33] Shares are calculated using 2006 data, consistent with the exposure measure in equation (5).

not statistically significant at conventional levels, this aggregate effect reflects a significant 3.4 percent contraction in exports to Spain and an insignificant response of exports to other destinations, as shown in columns (2) and (3). To explore heterogeneity, we split product–country-of-origin cells into two groups based on Spain's share in their total sales, such that each group accounts for 50 percent of Spain's total imports.[34] Columns (4)-(6) show that aggregate exposure has no statistically significant effect among exporters for whom Spain represents only a minor share of sales. By contrast, columns (7)-(9) indicate that when Spain is a major buyer, aggregate exposure leads to a 2.8 percent decline in total exports, driven almost entirely by a 4.5 percent contraction in sales to Spain, with no evidence of reallocation to other destinations.[35]

[Figure 12]

Figure 12 presents the event-study graph corresponding to the average effect reported in column (7) of Table 11. The decline in total exports from highly exposed product-origin pairs appears only after the policy shock, while exports from differently exposed pairs followed parallel trends before 2011, supporting our identifying assumption. These results indicate that the increase in loan loss provisions in Spain generated aggregate effects abroad through the import demand channel, as reallocation to alternative destinations was limited for the average exporter-product pair.

To assess the channels that may facilitate trade reallocation, we conduct a heterogeneity analysis at the product level. We test the hypothesis that homogeneous products, such as commodities, can be reallocated across countries relatively easily, whereas heterogeneous products–where buyers demand differentiated varieties–pose greater difficulties for reallocation. Using BACI data, we compute an implicit price for each HS 6-digit product–country pair by dividing total value by total weight, and then calculate the variance of these prices at the HS 2-digit level. Products with price dispersion in the bottom quartile are classified as homogeneous, while those above this cutoff are defined as heterogeneous.

[34] As a result of this partition, pairs with a high Spanish share are those where exports to Spain account for more than 6 percent of their total sales.

[35] Table A.13 in the Appendix conducts a similar analysis, estimating the impact of our aggregate exposure in countries that are geographically distant from Spain and do not share a common language. Columns (2), (5), and (8) show that exports to Spain decline sharply in these higher-trade-cost countries, consistent with our main results, which in turn drives the aggregate export response in columns (1), (4), and (7). By contrast, the response of exports to other destinations is unrelated to the trade costs of exporting to Spain.

[Table 12]

We report our results in Table 12, focusing on countries that were less able to attenuate the import demand shock from Spain–those with low financial development, greater geographic distance, and no common language–where the need for reallocation is expected to be strongest. Columns (1)-(3) present results for products with greater price dispersion (i.e., more heterogeneous goods). In this case, total exports fall by 9%, driven entirely by a contraction in sales to Spain, which is not offset by sales to other destinations. By contrast, column (4) shows that when products are relatively homogeneous, total exports remain unaffected. Columns (5)-(6) confirm that although exports to Spain still decline, homogeneous products are reallocated to other destinations, fully compensating for the decline in Spanish imports.[36]

Overall, our findings suggest that exporters face two types of frictions when attempting to smooth demand shocks in a partner country. Attenuation frictions arise in financially less developed countries, where limited access to external finance restricts exporters' ability to ease importers' financial constraints by offering more favorable trade finance terms. These frictions become especially binding when exporters also face high trade costs to serve the shocked trade partners. Reallocation frictions, by contrast, stem from product differentiation, which limits exporters' capacity to redirect sales of highly differentiated products to alternative destinations.

6 Conclusions

This paper provides novel evidence of an international trade channel through which domestic bank regulations spill over across borders. Using detailed Spanish administrative and international trade data, we show that financial regulations targeting the domestic banking sector can generate unintended effects on the trade flows of Spain's partners.

We focus on the sharp and unexpected 2012 increase in loan loss provisions for Spain's construction and real estate sectors–a regulation plausibly unrelated to global trade. Leveraging granular data from the Spanish Central Credit Register (CIR), the quasi-universe of firm-level trade flows,

[36] Figure 13 plots the density of aggregate exposure across product groups defined by price dispersion and shows that the distributions are similar.

and bilateral trade data from BACI, we estimate the regulation's impact along three dimensions: (1) credit supply to firms engaged in international trade, (2) firm-level trade outcomes, and (3) the total exports of Spain's trade partners.

Our results show that the policy-induced increase in provisions constrained credit supply to firms engaged in international trade, and importers in particular were unable to fully substitute through other banking relationships or funding sources. This credit contraction translated into a significant decline in imports at the intensive margin. While small exporters were affected, Spain's export flows were mostly sustained by large firms, underscoring that the primary cross-border transmission channel of the policy was the contraction in Spanish import demand.

In the aggregate, we document limited import reallocation within Spain: less exposed importers did not compensate for the decline in import demand from more exposed ones. Our cross-border analysis suggests that the ability of Spain's trading partners to attenuate the policy-driven import demand shock depended significantly on their domestic financial systems. Exporters in financially developed countries could absorb the shock, whereas those in less developed financial systems faced stronger frictions–especially when trade costs to Spain are high. Reallocation to alternative markets was also constrained: while homogeneous products were redirected to other destinations, heterogeneous products faced significant declines in total exports.

Taken together, these findings demonstrate that the cross-border consequences of banking regulation are not confined to international capital flows or multinational bank networks. Rather, they also propagate through international trade linkages, with distributional effects shaped by financial development, trade costs, and product differentiation.

The evidence presented in this paper carries important policy implications. Domestic policymakers should account for externalities beyond their borders when designing prudential policies. International coordination on financial regulation may therefore be critical, not only to safeguard financial stability, but also to minimize unintended disruptions to global trade.

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Figures and tables

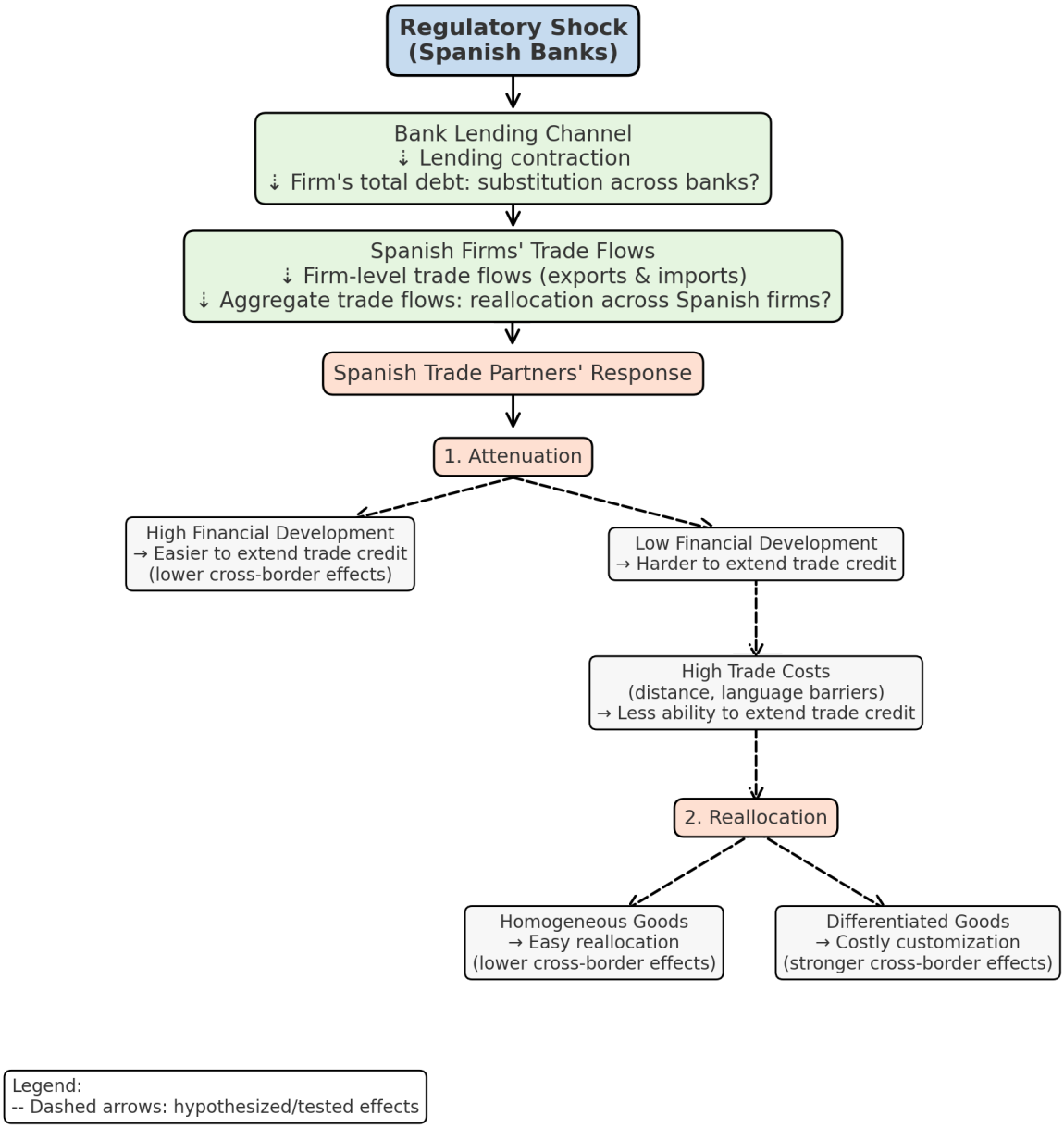


Figure 1: Channels of Cross-Border Spillovers of Bank Regulation

Table 1: Summary statistics

	Obs.	Mean	sd	p25	p50	p75
Panel A: *Bank-firm credit data*						
Log of Credit	1,288,007	5.65	1.65	4.61	5.64	6.65
Long-term credit ratio	1,288,007	54.33	41.08	6.07	59.32	100.00
Collateralization rate	1,288,007	13.40	30.25	0.00	0.00	0.00
NPL ratio	1,288,007	8.07	26.87	0.00	0.00	0.00
Credit share	1,288,007	23.30	22.83	6.34	15.29	32.85
Termination dummy	137,800	0.18	0.38	0.00	0.00	0.00
Panel B: *Firm data*						
Log of Total Bank Credit	316,925	7.17	1.60	6.12	7.09	8.13
Panel C: *Bank data*						
Exposure	83	36.76	16.71	25.70	34.95	47.36
Size	83	14.69	2.38	12.84	14.13	16.63
Capital ratio	83	9.56	6.46	6.66	8.04	10.31
Liquidity ratio	83	5.70	5.73	1.83	3.49	8.12
ROA	83	0.08	1.07	0.11	0.27	0.45
NPL ratio	83	5.39	4.26	2.75	4.84	6.61
Rural bank dummy	83	0.47	0.50	0.00	0.00	1.00
% Lending to X or M	83	34.66	21.11	18.57	34.18	48.59
Local Govt. Credit/Assets	83	2.67	6.20	0.32	1.50	3.08
Panel D: *Balance of Payments data*						
Exports, mid-point growth	649,050	-0.89	1.30	-2.00	-2.00	0.39
Imports, mid-point growth	558,540	-0.84	1.28	-2.00	-1.93	0.39
Exports, Entry dummy	274,933	0.35	0.48	0.00	0.00	1.00
Imports, Entry dummy	214,098	0.35	0.48	0.00	0.00	1.00
Exports, Exit dummy	229,050	0.36	0.48	0.00	0.00	1.00
Imports, Exit dummy	221,390	0.33	0.47	0.00	0.00	1.00
Panel E: *BACI data*						
Imports, mid-point growth	3,141,210	-0.54	1.07	-1.90	-0.28	0.23
Exports, mid-point growth	24,945	-0.07	0.40	-0.17	-0.00	0.11

In Panel A, bank-firm controls are computed using end of 2011 credit information. In Panel C, bank variables are calculated using supervisory financial statements at the end of 2011. All variables are defined in Appendix B.

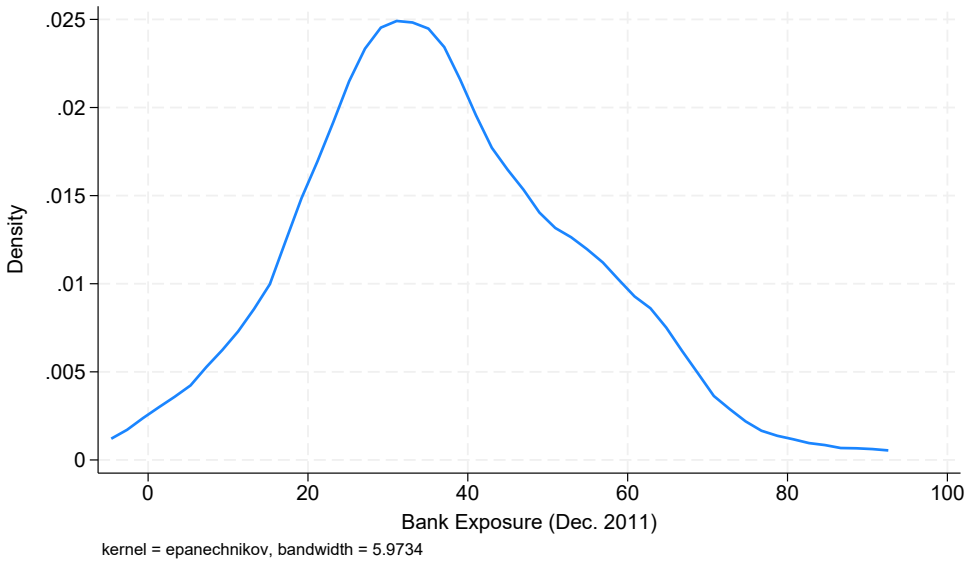


Figure 2: Bank Exposure: Kernel Density Estimate

This figure plots the kernel density of bank exposure defined by the ratio of construction and real estate lending over total corporate loans as of December 2011.

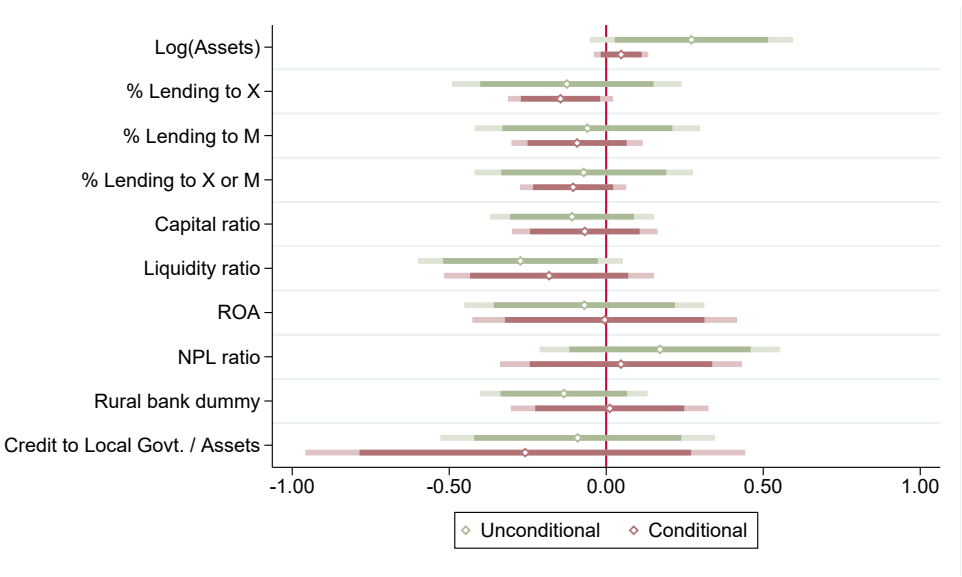


Figure 3: Bank Covariate Balance

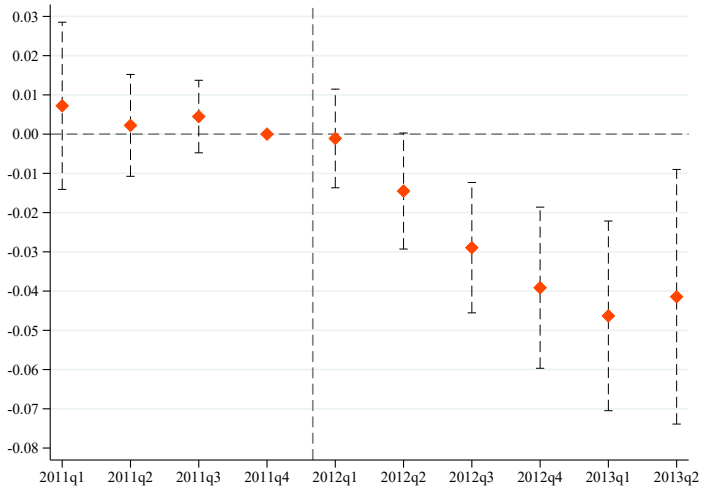
This figure shows coefficient estimates along with 95% confidence intervals (darker bars) and 99% confidence intervals (lighter bars) for the impact of a one standard deviation increase in bank exposure across different variables. All variables are standardized to have zero mean and a standard deviation of one. "Unconditional" estimates compare banks with different levels of exposure without conditioning on any fixed effects. "Conditional" estimates compare banks within the same size quartile (measured by total assets) and the same trade exposure quartile (measured by the share of loans to exporters and importers, excluding real estate and construction loans). Rural is an indicator variable equal to one for rural savings banks, and NPL represents non-performing loans, defined as outstanding debt with a repayment delay of more than 90 days.

Table 2: Impact of Provisioning Shift on Lending to Importing and Exporting Firms, Bank-Firm Level Analysis

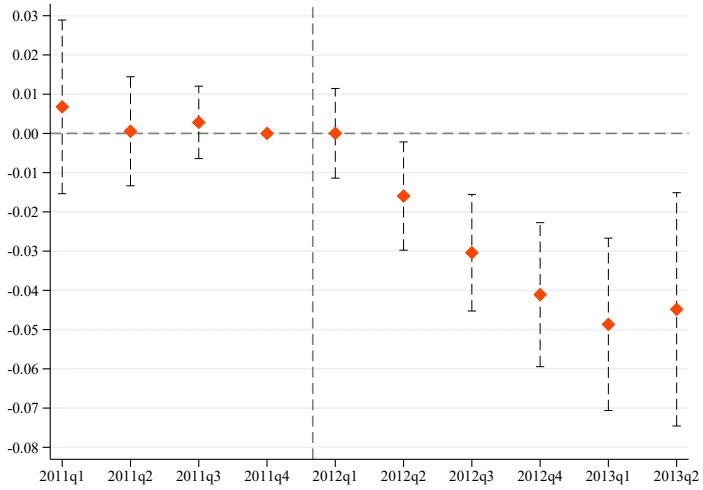
Panel A:	Intensive Margin			
Dep. Variable: Log(Credit)	*M*		*X*	
	(1)	(2)	(3)	(4)
Exposure × *Policy*	-0.025**	-0.031**	-0.025**	-0.031**
	(0.011)	(0.013)	(0.011)	(0.012)
Controls×time	No	Yes	No	Yes
Firm-time FE	Yes	Yes	Yes	Yes
Bank-firm FE	Yes	Yes	Yes	Yes
Obs.	962,963	962,963	973,386	973,386
R^2	0.97	0.97	0.97	0.97

Panel B:	Extensive Margin			
Dep. Variable: Termination	*M*		*X*	
	(1)	(2)	(3)	(4)
Exposure × *Policy*	0.016*	0.019*	0.014*	0.015
	(0.008)	(0.010)	(0.008)	(0.010)
Controls	No	Yes	No	Yes
Firm FE	Yes	Yes	Yes	Yes
Obs.	102,788	102,788	103,957	103,957
R^2	0.52	0.56	0.51	0.56

This table presents regression results on lending from bank b to firm f at the intensive margin (Panel A) and the extensive margin (Panel B). In Panel A, the dependent variable is the logarithm of credit granted by bank b to firm f in quarter t. In Panel B, conditional on the existence of the lending relationship at the end of 2011, the dependent variable is a dummy variable that takes the value of one if the lending relationship was terminated in the aftermath of the policy and zero otherwise. Columns (1) and (2) correspond to the sample of importers, whereas columns (3) and (4), exporters. *Exposure* is computed as the ratio of construction and real estate lending to total corporate sector lending by bank b as of the end of 2011. *Controls* are measured as of the end of 2011 and include bank-firm characteristics (the collateralization rate, the ratio of long-term lending, the share of firm f's NPLs with the bank, and the share of lending coming from bank b out of firm f's total bank lending) and bank characteristics (dummies for quartiles of size, measured by total assets, and quartiles of exposure to exporter/importer companies, measured as the lending share to exporters and importers relative to total corporate sector lending). All variables are defined in Appendix B. We exclude importing and exporting firms in the construction or real estate sectors. Standard errors are double clustered at the bank and firm levels and reported in parentheses. $***$ $p < 0.01$, $**$ $p < 0.05$, $*$ $p < 0.10$.



Panel A: Lending to Importers



Panel B: Lending to Exporters

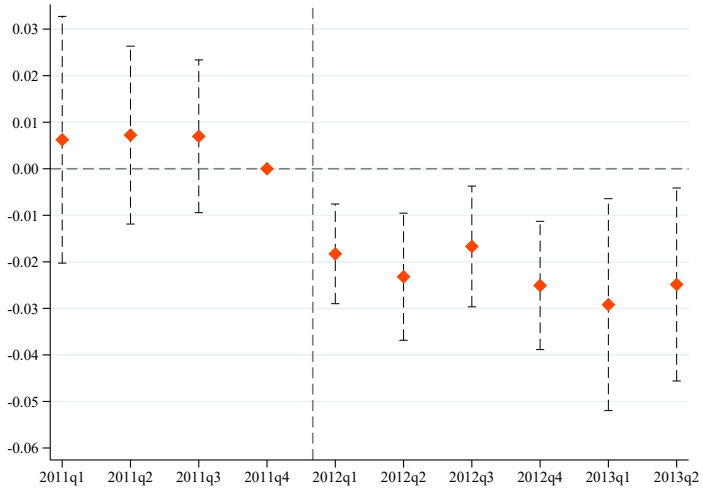
Figure 4: Impact on Lending to Importing and Exporting Firms at the Intensive Margin

This figure plots the event study associated with specification (1), where we replace *Policy* with quarter dummies. Panel (a) includes importers, while panel (b) consider exporters. The dependent variable is the logarithm of credit. We drop importing and exporting firms in construction or real estate sectors. Each dot represents the estimated coefficient of the interaction of bank exposure and a quarter dummy. We normalize the coefficient of 2011Q4 to zero. The dashed lines indicate the 2.5%–97.5% confidence interval, with standard errors double clustered at the bank and firm levels.

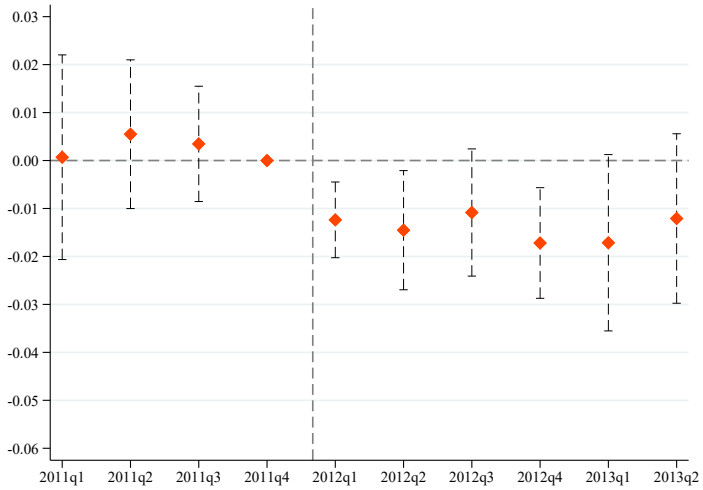
Table 3: Impact of Provisioning Shift on Total Bank Debt to Importing and Exporting Firms, Firm Level Analysis

Dep. Variable: Log(Credit)	M		X	
	(1)	(2)	(3)	(4)
$Exposure \times Policy$	-0.019***	-0.028***	-0.012**	-0.016**
	(0.006)	(0.007)	(0.005)	(0.007)
Controls×time	No	Yes	No	Yes
Firm FE	Yes	Yes	Yes	Yes
Time FE	Yes	No	Yes	No
$\hat{\alpha}_{f,t}$	No	Yes	No	Yes
Obs.	228,786	228,786	230,099	230,099
R^2	0.98	0.98	0.98	0.98

This table presents firm-level regression results for firms' total bank debt, estimated using equation (2). Columns (1) and (2) correspond to the sample of importers, whereas columns (3) and (4), exporters. The dependent variable is the logarithm of firm f's total bank debt. *Exposure* is calculated as the weighted average of the exposure of banks lending to firm f, using outstanding credit at the end of 2011 as weights. To account for credit demand, regressions in columns (2) and (4) include estimated firm-quarter fixed effects obtained from specification (1), while regressions in columns (1) and (3) include quarter fixed effects instead. *Controls* are the weighted average of bank-firm characteristics (collateralization rate, ratio of long-term lending, share of firm f's NPLs with the bank) and bank characteristics (quartiles of size and exposure to exporter/importer companies), measured as of the end of 2011 and weighted by banks' lending to firm f as of 2011. Additionally, we include industry and province indicators as control variables. All variables are defined in Appendix B. Importing and exporting firms in the construction or real estate sectors are excluded. Standard errors are double-clustered at the main bank and firm levels and are reported in parentheses.
$***\ p < 0.01$, $**\ p < 0.05$, $*\ p < 0.10$.



Panel A: Lending to Importers



Panel B: Lending to Exporters

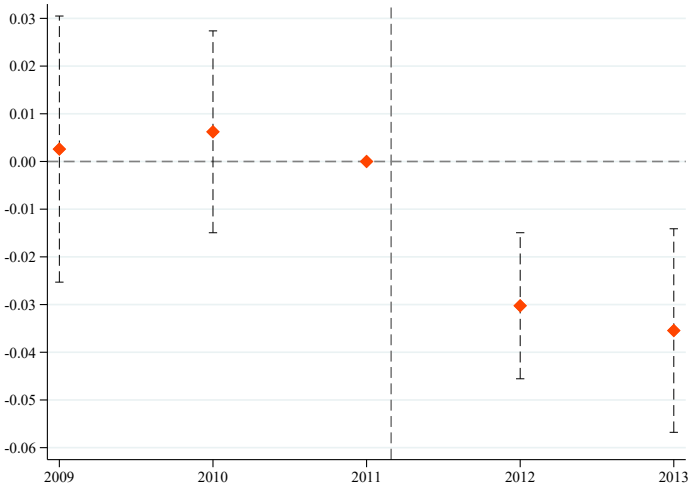
Figure 5: Impact on Total Bank Debt to Importing and Exporting Firms

This figure plots the event study associated with specification (2), where *Policy* is replaced with quarter dummies. Panel (a) includes importers, while panel (b) consider exporters. The dependent variable is the logarithm of firms' total bank credit. To account for credit demand, all regressions include the estimated firm-quarter fixed effects obtained from our bank-firm specification in (1). Importers and exporters in the construction or real estate sectors are excluded. Each dot represents the estimated coefficient of the interaction between a quarter dummy and the firm-level exposure, which is computed as the weighted average of the exposure of banks lending to firm f, using the outstanding credit at the end of 2011 as weights. The coefficient for 2011Q4 is normalized to zero. The dashed lines indicate the 2.5%–97.5% confidence interval, with standard errors double-clustered at the main bank level and firm level.

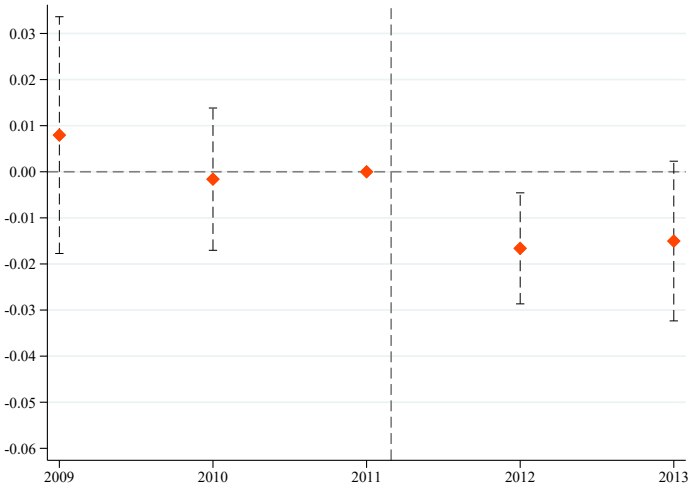
Table 4: Impact of Provisioning Shift on Firms' International Trade Flows

	Mid-point growth		Entry Dummy		Exit Dummy	
	M	X	M	X	M	X
	(1)	(2)	(3)	(4)	(5)	(6)
Exposure × *Policy*	-0.036***	-0.020**	-0.007**	0.000	0.014***	0.009**
	(0.011)	(0.009)	(0.003)	(0.003)	(0.004)	(0.004)
Product-Country-Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Province-Industry-Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Product-Country-Firm FE	Yes	Yes	No	No	No	No
Firm FE	No	No	Yes	Yes	Yes	Yes
Obs.	558,540	649,050	214,098	274,933	221,390	229,050
R^2	0.17	0.17	0.18	0.16	0.23	0.25

This table presents the regression estimates on firm's trade flows at the product-country-year level. In columns 1 and 2, we compute the mid-point growth rate between firm f's imports (exports) of product g to (from) country c and the 5-year average of firm f's imports (exports) of the same product from (to) that country, and regress it on the firm's exposure and a set of fixed effects. In columns 3 and 4, we employ a binary indicator that, conditional on not participating in the market the previous year, takes the value of one if the firm enters the market. In columns 5 and 6, we use a binary indicator that takes the value of one if the firm exits the market, conditional on participating in the same market the previous year. *Exposure* is computed as the average exposure of banks lending to firm f, with weights based on the outstanding credit as of the end of 2011. *Policy* is a dummy variable that takes the value of one after the provisioning increase. The fixed effects included in each regression are noted in the lower part of the table. All variables are defined in Appendix B. Importers and exporters in the construction or real estate sectors are excluded. Standard errors are double-clustered at the main bank and firm levels and are reported in parentheses. $***\ p < 0.01$, $**\ p < 0.05$, $*\ p < 0.10$.



(a) Imports



(b) Exports

Figure 6: Impact of Provisioning Shift on Imports and Exports at the Intensive Margin

This figure plots coefficient estimates from a modified version of the specification in (4). For each year, the coefficient corresponds to the interaction of *Exposure* with a year dummy. Each coefficient measures the impact of a one standard deviation increase in firm f's exposure to the policy on its imports (or exports) growth of good g from (or to) country c, relative to the year before the policy implementation (2011). Panel (a) presents the estimates for importers, whereas Panel (b) presents the estimates for exporters. Importers and exporters in the construction or real estate sectors are excluded. The dashed lines indicate the 2.5%–97.5% confidence interval, with standard errors double clustered at the main bank and firm levels.

Table 5: Reliance on Trade Credit and Policy Impact on Trade Flows

	Importers		
	(1)	(2)	(3)
Exposure × *Policy*	-0.036***	-0.033***	-0.032**
	(0.011)	(0.011)	(0.013)
Exposure × *Policy* × *Supplier Credit*			0.020**
			(0.008)
Product-Country-Year FE	Yes	Yes	Yes
Province-Industry-Year FE	Yes	Yes	Yes
Product-Country-Firm FE	Yes	Yes	Yes
Imports/Purchases Bins-Year FE	No	No	Yes
Obs.	558,540	519,335	519,265
R^2	0.17	0.17	0.18

This table presents the heterogeneous effects of the provisioning shift on trade outcomes based on firms' reliance on trade credit, specifically, importer-received credit in Column (3). *Supplier Credit* is defined as the average share of supplier credit, received by importers, in total financing (supplier credit plus bank debt) over the same period. This measure is standardized to have mean zero and standard deviation one. Column (1) replicate the main specification from Table 4 using the full sample. Column (2) restricts the sample to firms for which trade credit data are available. Lower-order interaction terms corresponding to the triple interactions are included in the regressions but not reported. Column (3) additionally includes fixed effects at the year-imports share bins level. Bins are constructed using quintiles of the firm's average imports-to-purchases ratio over 2010-2011. The dependent variable is the mid-point growth rate of firm f's imports of product g relative to the 5-year average of firm f's imports of the same product. *Exposure* is computed as the weighted average of the exposure of banks lending to firm f, using outstanding credit as of the end of 2011 as weights. *Policy* takes a value of one for 2012 and 2013 and zero otherwise. The fixed effects included in each regression are specified in the lower part of the table. Importers operating in the construction or real estate sectors are excluded. Standard errors are double-clustered at the main bank and firm levels and are reported in parentheses. $***\ p < 0.01$, $**\ p < 0.05$, $*\ p < 0.10$.

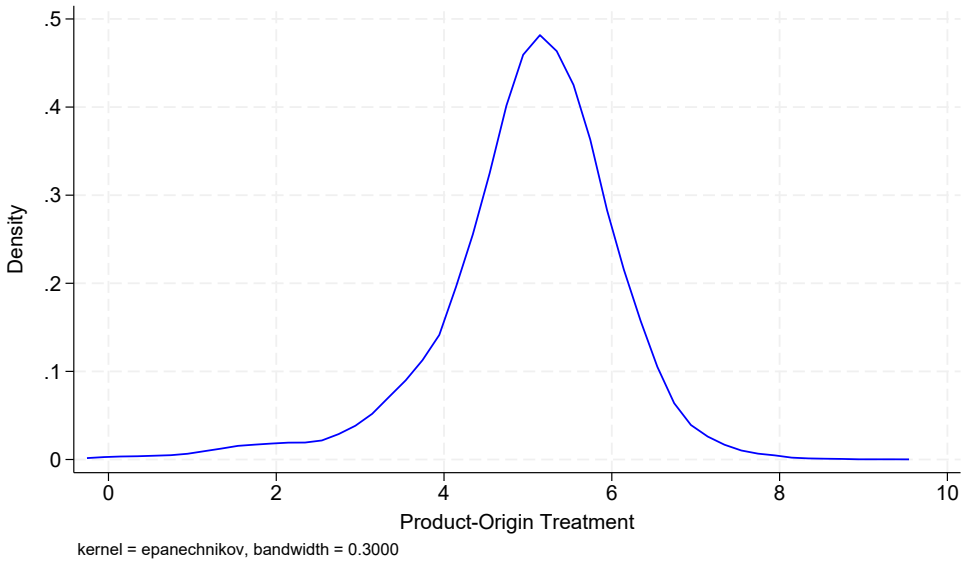


Figure 7: Product-origin Exposure: Kernel Density Estimate

This figure plots the kernel density of the standardized product-origin treatment, as defined in Equation 5.

Table 6: Impact of Provisioning Shift on Exports to Spain Relative to Other Destinations, Triple Difference-in-Differences Specification

	Mid-point growth				
	All destinations			Comparable destinations	All dest. Excl. GIIP exporters
	(1)	(2)	(3)	(4)	(5)
$Exposure_{go} \times \mathbb{1}[d = \text{Spain}] \times Post_t$	-0.032**	-0.027**	-0.021*	-0.022*	-0.023*
	(0.013)	(0.013)	(0.012)	(0.013)	(0.013)
Observations	1,600,910	1,600,910	1,600,910	144,500	1,394,170
Fixed Effects					
Exporter × Importer × Product	Yes	Yes	Yes	Yes	Yes
Importer × Year	Yes	Yes	Yes	Yes	Yes
Product × Year	No	Yes	Yes	Yes	Yes
Exporter × Year	No	No	Yes	No	Yes

This table presents the regression results for the mid-point growth rate of exports of product g from country o to country d in year t relative to its five-year average. The analysis is based on a product-origin level measure of exposure, interacted with a dummy variable that equals one when Spain is the importing country, and incorporates different sets of fixed effects, as specified in equation (6). Product-origin exposure is calculated as the weighted average of the exposures of Spanish banks lending to firms importing product g from country o, following equation (5). The fixed effects included in each regression are listed in the lower part of the table. Columns (1) to (3) include all importers, while column (4) focuses on a set of comparable destinations, as those in Autor et al. (2013). Column (5) includes all importers and excludes GIIP exporters. All variables and comparable countries are defined in Appendix B. Standard errors shown in parentheses are clustered by product and country of origin.
$***$ $p < 0.01$, $**$ $p < 0.05$, $*$ $p < 0.10$.

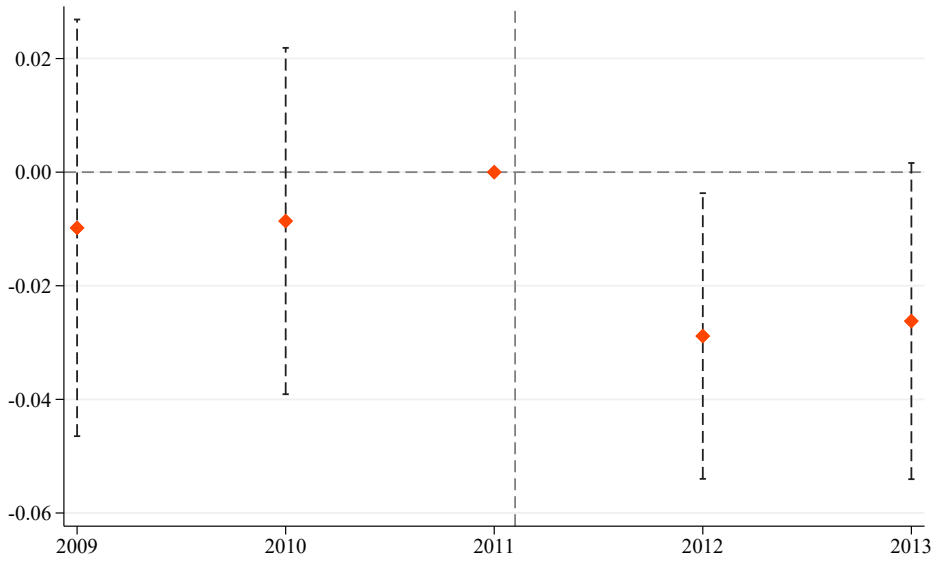


Figure 8: Event Study for the Average Effect of Product Exposure to Provisioning Shift on Exports to Spain Relative to Other Destinations

This figure plots coefficient estimates from a modified version of the specification in equation (6), which coincides with our benchmark specification in column (3) of Table 6. For each year, the coefficient corresponds to the interaction of the product-level exposure, the year dummy, and an indicator equal to one when Spain is the importing country. The dashed lines indicate the 2.5%–97.5% confidence interval, with standard errors clustered by product and country of origin.

Table 7: Impact of Provisioning Shift on Exports to Spain and Other Destinations

	Mid-point growth							
	Exports to Spain				Other Destinations			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
$Exposure_{go} \times Post_t$	-0.034**	-0.035***	-0.027**	-0.028*	-0.003	-0.004	-0.010	-0.010
	(0.013)	(0.013)	(0.014)	(0.015)	(0.007)	(0.007)	(0.007)	(0.008)
Observations	11,363	11,363	11,363	9,948	11,363	11,363	11,363	9,948
Fixed Effects								
Exporter × Product	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Spanish share decile × Year	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Product charact. × Year	No	Yes	Yes	Yes	No	Yes	Yes	Yes
Country charact. × Year	No	No	Yes	Yes	No	No	Yes	Yes

This table presents regression results for the mid-point growth rate of exports of product g from country o relative to its five-year average: to Spain (columns 1-3) and to destinations other than Spain (columns 5-7). Columns (4) and (8) report results excluding GIIP exporters. The analysis is based on a product-origin level measure of exposure, and incorporates different sets of fixed effects, as specified in equation (7). Product-origin exposure is calculated as the weighted average of the exposures of Spanish banks lending to firms importing product g from country o, following equation (5). The fixed effects included in each regression are listed in the lower part of the table. Product characteristics include a dummy for high or low heterogeneity: i.e, low, if price dispersion of the product is at the bottom quartile of the price dispersion distribution. Exporter country characteristics include: distance to Spain indicator (close to Spain if it belongs to the bottom quartile of the distance-to-Spain distribution), official language (Spanish or not). Spanish share corresponds to the participation of Spain in total exports of a specific origin×product pair. All variables are defined in Appendix B. Standard errors shown in parentheses are clustered by product and country of origin.
$***\ p < 0.01$, $**\ p < 0.05$, $*\ p < 0.10$.

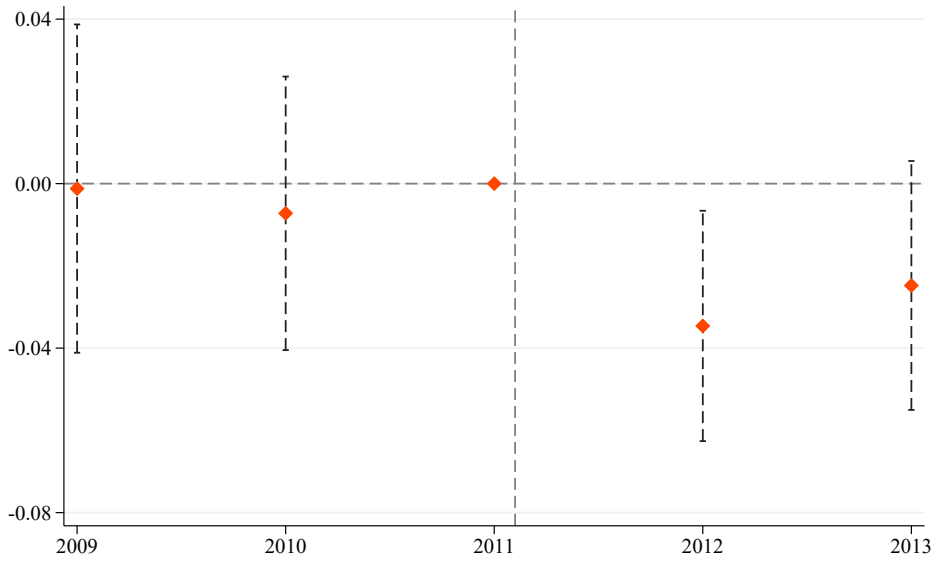


Figure 9: Event Study for the Average Effect of Product Exposure to Provisioning Shift on Exports to Spain

This figure plots coefficient estimates from a modified version of the specification in equation (7), which coincides with our benchmark specification in column (3) of Table 7. For each year, the coefficient corresponds to the interaction of the product-level exposure and the year dummy. The dashed lines indicate the 2.5%–97.5% confidence interval, with standard errors clustered by product and country of origin.

Table 8: Impact of Provisioning Shift on Exports to Spain, by Origin-Country Characteristics

	Mid-point growth Exports to Spain							
	High FD	Low Financial Development						
		All	Distance		Language		Far & Not Spanish	
			Close	Far	Spanish	Other	No	Yes
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
$Exposure_{go} \times Post_t$	0.005	-0.033**	-0.022	-0.036**	-0.026	-0.035**	-0.023	-0.039**
	(0.024)	(0.016)	(0.034)	(0.018)	(0.055)	(0.017)	(0.031)	(0.019)
Observations	2,703	8,271	1,620	6,651	1,040	7,231	2,660	5,611
Fixed Effects								
Exporter × Product	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Product charact. × Year	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Country charact. × Year	Yes	Yes	Yes	Yes	Yes	Yes	–	–
Spanish share decile × Year	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

This table presents the regression results for the mid-point growth rate of exports of product g from country o to Spain, relative to its five-year average. Column (1) reports estimates for exports to Spain from countries with high financial development, defined as those in the top quartile of the private credit-to-GDP ratio. Columns (2)-(8) report estimates for countries with low financial development, those at the bottom three quartiles. Column (2) includes all origins. Columns (3) and (4) correspond to exporters that are geographically close to Spain (bottom quartile of the distance-to-Spain distribution), or far from Spain, respectively. Columns (5) and (6) report estimates for exporters from Spanish-speaking and non-Spanish-speaking countries, respectively. Column (7) includes exporters that are either geographically close to Spain or Spanish-speaking, while Column (8) covers exporters that are both geographically distant and non-Spanish-speaking. The analysis is based on a product-origin level measure of exposure, and incorporates different sets of fixed effects, as specified in equation (7). Product-origin exposure is calculated as the weighted average of the exposures of Spanish banks lending to firms importing product g from country o, following equation (5). The fixed effects included in each regression are listed in the lower part of the table. Product characteristics include a dummy for high or low heterogeneity: i.e, low, if price dispersion of the product is at the bottom quartile of the price dispersion distribution. Exporter country characteristics include: distance to Spain indicator (close to Spain or not), official language (Spanish or non Spanish). Spanish share corresponds to the participation of Spain in total exports of a specific origin×product pair. All variables are defined in Appendix B. Standard errors shown in parentheses are clustered by product and country of origin.
$***\ p < 0.01$, $**\ p < 0.05$, $*\ p < 0.10$.

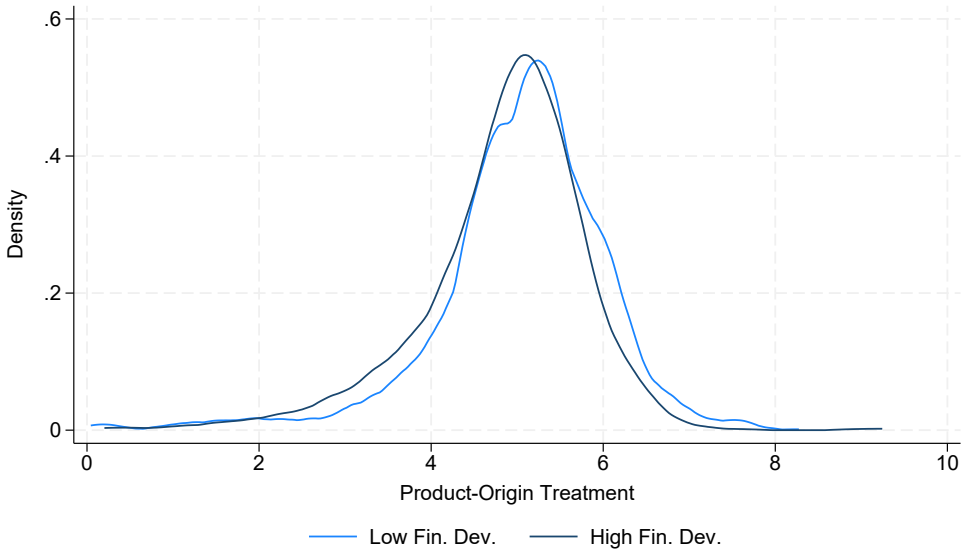


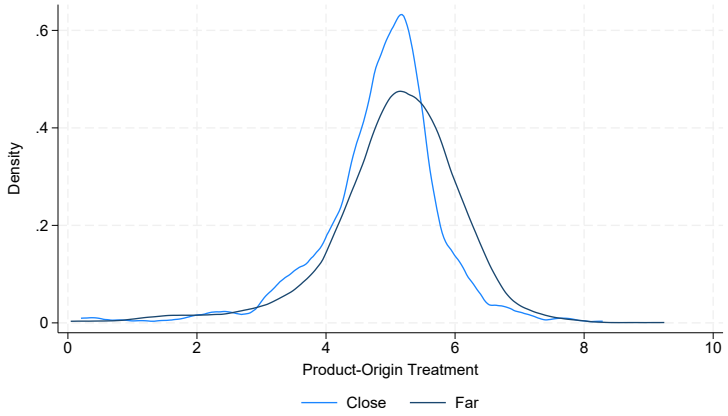
Figure 10: Product-origin Exposure: Kernel Density Estimates by Financial Development of Origin Country

This figure plots the kernel density of the standardized product-origin treatment, as defined in Equation 5, by the level of financial development in the origin country, where financially developed countries are defined as those in the top quartile of the private credit-to-GDP ratio.

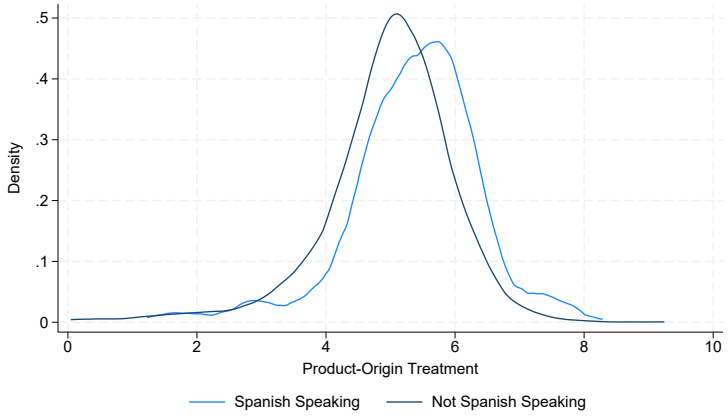
Table 9: Impact of Provisioning Shift on Exports to Destinations other than Spain, by Origin-Country Characteristics

	Mid-point growth Exports to Destinations other than Spain							
	High FD	Low Financial Development						
		All	Distance		Language		Far & Not Spanish	
			Close	Far	Spanish	Other	No	Yes
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
$Exposure_{go} \times Post_t$	0.001	-0.008	-0.015	-0.008	-0.034	-0.005	-0.022	-0.004
	(0.013)	(0.008)	(0.020)	(0.009)	(0.026)	(0.008)	(0.015)	(0.009)
Observations	2,703	8,271	1,620	6,651	1,040	7,231	2,660	5,611
Fixed Effects								
Exporter × Product	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Product charact. × Year	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Country charact. × Year	Yes	Yes	Yes	Yes	Yes	Yes	–	–
Spanish share decile × Year	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

This table presents the regression results for the mid-point growth rate of exports of product g from country o to destinations other than Spain, relative to its five-year average. Column (1) reports estimates for exports to Spain from countries with high financial development, defined as those in the top quartile of the private credit-to-GDP ratio. Columns (2)-(8) report estimates for countries with low financial development, those at the bottom three quartiles. Column (2) includes all origins. Columns (3) and (4) correspond to exporters that are geographically close to Spain (bottom quartile of the distance-to-Spain distribution), or far from Spain, respectively. Columns (5) and (6) report estimates for exporters from Spanish-speaking and non-Spanish-speaking countries, respectively. Column (7) includes exporters that are either geographically close to Spain or Spanish-speaking, while Column (8) covers exporters that are both geographically distant and non-Spanish-speaking. The analysis is based on a product-origin level measure of exposure, and incorporates different sets of fixed effects, as specified in equation (7). Product-origin exposure is calculated as the weighted average of the exposures of Spanish banks lending to firms importing product g from country o, following equation (5). The fixed effects included in each regression are listed in the lower part of the table. Product characteristics include a dummy for high or low heterogeneity: i.e, low, if price dispersion of the product is at the bottom quartile of the price dispersion distribution. Exporter country characteristics include: distance to Spain indicator (close to Spain or not), official language (Spanish or non Spanish). Spanish share corresponds to the participation of Spain in total exports of a specific origin×product pair. All variables are defined in Appendix B. Standard errors shown in parentheses are clustered by product and country of origin.
$***\ p < 0.01$, $**\ p < 0.05$, $*\ p < 0.10$.



(a) Distance



(b) Language

Figure 11: Product-origin Exposure: Kernel Density Estimates by Distance and Language

The figure plots the kernel density of the standardized product-origin treatment, as in Equation 5. Panel A splits origin countries into those geographically close to Spain–defined as the bottom quartile of the distance-to-Spain distribution– and those farther away. Panel B divides origin countries into Spanish-speaking and non-Spanish-speaking.

Table 10: Impact of Provisioning Shift on Exports to Spain by Presence of Spanish Banks

	Mid-point growth Exports to Spain							
	High FD		Low Financial Development					
					Far		Not Spanish	
	Without	With	Without	With	Without	With	Without	With
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
$Exposure_{go} \times Post_t$	0.004	-0.016	-0.037**	-0.032	-0.039*	-0.037	-0.034*	-0.057*
	(0.032)	(0.028)	(0.018)	(0.032)	(0.020)	(0.037)	(0.018)	(0.032)
Observations	1,788	915	6,571	1,700	5,366	1,285	6,196	1,035
Fixed Effects								
Exporter × Product	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Product charact. × Year	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Country charact. × Year	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Spanish share decile × Year	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

This table presents the regression results for the mid-point growth rate of exports of product g from country o to Spain, relative to its five-year average. Columns (1)-(2) reports estimates for exports to Spain from countries with high financial development, defined as those in the top quartile of the private credit-to-GDP ratio. Columns (3)-(8) report estimates for countries with low financial development, those at the bottom three quartiles. Columns (5)-(6) report estimates for countries that are geographically distant from Spain (top three quartiles of the distance-to-Spain distribution), columns (7)-(8) report estimates for countries that are not Spanish speakers. Columns (1), (3), (5), and (7) report estimates for exporting countries without a Spanish bank presence. Columns (2), (4), (6), and (8) report estimates for exporting countries where Spanish banks are present. The analysis is based on a product-origin level measure of exposure, and incorporates different sets of fixed effects, as specified in equation (7). Product-origin exposure is calculated as the weighted average of the exposures of Spanish banks lending to firms importing product g from country o, following equation (5). The fixed effects included in each regression are listed in the lower part of the table. Product characteristics include a dummy for high or low heterogeneity: i.e, low, if price dispersion of the product is at the bottom quartile of the price dispersion distribution. Exporter country characteristics include: distance to Spain indicator (close to Spain or not), official language (Spanish or non Spanish). Spanish share corresponds to the participation of Spain in total exports of a specific origin×product pair. All variables are defined in Appendix B. Standard errors shown in parentheses are clustered by product and country of origin.
$***\ p < 0.01$, $**\ p < 0.05$, $*\ p < 0.10$.

Table 11: Impact of Provisioning Shift on the Total Exports of Spain's Trade Partners, Conditional on Spain's share in their total sales

	Mid-point growth rate of Exports								
	All Product × Origin Pairs			Low Spanish Share			High Spanish Share		
	All	Spain	Rest	All	Spain	Rest	All	Spain	Rest
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
$Agg.\ Exposure_{go} \times Post_t$	-0.016	-0.034**	0.007	-0.041	-0.082	-0.034	-0.028*	-0.045**	-0.002
	(0.011)	(0.015)	(0.012)	(0.075)	(0.119)	(0.076)	(0.015)	(0.018)	(0.015)
Observations	11,363	11,363	11,363	8,525	8,525	8,525	2,838	2,838	2,838
Fixed Effects									
Exporter × Product	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Product charact. × Year	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Country charact. × Year	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

This table reports regression results for the mid-point growth rate of exports of product g from country o, relative to its five-year average. Columns (1), (4), and (7) present results for total exports to all destinations; columns (2), (5), and (8) for exports to Spain; and columns (3), (6), and (9) for exports to destinations other than Spain. Columns (1)-(3) include all product-origin pairs. Columns (4)-(6) restrict the sample to product-origin pairs with a low Spanish share, (i.e. Spanish purchases account for less than 6 percent of pair's total exports). Columns (7)-(9) restrict the sample to product-origin pairs with a high Spanish share. The analysis is based on an aggregate measure of exposure, and incorporates different sets of fixed effects, as specified in equation (9). Aggregate exposure is calculated as the product-origin level exposure defined in equation (5) multiplied by Spain's share of country o's exports of product g, following equation (8). The fixed effects included in each regression are listed in the lower part of the table. Product characteristics include a dummy for high or low heterogeneity: i.e, low, if price dispersion of the product is at the bottom quartile of the price dispersion distribution. Exporter country characteristics include: distance to Spain indicator (close to Spain if it belongs to the bottom quartile of the distance-to-Spain distribution), official language (Spanish or non Spanish). All variables are defined in Appendix B. Standard errors shown in parentheses are clustered by product and country of origin.
$***\ p < 0.01$, $**\ p < 0.05$, $*\ p < 0.10$.

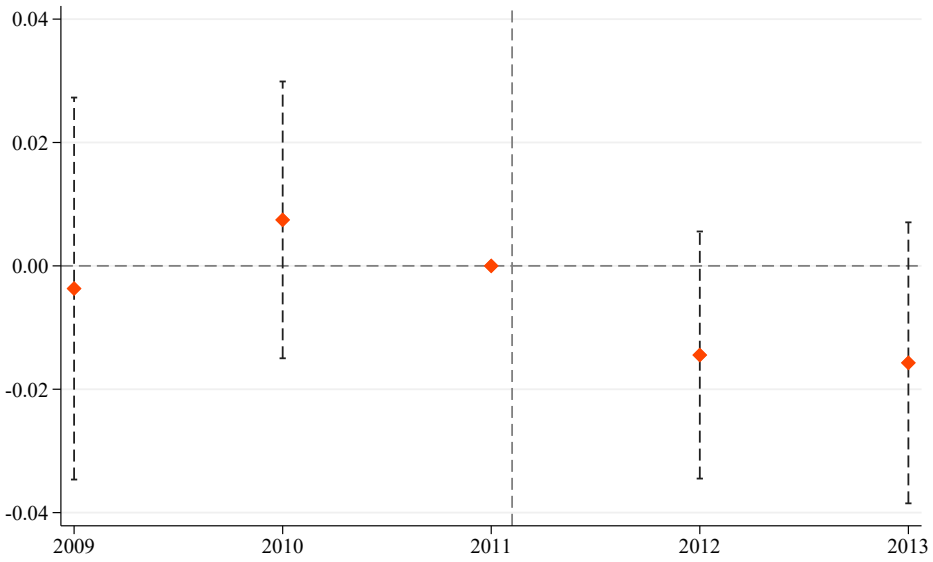


Figure 12: Event Study for the Average Effect of Aggregate Exposure to Provisioning Shift on Total Exports of Spain's Trade Partners, conditional on high Spanish share

This figure plots coefficient estimates from a modified version of the specification in equation (9), which coincides with our benchmark specification in column (7) of Table 11. For each year, the coefficient corresponds to the interaction of the aggregate exposure and the year dummy. The dashed lines indicate the 2.5%–97.5% confidence interval, with standard errors clustered by product and country of origin.

Table 12: Impact of Provisioning Shift on the Total Exports of Spain's Trade Partners and Product Differentiation: Low Financial Development and High Trade Costs Origins

	Mid-point growth rate of Exports					
	High Price Dispersion			Low Price Dispersion		
	All	Spain	Rest	All	Spain	Rest
	(1)	(2)	(3)	(4)	(5)	(6)
$Agg.\ Exposure_{go} \times Post_t$	-0.088**	-0.160***	-0.026	0.057	-0.291***	0.121**
	(0.037)	(0.049)	(0.025)	(0.052)	(0.098)	(0.059)
Observations	4,172	4,172	4,172	1,439	1,439	1,439
Fixed Effects						
Exporter × Product	Yes	Yes	Yes	Yes	Yes	Yes
Year	Yes	Yes	Yes	Yes	Yes	Yes

This table reports regression results for the mid-point growth rate of exports of product g from country o, relative to its five-year average. Columns (1) and (4) present results for total exports to all destinations; columns (2) and (5) for exports to Spain; and columns (3) and (6) for exports to destinations other than Spain. Columns (1)-(3) restrict the sample to products with high price dispersion, defined as those in the top three quartiles of the distribution. Columns (4)-(6) restrict the sample to products with low price dispersion (bottom quartile). The analysis is based on an aggregate measure of exposure, and incorporates different sets of fixed effects, as specified in equation (9). Aggregate exposure is calculated as the product-origin level exposure defined in equation (5) multiplied by Spain's share of country o's exports of product g, following equation (8). The fixed effects included in each regression are listed in the lower part of the table. All variables are defined in Appendix B. Standard errors shown in parentheses are clustered by product and country of origin.
$***\ p < 0.01$, $**\ p < 0.05$, $*\ p < 0.10$.

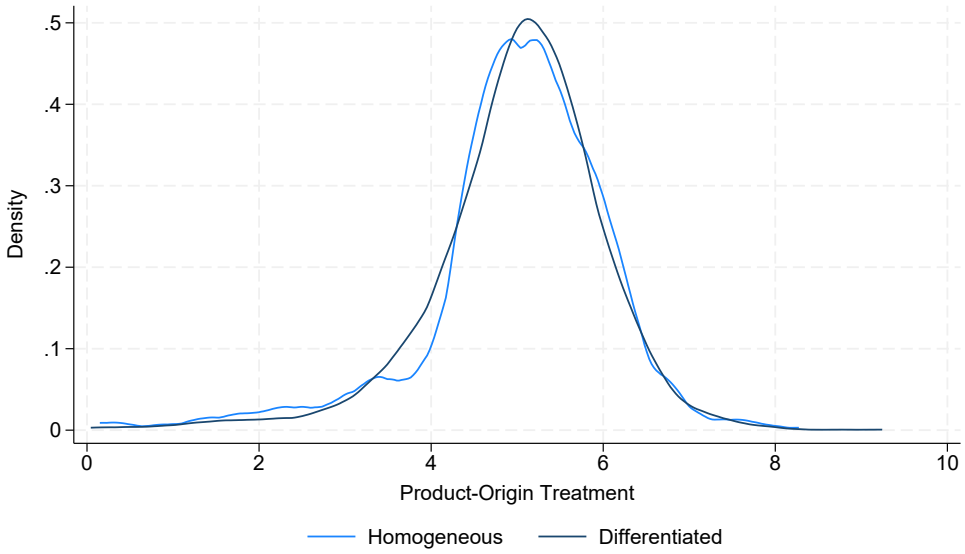


Figure 13: Product-origin Exposure: Kernel Density Estimates by Product Characteristics

This figure plots the kernel density of the standardized product-origin treatment, as in Equation 5, for heterogeneous products–defined as those in the top three quartiles of the distribution of HS6 price dispersion distribution–and homogeneous products.

A Additional Tables and Figures

Table A.1: Comparison with Related Literature

Aspect	**Paravisini et al. (2014)**	**Amado et al. (2025)**	**Tripathy (2020)**
Domestic economy analyzed	Peru	Spain	Mexico
Transmission channel	Credit supply (to firms) → exports	Credit supply (to firms) → imports and exports → foreign exporters	Subsidiaries' credit supply (to households) → local macro activity
Origin of shock	Shortage in foreign funding for domestic banks (driven by 2008 GFC)	Domestic regulatory shock (Spain's provisioning rule)	Foregin regulatory shock (Spain's provisioning rule)
Trade dimension	Exporting firms only	Importing and exporting firms	Not explored
Scope of outcomes	Firm-level exports	Firm-level imports/exports; aggregate partner exports	Household credit; credit to the NT sector (bank-municipality-level)
Reallocation margin	Not explored	Shows limited reallocation within and among countries	Not explored
Contribution	Identifies trade finance channel of domestic bank shocks	Identifies a real channel (trade-linkages) of cross-border spillovers of domestic bank regulation	Identifies cross-border spillovers via subsidiaries of global banks
Main Datasets	Credit registry + firm-country-product-level trade flows	Credit registry + firm-country-product-level trade flows + BACI	bank-municipality level household and corporate credit + credit registry

Table A.2: Effect of Shift in Provisions on firm's debt for both Importers and Exporters, Importers only and Exporters only

Panel A: Bank-firm level regressions			
Dep. Variable: Log(Credit)	$M \cap X$	$M \neg X$	$X \neg M$
	(1)	(2)	(3)
Exposure × *Policy*	-0.033**	-0.026**	-0.028**
	(0.013)	(0.012)	(0.011)
Controls×time	Yes	Yes	Yes
Firm-time FE	Yes	Yes	Yes
Bank-firm FE	Yes	Yes	Yes
Obs.	648,342	314,621	325,044
R^2	0.97	0.97	0.97
Panel B: Firm level regressions			
Dep. Variable: Log(Credit)	$M \cap X$	$M \neg X$	$X \neg M$
	(1)	(2)	(3)
Exposure × *Policy*	-0.022**	-0.038***	-0.010*
	(0.009)	(0.005)	(0.006)
Controls×time	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes
Time FE	Yes	Yes	Yes
$\hat{\alpha}_{f,t}$	Yes	Yes	Yes
Obs.	141,937	86,796	88,059
R^2	0.98	0.98	0.98

This table presents regression results on lending from bank b to firm f (Panel A) and on total firm's debt (Panel B). Column (1) corresponds to the sample of firms that are simultaneously importers and exporters, column (2) corresponds to the sample of importers that are not exporters, whereas column (3) corresponds to the sample of exporters that are not importers. *Exposure* in Panel A is computed as the ratio of construction and real estate lending to total corporate sector lending by bank b as of the end of 2011. In panel B, it is calculated as the weighted average of the exposure of banks lending to firm f, using outstanding credit at the end of 2011 as weights. In Panel A, *Controls* are measured as of the end of 2011 and include bank-firm characteristics (the collateralization rate, the ratio of long-term lending, the share of firm f's NPLs with the bank, and the share of lending coming from bank b out of firm f's total bank lending) and bank characteristics (dummies for quartiles of size, measured by total assets, and quartiles of exposure to importer/exporter companies, measured as the lending share to importers and exporters relative to total corporate sector lending). In Panel B, *Controls* are the weighted average of bank-firm characteristics and bank characteristics, measured as of the end of 2011 and weighted by banks' lending to firm f as of 2011. All variables are defined in Appendix B. We exclude importing and exporting firms in the construction or real estate sectors. Standard errors are double clustered at the bank and firm levels and reported in parentheses. $***\ p < 0.01$, $**\ p < 0.05$, $*\ p < 0.10$.

Table A.3: Effect of Shift in Provisions on Lending to Importing and Exporting Firms, Bank-Firm Level Analysis Accounting for Bank Specialization

Dep. Variable: Log(Credit)	M		X	
	(1)	(2)	(3)	(4)
$Exposure \times Policy$	-0.031**	-0.031**	-0.031**	-0.032***
	(0.013)	(0.012)	(0.012)	(0.011)
$Q_2 \times$ Policy		0.014		0.010
		(0.011)		(0.010)
$Q_3 \times$ Policy		-0.002		-0.002
		(0.008)		(0.007)
$Q_4 \times$ Policy		-0.022**		-0.017**
		(0.008)		(0.008)
Controls×time	Yes	Yes	Yes	Yes
Firm-time FE	Yes	Yes	Yes	Yes
Bank-firm FE	Yes	Yes	Yes	Yes
Obs.	962,963	962,963	973,386	973,386
R^2	0.97	0.97	0.97	0.97

This table presents bank-firm-level regression results on credit, obtained from estimating equation (1). Columns (1) and (2) correspond to the sample of importers, whereas columns (3) and (4), exporters. The dependent variable is the logarithm of credit granted by bank b to firm f. *Exposure* is computed as the ratio of construction and real estate lending to total corporate sector lending by bank b as of the end of 2011. In columns (2), and (4), we augment specification (1) by including interactions of *Policy* with indicators that capture whether the bank lending to the firm specializes in a country from which the firm imports or exports. Specifically, Q_i equals one if the bank's country specialization measure falls in the i-th quartile for at least one country from which the firm imports or exports. The specialization measure of bank b in destination country c is computed as in equation (3), following Paravisini et al. (2023). *Controls* are measured as of the end of 2011 and include bank-firm characteristics (the collateralization rate, the ratio of long-term lending, the share of firm f's non-performing loans (NPLs) with the bank, and the share of lending from bank b out of firm f's total bank lending) and bank characteristics (dummies for quartiles of size, measured by total assets, and quartiles of exposure to importer/exporter companies, measured as the lending share to importers and exporters relative to total corporate sector lending). All variables are defined in Appendix B. We exclude importers and exporters in the construction or real estate sectors. Standard errors are double-clustered at the bank and firm levels and are reported in parentheses.
$***\ p < 0.01$, $**\ p < 0.05$, $*\ p < 0.10$.

Table A.4: Effect of Shift in Provisions on Lending to Tradable and Non-tradable firms, Bank-Firm Level Analysis

Dep. Variable: Log(Credit)	*All Firms* (1)	$M+X$ (2)	*All Firms* (3)
$Exposure \times Policy$	-0.019**	-0.029**	-0.015*
	(0.009)	(0.012)	(0.009)
$Exposure \times Policy \times Tradable$			-0.011
			(0.008)
Controls×time	Yes	Yes	Yes
Firm-time FE	Yes	Yes	Yes
Bank-firm FE	Yes	Yes	Yes
Obs.	5,513,983	1,288,007	5,513,983
R^2	0.98	0.97	0.98

This table presents regression results on lending from bank b to firm f at the intensive margin, as specified in equation (1). Columns (1) and (3) include all firms, both tradable and non-tradable, while column (2) includes only firms engaged in international trade. The dependent variable is the logarithm of credit granted by bank b to firm f. *Exposure* is computed as the ratio of construction and real estate lending to total corporate sector lending by bank b as of the end of 2011. *Controls* are measured as of the end of 2011 and include bank-firm characteristics (the collateralization rate, the ratio of long-term lending, the share of firm f's non-performing loans (NPLs) with the bank, and the share of lending from bank b out of firm f's total bank lending) and bank characteristics (dummies for quartiles of size, measured by total assets, and quartiles of exposure to exporter/importer companies, measured as the lending share to exporters and importers relative to total corporate sector lending). All variables are defined in Appendix B. We exclude firms in the construction or real estate sectors. Standard errors are double-clustered at the bank and firm levels and are reported in parentheses.
$***\ p < 0.01$, $**\ p < 0.05$, $*\ p < 0.10$.

Table A.5: Effect of Shift in Provisions on annual Firm-level Outcomes

Panel A:	Importers				
	Bank Debt	Total Debt	Total Debt +Equity	Employment	Tangible Assets
	(1)	(2)	(3)	(4)	(5)
Exposure	-0.036***	-0.023*	-0.015*	-0.008*	-0.014**
	(0.013)	(0.013)	(0.009)	(0.004)	(0.005)
Firm controls	Yes	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes	Yes
Province FE	Yes	Yes	Yes	Yes	Yes
Main Buyer FE	Yes	Yes	Yes	Yes	Yes
Obs.	17,269	17,269	17,269	17,269	17,269
R^2	0.02	0.02	0.02	0.02	0.02
Panel B:	Exporters				
	Bank Debt	Total Debt	Total Debt +Equity	Employment	Tangible Assets
	(1)	(2)	(3)	(4)	(5)
Exposure	-0.022	-0.009	0.036	-0.006	-0.008
	(0.014)	(0.012)	(0.047)	(0.004)	(0.006)
Firm controls	Yes	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes	Yes
Province FE	Yes	Yes	Yes	Yes	Yes
Main Buyer FE	Yes	Yes	Yes	Yes	Yes
Obs.	17,194	17,194	17,194	17,194	17,194
R^2	0.01	0.02	0.02	0.02	0.03

This table presents regression results on firm-level outcomes obtained from annual financial statements. The dependent variable is the mid-point growth rate of firm f's total bank debt, total debt, total debt plus equity, employment, and tangible assets between 2011 and 2012. We regress these variables on firm-level exposure, controls, and a set of fixed effects. *Exposure* is computed as the weighted average of the exposure of banks lending to firm f, using outstanding credit as of the end of 2011 as weights. *Controls*, measured as of the end of 2011, include the weighted average of banks' total assets and the lending share to importing and exporting firms of banks lending to firm f, with outstanding debt of each bank lending to the firm used as weights. Additionally, controls include the logarithm of the firm's total assets, the ratio of cash to total assets, sales to total assets, and own funds to total assets. The fixed effects included in each regression are specified in the lower part of the table and account for industry, province, and indicators for the main destination country of a firm's exports. All variables are defined in Appendix B. Standard errors are double clustered at the main bank and firm levels, and reported in parentheses.
$***\ p < 0.01$, $**\ p < 0.05$, $*\ p < 0.10$.

Table A.6: Characteristics of Importers and Exporters

Firm characteristics	**Importers**				**Exporters**			
	p75	p50	p25	mean	p75	p50	p25	mean
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
log(assets)	9.61	8.46	7.49	8.61	9.66	8.54	7.52	8.65
log(employees)	4.04	2.96	1.94	3.03	4.14	3.17	2.09	3.14
log(age)	3.21	2.83	2.30	2.69	3.26	2.83	2.30	2.70
log(debt)	8.40	6.99	5.56	6.90	8.46	7.12	5.65	6.97
log(bank debt)	7.92	6.61	5.15	6.43	7.99	6.74	5.23	6.50
average collateral	0.11	0	0	0.11	0.14	0	0	0.12
Nr. of banks	5	3	2	3.82	5	3	2	3.88
Credit concentration (HHI_{firm})	0.99	0.52	0.30	0.58	0.98	0.51	0.30	0.58
log(tangible fixed assets)	7.91	6.44	4.67	6.23	8.01	6.62	4.92	6.41
log(LT financial investment)	6.48	4.10	2.00	4.33	6.65	4.29	2.13	4.44
log(LT external funds)	7.65	6.28	4.88	6.24	7.70	6.39	5.00	6.32
log(LT funds from financial institutions)	7.24	5.97	4.59	5.89	7.31	6.09	4.71	5.97

This table reports, in columns 1-4, the 75th, 50th, 25th percentile and mean of importer characteristics, and in columns 5-8, the corresponding values for exporters.

Table A.7: Average difference: exporters only minus importers only

Firm characteristics	Difference between importers and exporters			
	p75	p50	p25	mean
	(1)	(2)	(3)	(4)
log(assets)	0.008	0.002	-0.06**	-0.07***
log(employees)	0.22***	0.29***	0.18***	0.13***
log(age)	0.04***	0	0	0.024**
log(debt)	0.1***	0.11***	0.015	0.032
log(bank debt)	0.13***	0.11***	0.06	0.07*
average collateral	0.07***	0	0	0.02***
Nr. of banks	0	0	–	-0.003
Credit concentration (HHI_{firm})	–	0.004	0.010**	0.005*
log(tangible fixed assets)	0.15***	0.26***	0.35***	0.19***
log(long term financial investment)	0.17**	0.24***	-0.04	0.08
log(long term external funds)	0.09**	0.14***	0.16***	0.1***
log(long term funds from financial institutions)	0.1**	0.12***	0.17***	0.11***

This table reports, in columns 1-3, the difference between the sample of only exporters and only importers, at the 75th, 50th and 25th percentile of their characteristics' distribution. These coefficients are estimated through quantile regressions on a dummy that takes the value of 1 if the firm is classified as exporter only and zero if classified as importer only. Column 4 reports the mean difference in these characteristics for the two groups of firms. The statistical significance of these coefficients is based on the t-test.
$***\ p < 0.01$, $**\ p < 0.05$, $*\ p < 0.10$.

Table A.8: Impact of Provisioning Shift on Additional Trade Outcomes

	Mid-point growth (2011:2012)					
	M			X		
	No. Countries	No. Products	Total M	No. Countries	No. Products	Total X
	(1)	(2)	(3)	(4)	(5)	(6)
Exposure	-0.016*	-0.015	-0.032***	-0.021**	-0.027***	-0.027***
	(0.009)	(0.010)	(0.011)	(0.008)	(0.008)	(0.009)
Province FE	Yes	Yes	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes	Yes	Yes
Main Destination FE	Yes	Yes	Yes	Yes	Yes	Yes
Obs.	22,078	22,078	22,078	20,430	20,430	20,430
R^2	0.09	0.09	0.08	0.07	0.07	0.07

This table presents the regression estimates for additional firm-level trade outcomes. The dependent variable is the mid-point growth rate between 2011 and 2012 of an importer (exporter) number of trade partners, number of products imported (shipped), and total value of imports (or exports). We regress these variables on the firm's exposure and a set of fixed effects. *Exposure* is computed as the average exposure of banks lending to firm f, weighted by the outstanding credit as of the end of 2011. The fixed effects included in each regression are specified in the lower part of the table. All variables are defined in Appendix B. Importers and exporters in the construction or real estate sectors are excluded. Standard errors are double-clustered at the main bank and firm levels and are reported in parentheses. $***\ p < 0.01$, $**\ p < 0.05$, $*\ p < 0.10$.

Table A.9: Impact of Provisioning Shift on Firms' International Trade Flows, Weighted Regressions

	Mid-point growth			
	Unweighted		Weighted	
	M	X	M	X
	(1)	(2)	(3)	(4)
$Exposure \times Policy$	-0.036***	-0.020**	-0.035**	-0.018
	(0.011)	(0.009)	(0.014)	(0.013)
Product-Country-Year FE	Yes	Yes	Yes	Yes
Province-Industry-Year FE	Yes	Yes	Yes	Yes
Product-Country-Firm FE	Yes	Yes	Yes	Yes
Observations	558,540	649,050	558,540	649,050
R-squared	0.17	0.17	0.27	0.27

This table presents the regression estimates on firm's trade flows at the product-country-year level. The dependent variable is the mid-point growth rate between firm f's imports (exports) of product g from (to) country c and the 5-year average of firm f's imports (exports) of the same product from (to) that country, and it is regressed on the firm's exposure and a set of fixed effects. *Exposure* is computed as the average exposure of banks lending to firm f, with weights based on the outstanding credit as of the end of 2011. *Policy* is a dummy variable that takes the value of one after the provisioning increase. The fixed effects included in each regression are noted in the lower part of the table. Columns 1 and 2 present the unweighted results and correspond to columns 1 and 2, respectively, in Table 4. Columns 3 and 4 show the weighted results, using the 5-year average of imported and exported values as weights. Due to the presence of extremely large imported and exported values, weights are winsorized at the 5% level. All variables are defined in Appendix B. Importers and exporters in the construction or real estate sectors are excluded. Standard errors are double-clustered at the main bank and firm levels and are reported in parentheses.
$***\ p < 0.01$, $**\ p < 0.05$, $*\ p < 0.10$.

Table A.10: Impact of Provisioning Shift on Firms' International Trade Flows by Cumulative Product-Level Trade Share

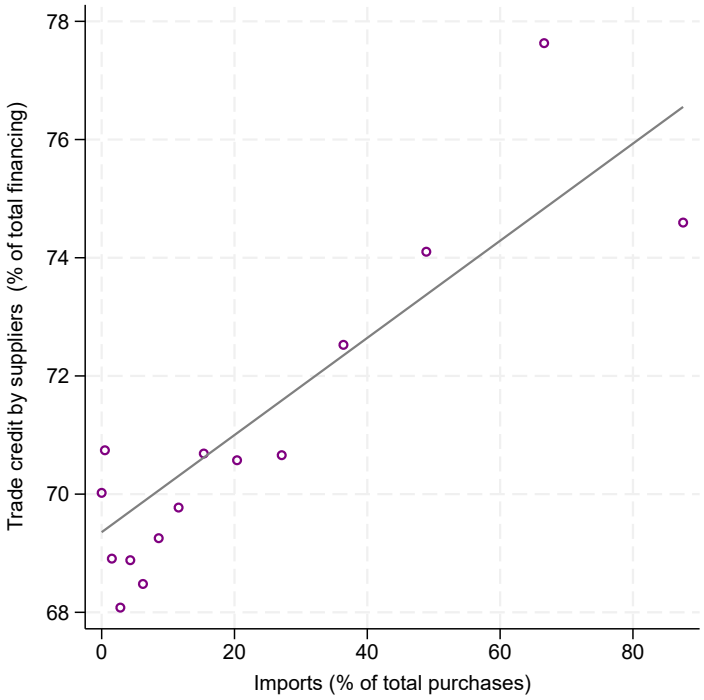
	Importers			Exporters		
Product-Level Trade Share:	100%	Bottom 25%	Top 75%	100%	Bottom 25%	Top 75%
	(1)	(2)	(3)	(4)	(5)	(6)
Exposure × *Policy*	-0.036***	-0.035***	-0.035*	-0.020**	-0.022**	-0.011
	(0.011)	(0.010)	(0.020)	(0.009)	(0.011)	(0.016)
Product-Country-Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Province-Industry-Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Product-Country-Firm FE	Yes	Yes	Yes	Yes	Yes	Yes
Obs.	558,540	415,620	135,535	649,050	450,235	188,005
R^2	0.17	0.16	0.28	0.17	0.16	0.26

This table presents the regression estimates on firm's trade flows at the product-country-year level. Columns 1-3 correspond to importers and 4-6 correspond to exporters. Columns 1 and 4 use the full sample of importers and exporters, respectively. Columns 2 and 5 restrict the sample to firms representing the top 75% of total trade value by product in 2011. Columns 3 and 6 restrict the sample to firms representing the bottom 25% of total trade value by product in 2011. *Exposure* is computed as the average exposure of banks lending to firm f, with weights based on the outstanding credit as of the end of 2011. *Policy* is a dummy variable that takes the value of one after the provisioning increase. The fixed effects included in each regression are noted in the lower part of the table. All variables are defined in Appendix B. Importers and exporters in the construction or real estate sectors are excluded. Standard errors are double-clustered at the main bank and firm levels and are reported in parentheses.
$***\ p < 0.01$, $**\ p < 0.05$, $*\ p < 0.10$.

Table A.11: Bank-Firm Relationship Characteristics and Trade Flows

Panel A:	Importers				
	(1)	(2)	(3)	(4)	(5)
Exposure×Policy	-0.036***	-0.034***	-0.029**	-0.063***	-0.050***
	(0.011)	(0.011)	(0.011)	(0.010)	(0.010)
×Available funds in CLs		0.010*			0.012**
		(0.005)			(0.005)
×NPL			-0.134***		-0.111**
			(0.049)		(0.047)
×Share Main Bank				0.036***	0.028***
				(0.007)	(0.007)
Product-Country-Firm FE	Yes	Yes	Yes	Yes	Yes
Product-Country-Year FE	Yes	Yes	Yes	Yes	Yes
Province-Industry-Year FE	Yes	Yes	Yes	Yes	Yes
Observations	558,540	558,540	558,540	558,540	558,540
R^2	0.17	0.17	0.17	0.17	0.17
Panel B:	Exporters				
	(1)	(2)	(3)	(4)	(5)
Exposure × *Policy*	-0.020**	-0.019**	-0.010	-0.043***	-0.026***
	(0.009)	(0.009)	(0.009)	(0.010)	(0.010)
×Available funds in CLs		0.006			0.009
		(0.007)			(0.007)
×NPL			-0.093*		-0.072
			(0.048)		(0.047)
×Share Main Bank				0.033***	0.021***
				(0.005)	(0.006)
Product-Country-Firm FE	Yes	Yes	Yes	Yes	Yes
Product-Country-Year FE	Yes	Yes	Yes	Yes	Yes
Province-Industry-Year FE	Yes	Yes	Yes	Yes	Yes
Observations	649,050	649,050	649,050	649,050	649,050
R^2	0.17	0.17	0.17	0.17	0.17

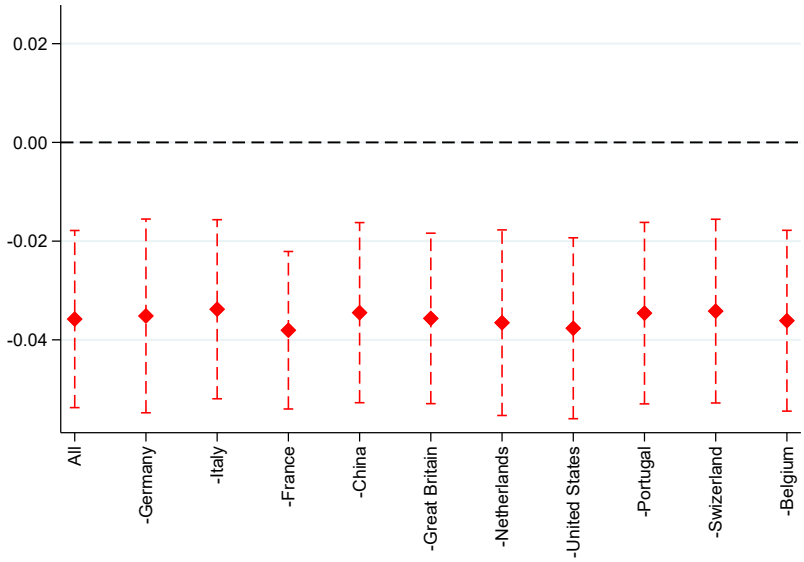
This table presents the heterogeneous effects of the provisioning shift on trade outcomes based on lending relationship characteristics. The dependent variable is the mid-point growth rate of firm f's exports of product g relative to the 5-year average of firm f's exports of the same product. We regress this variable on the firm's exposure and a set of fixed effects. *Exposure* is computed as the weighted average of the exposure of banks lending to firm f, using outstanding credit as of the end of 2011 as weights. *Policy* takes a value of one for 2012 and 2013 and zero otherwise. *Available Funds in CLs* represents the share of undrawn to total committed funds available in firm f's credit lines as of the end of 2011. *Share Main Bank* is the share of firm f's outstanding credit held with its main bank as of the end of 2011. *NPL* takes a value of one if the firm had at least one non-performing loan as of the end of 2011 and zero otherwise. To facilitate the interpretation of the coefficients, *Available Funds in CLs* and *Share Main Bank* are standardized. The fixed effects included in each regression are specified in the lower part of the table. All variables are defined in Appendix B. Importers and exporters in the construction or real estate sectors are excluded. Standard errors are double-clustered at the main bank and firm levels and are reported in parentheses.
$***\ p < 0.01$, $**\ p < 0.05$, $*\ p < 0.10$.



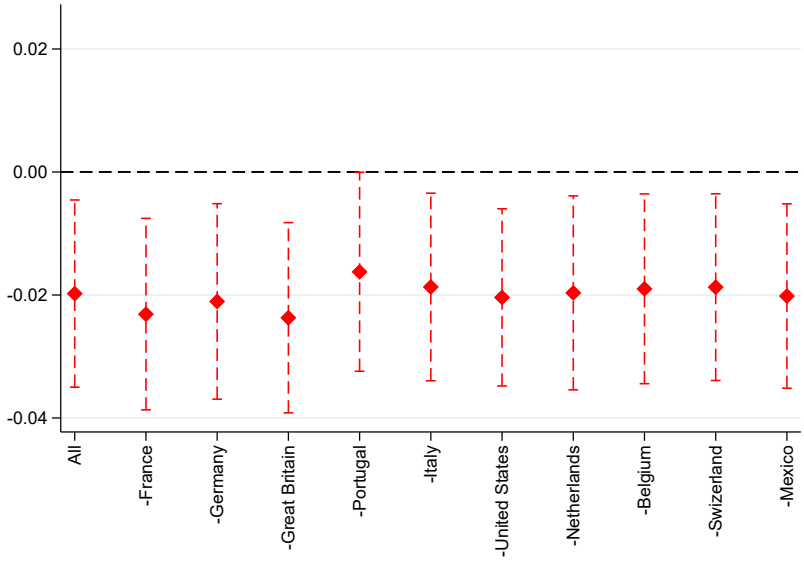
Binscatter of Trade Credit (by suppliers) on Imports (15 bins)

Figure A.1: Trade intensity and use of Trade Credit

This figure presents binned scatterplots illustrating the relationship between firms' trade intensity and their reliance on trade credit. It plots imports as a share of total purchases (x-axis) against trade credit granted by suppliers as a share of total financing (y-axis). Points represent the average values of the X and Y variables within 15 quantile bins of the X-axis variable.



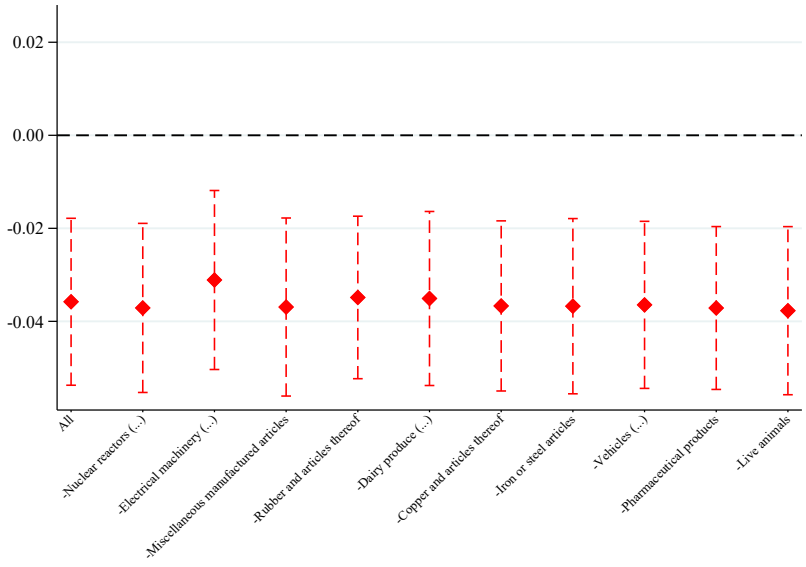
(a) Imports



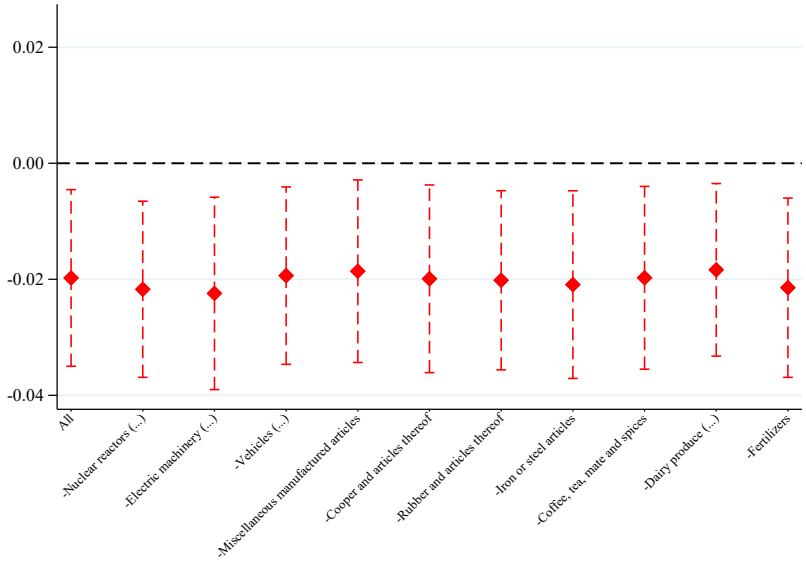
(b) Exports

Figure A.2: Sensitivity Analysis to Main Destination and Origin Countries

The figure presents a sensitivity analysis of our baseline results in specification (4). In Panel (a), we present the sensitivity analysis for imports after sequentially excluding each of the top 10 main origin countries for Spanish imports. In Panel (b), we present the analysis for exports after sequentially excluding each of the top 10 main destinations for Spanish exports. As a benchmark, the first point in each figure (*All*) coincides with the coefficient in columns 1 and 2 of Table 4, respectively. We drop firms in the construction or real estate sectors. Bands represent the 90% confidence intervals. Standard errors are double-clustered at the main bank and firm levels.



(a) Imports



(b) Exports

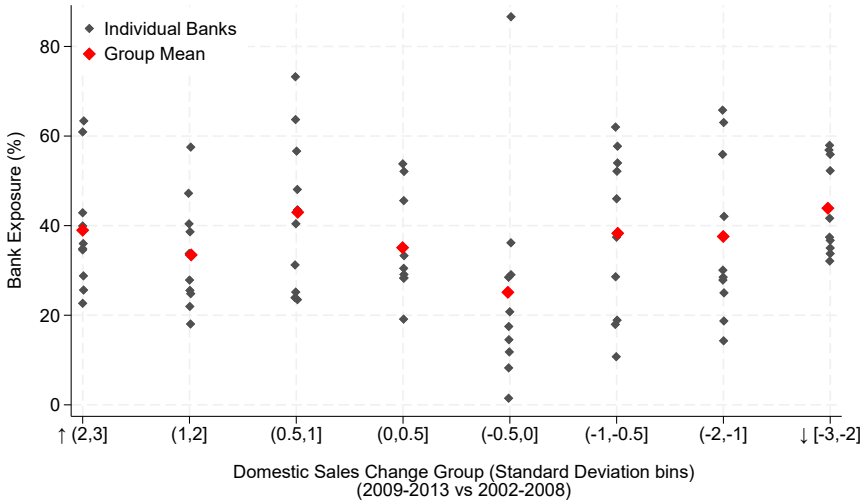
Figure A.3: Sensitivity Analysis to Main Import and Export Products

The figure presents a sensitivity analysis of our baseline results in specification (4). In Panel (a), we present the sensitivity analysis for imports after sequentially excluding each of the top 10 main imported products for Spanish firms. In Panel (b), we present the analysis for exports after sequentially excluding each of the top 10 main exported products of Spanish firms. As a benchmark, the first point in each figure (*All*) coincides with the coefficient in columns 1 and 2 of Table 4, respectively. We drop firms in the construction or real estate sectors. Bands represent the 90% confidence intervals. Standard errors are double-clustered at the main bank and firm levels.

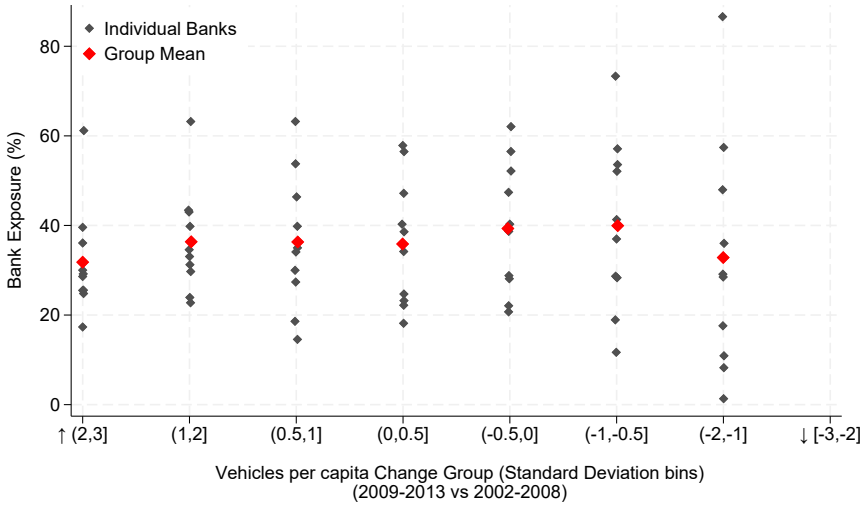
Table A.12: Impact of Provisioning Shift on Firms' International Trade Flows
Excluding firms highly related to GIIPS

	Mid-point growth		Entry Dummy		Exit Dummy	
	M	X	M	X	M	X
	(1)	(2)	(3)	(4)	(5)	(6)
$Exposure \times Policy$	-0.039***	-0.022**	-0.006	-0.000	0.014***	0.010**
	(0.010)	(0.010)	(0.004)	(0.004)	(0.003)	(0.004)
Product-Country-Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Province-Industry-Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Product-Country-Firm FE	Yes	Yes	No	No	No	No
Firm FE	No	No	Yes	Yes	Yes	Yes
Obs.	175,864	187,332	177,588	541,365	455,025	230,960
R^2	0.19	0.26	0.25	0.17	0.17	0.17

In this table, we replicate the specification from Table 4, excluding firms highly exposed to GIIPS countries. Exposure is defined using 2006 data–prior to the global financial crisis: we compute the share of each firm's exports and imports originating from or destined to Greece, Italy, Portugal, and Ireland, and exclude firms in the top quartile of this distribution.



(a) Exposure of Top 10 Lenders by Province Grouped by Change in Domestic Sales



(b) Exposure of Top 10 Lenders by Province Grouped by Change in Vehicles per Capita

Figure A.4: Bank exposure across provinces, based on Almunia et. al (2021)

Panel (a) shows, for each group of provinces on the x-axis–classified based on the standardized percentage change in average firm-level domestic sales between the periods 2002-2008 and 2009-2013–the exposure to the regulation (as defined in Section 5.1.1) for the top 10 banks with the highest share of loans granted to firms operating in each group. In Panel (b), the groups on the x-axis are defined based on the standardized percentage change in the number of vehicles per capita. The classification of provinces across groups is obtained by reverse-engineering the information presented in Figure 3 of Almunia et al. (2021).

Table A.13: Impact of Provisioning Shift on the Total Exports of Spain's Trade Partners and Trade Costs, Low Financially Developed Origins

	Mid-point growth rate of Exports								
	Far from Spain			Not Spanish Speaking			Far and Not Spanish		
	All	Spain	Rest	All	Spain	Rest	All	Spain	Rest
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
$Agg.\ Exposure_{go} \times Post_t$	-0.046*	-0.117***	0.009	-0.022	-0.103***	0.025	-0.065*	-0.181***	-0.003
	(0.027)	(0.039)	(0.020)	(0.023)	(0.032)	(0.018)	(0.033)	(0.045)	(0.025)
Observations	6,651	6,651	6,651	7,231	7,231	7,231	5,611	5,611	5,611
Fixed Effects									
Exporter × Product	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Product charact. × Year	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Country charact. × Year	Yes	Yes	Yes	Yes	Yes	Yes	–	–	–

This table reports regression results for the mid-point growth rate of exports of product g from country o, relative to its five-year average. Estimates consider only low financially developed origins. Columns (1), (4), and (7) present results for total exports to all destinations; columns (2), (5), and (8) for exports to Spain; and columns (3), (6), and (9) for exports to destinations other than Spain. Columns (1)-(3) correspond to exporters that are geographically far from Spain (top three quartiles of the distance-to-Spain distribution). Columns (4)-(6) restrict the sample to exporters from non-Spanish-speaking countries. Columns (7)-(9) restrict the sample to exporters that are both geographically distant and non-Spanish-speaking. The analysis is based on an aggregate measure of market exposure, and incorporates different sets of fixed effects, as specified in equation (9). Aggregate market exposure is calculated as the product-level exposure defined in equation (5) multiplied by Spain's share of country o's exports of product g, following equation (8). The fixed effects included in each regression are listed in the lower part of the table. Product characteristics include a dummy for high or low heterogeneity: i.e, low, if price dispersion of the product is at the bottom quartile of the price dispersion distribution. Exporter country characteristics include: distance to Spain indicator (close to Spain if it belongs to the bottom quartile of the distance-to-Spain distribution), official language (Spanish or non Spanish). All variables are defined in Appendix B. Standard errors shown in parentheses are clustered by product and country of origin.
$***\ p < 0.01$, $**\ p < 0.05$, $*\ p < 0.10$.

B Variable definitions

Firm-bank variables (Source: Credit Register, Bank of Spain)

- *Log of Credit*: The logarithm of committed credit granted by bank b to firm f at quarter t.
- *Termination*: A dummy variable that equals 1 if the bank-firm relationship is terminated in the aftermath of the policy, conditional on its existence as of the end of 2011.
- *Long-term credit ratio*: The ratio of the amount of loans with residual maturity above a year that a firm has with its bank, divided by the credit granted by the bank, as of the end of 2011.
- *Collateralization rate*: The ratio of the amount of collateralized loans that a firm has with its bank, divided by the credit granted by the bank, as of the end of 2011.
- NPL ratio: The amount of non-performing loans that a firm has with its bank as of the end of 2011, divided by the credit granted by the bank as of the end of 2011.
- *Credit Share*: The total amount of loans from bank b as of the end of 2011, divided by the firms' total bank debt as of the end of 2011.

Bank variables (Source: Supervisory Reports, Bank of Spain)

- *Exposure*: The amount of loans to the construction and real estate sectors over total lending to non-financial firms as of the end of 2011.
- *Size*: The logarithm of the bank's total assets as of the end of 2011.
- *Capital*: Equity to total assets as of the end of 2011.
- *Liquidity*: Liquid assets (cash and balance with central banks, and loans and advances to governments and credit institutions) to total assets as of the end of 2011.

- *ROA*: Net income to assets as of the end of 2011.
- *NPL ratio*: Non-performing loans as a share of the bank's total credit as of the end of 2011.
- *Rural bank dummy*: A dummy variable that equals 1 if the bank is a rural saving bank.
- % *Lending to X or M*: Lending share to exporters and importers relative to total corporate sector lending as of the end of 2011.
- *Local Govt. Credit to Assets*: Credit to local governments to assets as of the end of 2011.

Firm-level variables (Source: Credit Register, Bank of Spain)

- *Log of Total Bank Credit*: The logarithm of firm's f total bank credit at quarter t.
- $Exposure_f$: Weighted average of the exposure of banks lending to firm f, using the outstanding credit as of the end of 2011 as weights.

Exports and imports, firm-market level (Source: Customs data, Bank of Spain)

- *Exports*: Exports of the 2-digit-HS product g to country c by firm f at year t.
- *Imports*: Imports of the 2-digit-HS product g from country c by firm f at year t.
- *Entry*: A dummy variables that takes the value of one if exports/imports in market (g,c) of firm f are greater than zero at year t, conditional on being zero the previous year.
- *Exit*: A dummy variables that takes the value of one if exports/imports in market (g,c) of firm f are zero at year t, conditional on being positive the previous year.
- *No. Countries*: Number of countries to (from) which a firm exports (imports) in year t.
- *No. Products*: Number of products shipped (purchased) to (from) abroad by a firm in year t.

Firm balance sheet data (Source: Central Balance Sheet Data Office)

- *Total Debt*: Firm's f total debt (bank and non-bank debt) in year t.
- *Employment*: The average number of employees of a firm in year t.
- *Tangible Assets*: Tangible assets of firm f in year t.

Bilateral trade flows (Source: BACI)

- M_{cgot}: Imported value of country c from country o and product g in year t.
- $Exposure_{go}$: Weighted average of banks' exposure to the policy, where the weights account for the relative importance of banks as credit suppliers for firms importing product g from country o.
- *Agg. Exposure*$_{go}$: This aggregate exposure is equal to Exposure$_{go}$ interacted with the share of Spanish purchases in a given market defined by product g and country o.
- X_{got}: Exported value of product g by country o in year t.
- *Comparable countries*: Australia, Belgium, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Japan, Luxembourg, Netherlands, New Zealand, Portugal, Spain, Switzerland and United States.

Country of origin characteristics (Source: CEPII Gravity, Global Financial Development Database, and BankFocus)

- *Close to Spain*: If the distance from the origin country to Spain is below the percentile 25 of the distance to Spain distribution.
- *Spanish Speaking*: If the origin country is a Spanish-speaking country.
- *FTA*: If the origin country has a trade agreement with Spain.
- *Spanish share*: If Spain's share of global purchases for good g is above the median.

- *Price dispersion*: Product's price dispersion is measured as the HS2-level variance of implicit prices, computed at the HS6-digit product level for each country.
- *Heterogeneous products*: If the product's price dispersion is above the percentile 25 of the price dispersion distribution.
- *Financial Development*: If private credit to GDP ratio is above the percentile 75 of the corresponding distribution.
- *Spanish Banks*: If Spanish banks operate in the country.