The Trade Channel of Bank Regulations: Evidence from Spain's Export and Import Partners*

Maria Alejandra Amado Bank of Spain

Carlos Burga PUC-Chile

Jose E. Gutierrez Bank of Spain

March 17, 2025

Abstract

We document a novel channel through which bank regulations generate cross-border real effects via international trade linkages. We exploit a one-time, unexpected increase in loan provisions in Spain and use comprehensive administrative data from the Spanish credit register matched with the quasi-universe of firm-level trade flows spanning from 2009 to 2013. Spanish importers and exporters that relied on banks most affected by the policy experienced significant reductions in credit supply, leading to a contraction in their trade flows, with the effect being more pronounced for importers. By leveraging bilateral trade data at both the country and product level, we further show that overall Spanish imports declined following the policy, suggesting limited reallocation across Spanish importers. The decrease in Spain's import demand triggered a contraction in the total exports of Spain's trade partners, particularly among those expected to face higher trade costs when exporting to Spain–such as more distant partners, those with greater tariff and non-tariff barriers and no common language. The effect is also stronger for products that are more difficult to reallocate to other markets–those where Spain is a key global buyer or those with greater heterogeneity. Our documented trade channel is further amplified by the presence of Spanish banks abroad.

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

*The authors are grateful to Saleem Bahaj, Soner Baskaya, Rodolfo Campos, Alejandro Casado, Andrea Ferrero, Gabriel Jiménez, Ján Klacso (discussant), David Martinez-Miera, Adrien Matray, Enrique Moral-Benito, Alexandra Matyunina, Steven Ongena, Carlos Pérez Montes, Elvira Prades, Jose-Maria Serena, Jacopo Timini and Chenzi Xu for their heplpul feedback. We also thank participants at an internal seminar at the Bank of Spain and the Czech National Bank Workshop on Financial Stability and Macroprudential Policy. We thank Eduardo Gutierrez for his help with the Balance of Payments data on Spanish exports and imports. We also thank Estefano Benvenuto and Ricardo Sifuentes for their excellent research assistance. This article is the exclusive responsibility of its authors and does not necessarily reflect the opinion of the Banco de España or the Eurosystem.
Corresponding author: Maria A. Amado. E-mail: alejandra.amado@bde.es

1 Introduction

In an era marked by rising geopolitical tensions, protectionist policies, and increasing tariffs, the global trade landscape is undergoing rapid transformation. While much research has focused on the direct effects of trade policy (Attanasio et al. 2004; McCaig and Pavcnik 2018; Fajgelbaum et al. 2020), less is known about the indirect channels through which non-trade domestic policies, such as banking regulations, propagate across borders and exacerbate global trade disruptions. We leverage a unique dataset from Spain that merges granular credit registry data, firm-level trade flow data and data on country-level bilateral trade flows, to provide novel evidence of an international trade channel through which bank regulatory adoption spillovers take place.

A priori, it is unknown whether bank regulations can spill over through international trade flows. On the one hand, tighter credit conditions may disproportionately affect firms engaged in international trade compared to those focused on the domestic market, given their higher working capital needs and higher default risk associated with international trade (e.g., Amiti and Weinstein (2011)). On the other hand, firms engaged in international trade are typically larger (e.g., Eaton et al. (2011)) and may have access to multiple sources of external financing, potentially mitigating the impact of domestic bank regulations on their trade activities. Moreover, even if firms engaged in international trade experience a decline in trade flows, foreign trade partners might adjust their sales or purchases abroad by reallocating across markets (Almunia et al., 2021). For instance, a decline in Spanish demand for Brazilian products could be offset by increased Brazilian exports to France. Consequently, whether domestic bank regulations generate cross-border spillovers through international trade remains an open empirical question.

To address this question, we proceed in three steps. First, we exploit a significant and unexpected increase in loan loss provisions implemented in Spain in 2012, which targeted the construction and real estate sectors. This regulatory change led to a rise in banks' provisions equivalent to approximately 8.5% of Spain's GDP (Jiménez et al., 2017). By exploiting variation in banks' exposure to this shock and using granular credit registry data, we estimate the credit channel of

the regulation on Spanish firms engaged in international trade. Second, using firm-level import and export data covering nearly the entire population of Spanish exporters and importers, we evaluate how firms' exposure to the regulation affected their trade flows. Third, we assess the spillover effects by analyzing cross-country trade flow data at the product level and estimating how market exposure to the regulation affected the total exports of Spain's trade partners.

Our analysis using data from the Spanish Central Credit Register (CIR) shows that firms engaged in international trade–both importers and exporters–faced tighter lending conditions following the increase in provisions imposed on banks in 2012. Following Jiménez et al. (2017), we construct a measure of bank-level exposure to the policy, defined as the share of a bank's outstanding debt in the construction and real estate industries prior to the policy's implementation. We then employ a difference-in-differences approach to estimate the bank lending channel of the regulation, comparing firms' outstanding debt across banks with varying exposure levels before and after the policy change, while controlling for firm-level credit demand shocks, in line with Khwaja and Mian (2008). Our results in this first step are statistically significant and indicate that a one standard deviation increase in bank exposure reduces credit supply to firms engaged in international trade by 3% relative to less exposed banks lending to the same firm. A similar effect is observed when analyzing credit supply to importers and exporters separately. Additionally, results at the extensive margin show that more exposed banks were 1.6 percentage points more likely to terminate lending relationships with firms engaged in international trade after the policy implementation, an effect primarily driven by importers.

At this stage, our main identification assumption is that, in the absence of the policy, credit granted by banks with different exposure levels would have followed parallel trends. We provide evidence and several robustness checks to validate this assumption. First, we confirm the absence of pre-trends by showing that our measure of bank exposure has no effect on credit supply before the policy's implementation. Second, we conduct a covariate balance analysis and verify that bank exposure to the policy is statistically orthogonal to multiple measures of bank performance–such as

return on assets, non-performing loans, and capital and liquidity ratios–after controlling for relevant pre-policy bank characteristics. Furthermore, following Paravisini et al. (2023), we assess whether our results remain robust in the presence of bank specialization in specific foreign markets. To account for the possibility that, after the shock, credit demand shifted disproportionately toward banks specializing in foreign markets where the firm operates, we incorporate destination and origin-based indicators in our bank-firm regressions that account for whether the firm exports or imports from a destination in which the bank has a certain level of specialization. Our findings remain stable and statistically significant, suggesting that bank specialization is unrelated to the source of the shock and does not drive our estimated credit channel effects.

To account for the possibility that importers or exporters might mitigate the credit supply shock by leveraging their multiple banking relationships–substituting debt from highly exposed banks with credit from less exposed banks–we estimate the effect of the regulation on firms' total bank debt. Specifically, we construct a firm-level measure of exposure, defined as the weighted average of bank exposure, with weights based on each bank's share in the firm's total debt. The main challenge in this identification strategy is controlling for time-varying firm-level demand shocks. To address this, we incorporate the estimated firm-time fixed effects from our bank-firm regressions as an additional control, following Abowd et al. (1999) and Bonaccorsi di Patti and Sette (2016). Our results remain statistically significant: a one standard deviation increase in a firm's exposure to the policy reduces its total bank debt by approximately 2.2% after the policy's implementation, with a stronger effect for importers (2.8%) than for exporters (1.6%). These findings indicate that firms have limited ability to substitute credit across banks, suggesting that the policy may have had real effects on firm outcomes, such as sales and foreign purchases.

However, larger firms may have access to alternative sources of funding not captured in our credit registry data. To account for this, we use an additional dataset containing firms' annual financial statements and assess the policy's impact on total debt, including both bank and non-bank financing. Our findings indicate that firms engaged in international trade and more dependent

on exposed banks experience a greater decline in total debt, suggesting that even the largest firms struggle to offset the credit supply shock induced by the policy.

Furthermore, we provide additional evidence that the observed credit reduction stems from the domestic regulatory shock rather than foreign demand or supply factors. First, we find that firms engaged in international trade and more reliant on exposed banks reduced employment and investment following the policy. This alleviates concerns that our results are driven by shocks occurring in a specific foreign country. Moreover, we observe that the estimated credit supply shock for non-tradable firms is not statistically different from that for tradable firms, further supporting our identification strategy.

In the second step, we estimate the policy's impact on firm-level trade outcomes by combining CIR data with transactional Balance of Payments data, which provide information at the firm, 2-digit Harmonized System (HS) product code, country, and year levels. As in the previous step, we employ a difference-in-differences approach and compare the evolution of exports and imports across firms with different exposure levels, before and after the policy's implementation. Leveraging the granularity of our trade-flow data, we incorporate a comprehensive set of fixed effects, following Paravisini et al. (2015), to isolate the policy's effect from other confounding factors affecting firm-level trade outcomes. Specifically, we include firm-country-product fixed effects to account for time-invariant factors, such as a firm's knowledge of a particular market. Additionally, we introduce country-product-time fixed effects to capture supply shocks in the country of origin (for imports) and demand shocks in the destination country (for exports). To further control for variations in the local demand and supply faced by importers and exporters, respectively, we add province-industry-time fixed effects.

We find that the increase in loan loss provisions significantly affected the trade flows of Spanish firms. Specifically, a one standard deviation increase in a firm's exposure to the policy resulted in a 3.6% decrease in imports and a 2% decrease in exports. Moreover, among these firms with multiple bank relationships, those with loans concentrated on a single bank were significantly less affected

by the regulation compared to firms that rely on multiple banks lending relatively smaller amounts, highlighting the value of lending relationships in insulating borrowers from negative shocks (Bolton et al. (2016)). We also find that importers with available funds in their credit lines mitigated the negative impact of the regulatory shock on their imports by 1 percentage point. Additionally, riskier importers were less capable of adjusting to the credit supply shock induced by the policy.

Our findings also hold at the extensive margin: firms one standard deviation more exposed to the policy were 1.4 and 0.9 percentage points more likely to exit importing and exporting markets, respectively. Additionally, more exposed importers were 0.7 percentage points less likely to enter new markets after the policy's implementation. Consistent with these findings, we observe that the average exporter reduced both the number of products shipped and the number of destination countries served, whereas the average importer reduced the number of supplying countries. These results support the existence of a trade finance channel through which domestic bank shocks affect the sales of domestic exporters and the purchases of importers in foreign markets (Amiti and Weinstein, 2011; Paravisini et al., 2015; Xu, 2022; Kabir et al., 2024).

To ensure that our results are not disproportionately driven by firms with numerous small and often volatile trade relationships, we use weighted regressions in our firm-country-product specification, with firm-country-product trade flows as weights. We find that, after accounting for weights, the effect on exporters' trade flows is no longer statistically significant, whereas the effect on import flows remains significant and quantitatively robust. Thus, while the shock affected smaller exporting firms, it did not have a broader impact on country-product-level exports, indicating that its effects on exports largely dissipated within Spain's boundaries.

Since our results from the first and second steps indicate that the policy's impact is consistently stronger for importers, in our subsequent analysis, we focus on the spillover effects of the reduction in Spanish import demand, as this appears to be the primary channel through which the policy affected trade flows.

In the third step, we account for cross-border spillovers using BACI data, which provides trade

flows by country of origin, destination, and 2-digit product level. First, we examine the extent to which imports are reallocated across Spanish firms. We then explore whether Spain's trade partners mitigate the contraction in Spanish imports by reallocating their exports to other markets.

We define markets as product $\times$ country-of-origin pairs, and construct a measure of exposure to the policy at this level. This measure reflects the extent to which Spanish importers in a given market rely on funding from exposed banks. For instance, if Spanish importers of textiles from India depend heavily on financing from highly exposed banks, then textile imports from India are considered highly exposed to the regulation. To estimate the regulation's impact on total Spanish imports, we employ a triple difference-in-differences approach, comparing the evolution of Spanish imports from highly versus less exposed markets relative to other countries' imports from the same markets, before and after the policy. This approach allows us to saturate the specification with market-time fixed effects, controlling for unobserved time-varying shocks at the market level and mitigating concerns that our exposure measure is influenced by supply-side shocks in foreign markets. Our findings indicate that import reallocation across Spanish firms is limited. Specifically, a one standard deviation increase in market exposure results in a significant 3% decline in Spanish imports relative to other countries' imports from the same markets following the policy's implementation.

Next, we aggregate our export panel at the country-of-origin and product level to examine whether exporters mitigate the contraction in Spanish imports by offering more favorable trade credit conditions to importers–partially offsetting the reduction in credit from Spanish banks–or by reallocating sales to other destinations. We construct an aggregate measure of exposure by interacting our previous exposure measure with the share of Spanish purchases in a given market. To estimate the regulation's impact on total foreign exports, we employ a difference-in-differences specification, comparing the evolution of total exports from highly exposed markets relative to less exposed ones before and after the policy's implementation. The validity of our identification strategy relies on the assumption that, in the absence of the policy, exports from highly exposed markets

would have followed similar trends as those from less exposed markets. Since time-varying market fixed effects cannot be included in this specification, we support our identification strategy testing parallel trends in the pre-reform period. We find that one standard deviation higher exposure leads to a 3.2% reduction in total exports, albeit statistically insignificant at conventional significance levels and possibly masking heterogeneities at the country or product levels. The decline in exports from highly exposed markets occurs only after the policy's implementation, while no effect is observed before 2011, supporting our identifying assumption. Overall, our findings suggest that Spain's trade partners were unable to offset the contraction in Spanish imports.

We further explore the underlying factors that determine exporters' ability to offset a credit supply shock affecting their clients–Spanish importers–by providing financial support through more favorable trade credit terms. In principle, higher trade costs may increase the needs of external financing, limiting exporters capacity to extend trade credit. Such costs are often shaped by country-specific characteristics. For instance, exporters located farther from Spain face higher variable trade costs due to longer shipping times. Similarly, exporters from non-Spanish-speaking countries may incur higher fixed trade costs, as they must invest in overcoming language barriers. Additionally, exporters from countries without a Free Trade Agreement (FTA) with Spain may face higher costs due to tariffs and non-tariff barriers. We divide our sample of countries based on these characteristics to hold the size of the Spanish demand shock constant and assess in which sample this shock leads to a stronger contraction in exports. Our findings indicate that a one standard deviation increase in exposure has no significant effect on exports from countries that are geographically close to Spain (below the median distance), Spanish-speaking, or have a Free Trade Agreement (FTA) with Spain. In contrast, the contraction in exports is more pronounced for countries facing higher trade costs. Specifically, a one standard deviation increase in exposure leads to an 11% decline in exports for countries that are geographically distant from Spain, an 18% decline for those that are both distant and non-Spanish-speaking, and a 10% decline for those that are distant and lack an FTA with Spain. These results are consistent with higher trade costs

limiting exporters' ability to mitigate the contraction in Spanish imports.

We then explore the role of product-specific attributes in determining the reallocation of trade flows. For example, if Spain is a major buyer of a particular product, exporters may struggle to find alternative markets. Moreover, if products are highly heterogeneous, meaning countries purchase different varieties, exporters might face greater challenges in reallocating trade flows away from Spain. We consider that Spain is a main buyer of a given product if the share of Spain's purchases in the world is above the median. We measure product heterogeneity by computing the price at which each HS 6-digit product is sold in each country and then calculating the variance of these prices at the HS 2-digit product level. We then define heterogeneous products as those whose price dispersion is above the median. Our analysis reveals two key findings: first, exports decline by 5.1% for products where Spain is a main buyer, while there is no decline when Spain is a minor buyer. Second, when products are heterogeneous, exports decline by 9%, whereas they remain stable for relatively homogeneous products. Our findings suggest that exporters face frictions related to market size and product-specific adjustments when they intend to reallocate trade flows after a demand shock.

Finally, we examine the role of Spanish banks in shaping the cross-border effects we document. Spanish banks operate in multiple countries and provide financing to firms engaged in international trade. As a result, our estimates may partially capture a reduction in business loans issued by Spanish banks abroad, similar to the effect documented by Tripathy (2020). By including exporter-year fixed effects, we already account for the presence of Spanish banks in foreign countries. However, the extent of Spanish banks' participation in these markets may still amplify our results. For instance, if Spanish banks are particularly specialized in financing firms that export to Spain (Paravisini et al., 2023), the impact of market exposure could be larger. To analyze this financial channel, we leverage BankFocus data to track the footprint of Spanish banks in foreign markets.

We find a significant contraction in exports from countries where Spanish banks operate, suggesting that our documented trade channel is amplified by Spanish lenders. This result aligns with

the notion of bank specialization, wherein Spanish banks have a competitive advantage in financing firms that export to Spain, enabling them to capture a larger market share in this segment. Consequently, when loan loss provisions increase, highly exposed markets experience a sharper decline in total exports, as a substantial portion of their trade is financed by Spanish banks directly affected by the regulation.

It is important to note that while the amplification of cross-border spillovers through Spanish banks is limited to a small set of countries, the trade channel itself remains strong across most locations. Specifically, we find that distance, language barriers, and the absence of an FTA play a crucial role in explaining export contractions in markets without a Spanish banking presence.

Overall, our findings highlight how financial regulations, even when targeting domestic vulnerabilities, can propagate through trade linkages and amplify global trade disruptions. Moreover, our results underscore the importance of cross-border coordination in the design of prudential bank regulatory policies to mitigate unintended spillovers on global trade networks.

Contribution to the literature. This paper contributes to the literature on the cross-border transmission of financial shocks by identifying a novel mechanism through which domestic banking regulations propagate internationally. Traditional channels in the literature emphasize asset prices and portfolio effects as key drivers of financial shock transmission, particularly in globally integrated markets. Theoretical work has largely focused on the international spillovers of capital requirements and macroprudential policies on cross-border capital flows (Bahaj and Malherbe, 2024), as well as the strategic interactions between national regulators and the potential welfare gains from cooperation (Korinek, 2017; Faia and Weder di Mauro, 2016; Bolton and Oehmke, 2018; Segura and Vicente, 2019). Empirically, most studies document these effects using aggregate country-level or bank-level data, often focusing on global banks or their subsidiaries (Aiyar et al., 2014; Reinhardt and Sowerbutts, 2015; Buch and Goldberg, 2017; Baskaya et al., 2017). Within this literature, the study most closely related to ours is Tripathy (2020). Using micro-level data, this paper examines how macroprudential regulations in Spain affected Mexican subsidiaries of Span-

ish banks, ultimately influencing household credit and economic activity in Mexico's non-tradable sectors. While their analysis focuses on the same regulatory episode we study, their identified transmission channel operates exclusively through foreign subsidiaries, whereas we highlight a distinct mechanism–bilateral trade linkages–as a conduit for financial shock transmission. Moreover, consistent with their findings, we observe that the presence of Spanish bank subsidiaries in foreign trade partners amplifies our estimated bilateral trade channel of cross-border spillovers.

Beyond the financial shock transmission literature, our paper also contributes to research on the impact of global macroeconomic shocks on tradable firms via the international exposure of their domestic banking systems. Existing studies have explored transmission mechanisms through capital flow reversals (Paravisini et al., 2015), multinational banks (Xu, 2022), and correspondent banks that facilitate trade (Borchert et al., 2023). Our approach is broader, demonstrating that domestic regulatory shocks can spill over internationally through trade linkages, even in the absence of global banks, multinationals, or foreign subsidiaries.

Additionally, we contribute to the well-established literature on the role of banks in facilitating trade finance (Amiti and Weinstein, 2011; Chor and Manova, 2012; Manova, 2013; Del Prete and Federico, 2014; Paravisini et al., 2015; Demir et al., 2017; Niepmann and Schmidt-Eisenlohr, 2017; Ahn and Sarmiento, 2019; Moreira and Monteiro, 2023; Dogan and Hjortso, 2024; Kabir et al., 2024). While prior research has shown that credit constraints influence trade outcomes, we extend this literature by documenting not only the impact of bank regulatory shocks on the trade activity of Spanish firms but also the limited reallocation of trade flows within Spain and among Spain's trade partners. To our knowledge, this is the first paper to identify spillover effects through commercial ties, highlighting how trade networks can amplify the international transmission of domestic financial shocks.

The rest of the paper is organized as follows: section 2 provides details of our policy experiment; section 3 describes our data; our empirical strategy and results are discussed in section 4; and finally, section 5 concludes.

2 Institutional background

In 2012, the incoming Spanish government mandated higher provisions for banks' exposures to the real estate and construction sectors, based on outstanding credit as of late 2011. The policy aimed to reduce uncertainty surrounding the valuation of these assets, which had been heavily affected by the 2008 Global Financial Crisis. This one-time, ad hoc adjustment was implemented in two phases.

First, in February, banks were mandated to provision 7% for all performing loans related to construction and real estate. Then, in May, provisioning requirements were further differentiated based on loan purpose: an additional 45% for land, 7% for completed real estate developments, and 22% for real estate projects still in progress. Provisions for non-performing loans (NPLs) in the construction and real estate sectors were also increased. Banks were required to meet these heightened provisioning levels by the end of 2012.

The policy represented a substantial shock for Spanish banks. The global financial crisis had already depleted their provision buffers, limiting their capacity to comply with the new requirements by drawing on existing reserves. As a result, bank provisions surged by approximately $85 billion, equivalent to around 8.5% of Spain's GDP, as documented by Jiménez et al. (2017). This sharp increase had a significant adverse effect on bank profitability in 2012, as the provisions were categorized as specific provisions.

We use banks' pre-policy exposure to construction and real estate firms as a measure of their exposure to the policy, following Jiménez et al. (2017). That study finds that banks with greater exposure tightened their lending standards afterward, negatively impacting firms that relied primarily on them for financing. In contrast, our analysis focuses on non-financial firms engaged in international trade. These firms are typically larger and may have multiple lending relationships or alternative sources of external financing, potentially insulating them from domestic banking regulations.

Moreover, we study whether the policy affected Spanish exports and imports and whether it

had cross-border effects through trade linkages. Importantly, for our identification strategy, the policy specifically targeted non-tradable sectors like real estate and construction, which enhances the exogenous nature of the shock for firms engaged in international trade.

Among the 83 banking groups lending to firms engaged in international trade, exposure to the construction and real estate sectors varies considerably. Banks at the 25th, 50th (median), and 75th percentiles allocated 26.5%, 34.9%, and 47.0% of their corporate lending to these sectors, respectively (see Panel C of Table 1). Figure 1 further illustrates this variation through a kernel density estimation of bank exposures.

3 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. First, to examine the bank lending channel of the regulation, we use quarterly bank-firm credit data from the CIR, focusing on the periods surrounding the policy's implementation. Next, to assess the policy's impact on firms' international trade flows, we leverage firm-country-product annual data from the Balance of Payments. Finally, for our spillover analysis on Spain's trade partners, we use country-product yearly data from BACI.

3.1 Credit Register (CIR)

Our bank-firm credit data comes 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 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. 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.

3.2 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.[1]

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

[1]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.

extensive coverage, capturing 91.3% of total trade flows relative to official trade statistics reported by Customs (see Almunia et al. (2021), Prades and Villegas-Sanchez (2022), and Gutiérrez and Moral-Benito (2024) for further details). We integrate this dataset with CIR information to construct a firm-level exposure measure. Specifically, we compute a firm's exposure to the policy by averaging the exposures of all banks lending to that firm, using lending amounts as of the end of 2011 as weights. This approach allows us to assess whether the increase in provisions disproportionately affected the import and export growth of firms more dependent on exposed banks.

Our trade data includes 659,910 export observations from 25,173 firms and 566,170 import observations from 23,029 firms, covering 99 different products traded with 189 export destinations and 167 import origins between 2009 and 2013. Firms in our sample frequently enter and exit trade markets. For example, among firms already participating in a market, the exit rate was approximately 35%, while firms not initially in a market had an entry rate of around 35% over the same period (see Panel C of Table 1).

3.3 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 market exposure to the policy, constructed using Balance of Payments and CIR data.[2] 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

[2]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.

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).

4 Empirical strategy and results

Our study focuses on assessing whether bank regulations implemented in one country can generate 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–such as demand shocks for exports or supply shocks for imports–from the effect of the policy intervention poses additional challenges.

Our identification strategy addresses these concerns by exploiting two key elements: (i) an unexpected bank regulatory shock targeting banks exposed to non-tradable industries (real estate and construction) and (ii) a rich database that enables us to control for both observed and unobserved shocks in the destination and origin countries of Spanish firms' exports and imports, respectively.

The bank regulatory shock we analyze is the one-time sudden increase in construction and real estate credit provision rates in 2012. As explained in section 2, banks were required to temporally increase their provisions based on all their lending exposure to construction and real estate firms as of 2011Q4. Importantly, as pointed out by Jiménez et al. (2017), the increase was substantial, unexpected, and a one-time raise for banks. Crucially, for our identification, this raise targeted a non-tradable sector in Spain, such as construction and real estate. Thus, our analyzed shock was fairly exogenous to the global economic cycle.

Additionally, we exploit the structure of our granular trade-flow dataset for Spanish firms. In particular, we include a comprehensive set of time-invariant and time-varying fixed effects to disentangle our estimates from potential omitted factors, as in Paravisini et al. (2015).

Our analysis proceeds in several steps. First, using bank-firm-level data, we examine whether banks with higher exposure to the policy reduced lending to exporting and importing firms. Next, leveraging our firm-product-country-year dataset, we assess the policy's impact on Spanish firms' trade flows. Finally, utilizing a country-product-year panel of trade flows, we estimate the broader effects of the policy shift on Spain's trade partners.

4.1 Effect on credit supply to exporters and importers

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.[3] 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* 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 exporter/importer firms, measured as the share of lending to exporters and importers relative to lending to the corporate sector. Importantly, our balance-of-covariates analysis indicates that, after controlling for these

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

bank bins, the bank exposure measure is statistically orthogonal to other key bank characteristics, such as ROA, NPLs, liquidity, and capital ratios (see Figure 2).

Finally, we control for firm credit demand by adding firm fixed effects, restricting our sample to firms borrowing from multiple banks (Khwaja and Mian, 2008).[4] 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 (e.g., sales or purchases 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 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

[4] 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.

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 for three distinct samples of firms: exporters and importers–columns (1) and (2)–, exporters only–columns (3) and (4)–, and importers only–columns (5) and (6). Panel A presents the regression results for the model specified in equation (1). Results show an economically meaningful impact of the policy on credit supply to exporters and importers. Our findings indicate that a one standard deviation increase in bank exposure would have decreased the credit supply to a firm engaged in international trade by 3% compared to other banks lending to the same firm (see column 2). This is economically significant, particularly given that the average quarterly credit growth rate during the pre-treatment period is -2.6%. Furthermore, when analyzed separately in columns (4) and (6), we observe a similar negative impact on credit supply to exporters and importers, with reductions of 3.1% for both. In addition, Panel B of Table 2 shows that adjustments also occur at the extensive margin. Specifically, higher exposure to the policy is associated with an increased probability of terminating a lending relationship, which is statistically significant for importers in our preferred specification (column 6).

[Figure 3]

Additionally, Figure 3 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 exporters or importers significantly more than other banks. However, following the increase in provisioning, these banks sharply curtailed their credit supply to these firms.

[Table 3]

[Figure 4]

In Table 3, we present the results for specification (2) and examine whether firms were able to mitigate the negative credit supply shock by borrowing from less affected banks. As before, we separate our results into three groups: exporters and importers–columns (1) and (2)–, exporters only–columns (3) and (4)–, and importers only–columns (5) and (6). The findings suggest that the policy led to a reduction in total bank debt for both exporting and importing firms. Specifically, column (2) indicates that a one standard deviation increase in the exposure of all banks lending to a firm would have reduced the firm's total bank debt by approximately 2.2% in 2012. Similarly, columns (4) and (6) show decreases of 1.6% and 2.8% for exporters and importers, respectively. Furthermore, the absence of pre-trends, as shown in Figure 4, confirms that the reduction in total bank debt was attributable to the policy's implementation. The negative and significant effect appears only after the increase in provisions. Notably, importers experience a more pronounced and persistent decline in total debt, suggesting that exporters may have been better able to leverage multiple bank relationships to partially mitigate the impact of the regulation.

Our findings indicate that Spanish firms engaged in international trade were unable to fully offset the policy's impact by borrowing from less exposed banks. Instead, both exporters and importers faced tighter lending conditions, leading to a general decline in bank debt despite being large firms. In the next section, we examine how this credit reduction affected firms' trade activity.

4.1.1 Additional checks

To further support the hypothesis that our results are driven by the domestic regulatory shock rather than shocks affecting firms' trade partners, we conduct three additional tests. First, we assess the robustness of our estimated credit channel by accounting for potential bank specialization, following Paravisini et al. (2023). Second, we verify that the regulatory shock had a similar impact

on both tradable and non-tradable firms. Third, we confirm that the policy remained binding for firms even when considering alternative non-bank financing sources.

Bank specialization. The presence of bank specialization could cause domestic exporters to disproportionately reduce their credit demand from banks specialized in the destinations they serve, particularly in response to demand shocks in foreign countries, as shown by Paravisini et al. (2023). If bank specialization in certain countries is correlated with our measure of bank exposure to the policy, foreign shocks to these countries might bias the identification of the credit channel driven by the domestic bank regulatory shock. Then, to rule out this possibility, we regress an augmented version of our specification (1). In particular, we include interactions of *Policy* with indicators, Q_i, that account for whether a bank that lends to a firm specializes in a country to (from) which the firm exports (imports). This allows us to control for any disproportionate growth in credit demand following the policy that is not captured by our firm-quarter fixed effects. Specifically, the indicator Q_i takes the value of one if the bank's country specialization measure lies in the i-th quartile for at least one country to (from) which the firm exports (imports). The specialization measure of bank b in country c is constructed for the 50 main destinations of Spanish exports, following the methodology in Paravisini et al. (2023) 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.

The results of the augmented regressions are presented in Table A.1 of the Appendix. As shown, the coefficient of the interaction between *Exposure* and *Policy* remains statistically significant and exhibits minimal variation compared to our baseline estimate. This indicates that bank special-

ization is unrelated to the source of the regulatory shock and does not drive our estimated credit channel effects.

Effect on non-tradable firms. We estimate specification (1) including non-tradable firms. These firms should not have been affected by shocks in foreign countries. Therefore, if the estimated effect of the domestic regulatory shock on credit supply does not differ between tradable and non-tradable firms, it would provide further evidence that the effect observed for firms engaged in international trade is indeed driven by the domestic shock. As shown in Table A.2, we do not observe any differential effect of the regulatory shock on lending between tradable and non-tradable firms. This supports the interpretation that the identified credit supply effect for exporters and importers is attributable to the policy shift.

Sources of non-bank funding. Finally, we examine whether firms engaged in international trade were able to substitute bank credit with other non-bank funding sources. Given that these firms are typically larger, they could have accessed alternative funding, such as market debt, to mitigate the impact of the regulatory shock on real outcomes, including sales and purchases abroad. To investigate this, we gather annual data from firms' financial statements, sourced from the Spanish Central Balance Sheet Data Office. As shown in column 1 of Table A.3, a one standard deviation increase in the exposure of all banks lending to a firm, would have significantly reduced firm's total debt in 2.4% the year after the policy implementation. This suggests that these firms were unable to offset the regulatory shock with non-bank alternative sources. Additionally, columns 2 and 3 report a negative effect on investment and employment growth for firms more reliant on lending from exposed banks, indicating that the shock had real effects and making it plausible to observe an effect on these firms' sales and purchases abroad. Moreover, the negative average effect on investment and employment makes it less likely that a shock in a particular destination or origin country is behind our results.

4.2 Effect on firm-level trade outcomes

Next, we investigate whether the increase in provisions affected the growth of import and export values for firms that were more dependent on banks significantly impacted by the policy.

To this end, we use Balance of Payments trade flow data, which provides information at the firm, country, 2-digit product, and year level. The detailed structure of this dataset allows us to estimate the impact of increased provisions on firms' exports and imports. Specifically, 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 exports (imports) of product g to (from) country c in year t, relative to the five-year average of exports (imports) of that product to (from) the same country during 2009-2013.

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

where $\overline{Z}_{f,c,g} = 1/5 \sum_{t=2009}^{2013} Z_{f,c,g,t}$ for Z = Exports, Imports. Notably, this dependent variable enables us to capture market entries and exits, which are indicated by a zero value in exports or imports (Cortés et al., 2020).[5] *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. (2015). 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 exports, these fixed effects capture demand shocks for product g in the destination

[5] 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 results remain robust when using the logarithm of trade flows as the dependent variable, with these alternative estimates available upon request.

country c, while for imports, they account for supply shocks in the country of origin c, such as variations in transport costs. This allows us to compare the export (import) value of product g to (from) country c with that of firms exporting (importing) the same good to (from) the same destination. Finally, we augment the regression with province-industry-year fixed effects to capture variations in local demand for imported goods and supply conditions for exported goods. This ensures that we are comparing the export (import) value of product g to (from) destination (origin) country c with firms operating within the same province and industry. Standard errors are double-clustered at both the firm level and the firm's main bank level. Given the granularity of our data, we exclude the smallest transactions in the sample–those representing less than 1% of the total exported or imported value between 2009 and 2013. Specifically, this restriction excludes firms' exports to markets where the average annual export value was less than 29,000 euros between 2009 and 2013, and imports from markets where the average annual import value was less than 35,000 euros. This ensures that our results are not contaminated by very small and highly volatile trade flows. Moreover, the trade flows dynamics at the firm level are significant not only at the intensive margin but also at the extensive margin, which our dependent variable effectively captures (see Panel C of Table 1).

[Table 4]

The results of this analysis are presented in Table 4. In columns 1 and 2, we use the mid-point growth rate, as defined in equation 2, as the dependent variable, which allows us to capture both the intensive and extensive margins. In columns 3 to 6, we disentangle the policy effect along the extensive margin by employing binary indicators of entry and exit in a particular market. *Entry* takes the value of one if exports (imports) by firm i of product g to (from) country c are strictly positive at time t, conditional on exports (imports) being zero in the previous period. Conversely, *Exit* takes the value of one if exports (imports) by firm i of product g to (from) country c are zero at time t, conditional on exports (imports) being strictly positive in the previous period.

The results indicate a significant impact of the increase in provisions on the trade flows of

exporters and importers, with a more pronounced effect on imports. Column 1 shows that, following the policy implementation, a one standard deviation increase in a firm's exposure to banks heavily involved in the construction and real estate sectors would have resulted in a 2% decrease in exports, statistically significant at conventional levels. The effect is even more pronounced for imports, where the decrease would have been 3.6%. Additionally, we observe significant effects along the extensive margin. Specifically, firms that were one standard deviation more exposed to the affected banks were 0.9% and 1.4% more likely to exit export and import markets, respectively, following the increase in provisions (see columns 5 and 6 of Table 4). Regarding market entry, a significant effect is only observed for imports, where firms were 0.7% less likely to enter new markets after the policy implementation (see column 4 of Table 4).

[Table 5]

Table 5 presents firm-level results of the impact of the policy on additional trade outcomes. In particular, we examine the (mid-point) growth rate between 2011 and 2012 of an importer's (exporter's) number of origin (destination) countries, the number of products imported (exported), and total firm-level trade flows. Our findings indicate that exporters with one standard deviation higher exposure to the affected banks significantly reduced the growth rate of the number of destination countries served by 2.1% and the number of products shipped by 2.7% following the policy implementation. Similarly, more exposed importers reduced the growth rate of the number of countries from which they import by 1.6% after the policy change. Firm-level aggregate trade flows align with our more granular estimates in Table 4, showing that importers and exporters with greater exposure to the affected banks experienced a significant reduction in the growth rate of imports (3.2%) and exports (2.7%), respectively.

[Figure 5]

Figure 5 provides supporting evidence on the impact of the increase in provisions on export and import growth at the firm-country-product-year level. Specifically, we re-estimate specification (4)

by replacing the interaction term of $Exposure \times Policy$ with the interaction of $Exposure$ and a set of time dummies for each year, using 2011 as the baseline. As shown, imports responded negatively to firms' exposure only after the policy was implemented, with no pre-trends detected. A similar pattern is observed for exports; however, unlike imports, a slight recovery is noticeable in 2013.

4.2.1 Additional checks

Overall, the results in this subsection indicate that the increase in provisions, which triggered a negative credit supply shock, led to a decline in export and import flows among Spanish firms engaged in international trade, with a more pronounced effect on imports. To reinforce that our findings on firm-level trade outcomes are driven by the domestic financial channel rather than foreign supply or demand shocks, we conduct two robustness checks. First, we examine whether strong bank-firm relationships mitigate the negative impact of the regulatory shock on trade flows. Second, we conduct a sensitivity analysis by excluding certain destination and origin countries of Spanish exports and imports, respectively, as well as specific product categories. This helps to verify that our results are not driven by any particular market or product type.

Additionally, to ensure that our results are not disproportionately driven by firms with numerous small and often volatile trade relationships, we use weighted regressions, with firm-country-product trade flows as weights. This approach ensures that our estimates better reflect the dynamics of firms with more stable trade relationships and more representative of overall trade flows.

Bank-firm relationship. Table A.4 in the Appendix examines the role of bank-firm relationships in mitigating the impact of the financial shock on firms' trade flows. Specifically, it assesses whether firms with greater credit line availability, higher dependence on a particular bank as a credit supplier, or without non-performing loans experienced a smaller contraction in exports and imports following the regulatory shock. The results in Panel A show that exporters and importers more dependent on a single bank were significantly less affected by the regulation than firms that rely on multiple banks lending relatively smaller amounts. This finding is consistent with the idea

that relationship banks insulate their borrowers during bad times to protect their lending relationship investments (see, for instance, Bolton et al. (2016)). Additionally, importers with higher credit line availability were better able to mitigate the negative effects of the shock, showing significantly smaller declines in trade flows. We also find that credit line availability dampens the effect of the shock for exporters, although the estimated coefficient is not statistically significant. Moreover, firms with non-performing loans experienced more detrimental effects on their trade flows compared to firms without non-performing loans, indicating that riskier firms were less capable of accommodating the negative credit supply shock induced by the policy. This effect was more pronounced for importers than for exporters. Overall, these findings suggest that access to liquidity, established lending relationships, and the risk profile played a critical role in buffering firms against the adverse financial shock induced by the policy.

Sensitivity analysis. Figure A.1 in the Appendix presents the estimated coefficient $\hat{\theta}$ from our preferred specification, after sequentially excluding each of the top 10 main destination (Panel (a)) and origin countries (Panel (b)) for Spanish exports and imports, respectively. The estimated coefficients remain statistically significant and stable, supporting the interpretation that our results are driven by the domestic regulatory policy rather than by specific supply or demand shocks in the origin or destination countries. Figure A.2 replicates this analysis by sequentially excluding each of the top 10 main exported (Panel (a)) and imported (Panel (b)) products, further demonstrating that our findings are not affected by any specific product shock.

Weighted regressions. Table A.5 in the Appendix presents the results of weighted regressions for our firm-country-product specification. After incorporating weights, we find that the effect on exporters' trade flows is no longer statistically significant, while the impact on import flows remains both significant and quantitatively robust.

So far, our findings consistently indicate that the policy's impact was stronger for importers across both the intensive and extensive margins. Furthermore, when weighting by bilateral trade flows, only the effect on importers remains statistically significant, suggesting that the observed

impact on exports was largely driven by smaller trade flows. This implies that while the shock affected smaller exporting firms, it did not translate into a broader decline in country-product-level exports, meaning its effects on exports largely remained within Spain's borders. Given this, our subsequent analysis focuses on the cross-border spillover effects of the reduction in Spanish import demand, as this appears to be the primary channel through which the policy influenced trade flows.

4.3 Effect on Spanish imports and international trade reallocation

In this section, we estimate to what extent Spanish trade partners are affected by the increase in Spanish loan loss provisions through international trade linkages. Notice that the decline in trade flows of Spanish firms that are highly exposed to the policy through their banks does not necessarily imply that Spanish trade flows, as a whole, are declining. For example, the contraction of highly exposed firms' imports of machinery for the wine industry can be offset, in equilibrium, by an expansion of less exposed firms' imports that become more competitive as their banks were less affected by the policy.[6] Thus, a small or even null response of Spanish imports can be consistent with our findings. On the other hand, even if Spanish total imports exhibit a significant decline after the implementation of loan loss provisions, foreign countries can reallocate their exports to other countries. For example, if exporters face increasing marginal costs, they might reallocate exports following a demand shock in a specific location (Almunia et al., 2021).

To test the role of these general equilibrium forces in shaping the cross-border effects of macroprudential policies, we use BACI data, which includes information on the value of trade flows by country of origin, destination, and product (defined by the Harmonized System code of 2002). This is a yearly panel, and we focus on the period 2009-2013. Given the level of aggregation of this data, we construct a measure of exposure to the policy at the product $\times$ country-of-origin level as

[6] This is particularly important for firms engaged in international trade. Since they are typically large, they can take over the market share of competitors who are facing negative shocks.

follows:

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

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 weights w_b^{go} reflect each bank's relative importance in financing imports of good g from country o. We use information as of the end of 2006, three years prior to the starting of our sample period, to compute this measure of exposure.[7] Thus, product × country-of-origin bins are highly exposed to the policy if firms importing them depend more on highly treated banks. Throughout the text, we will refer to product × country-of-origin bins as markets.

We start by studying the impact of our market-level exposure to the regulation by comparing the evolution of Spain's total imports from highly exposed markets versus less exposed ones, before and after the policy, relative to the evolution of other countries' imports of the same markets in a triple difference-in-differences setting:

$$\frac{M_{cgot} - \overline{M}_{cgo}}{(M_{cgot} + \overline{M}_{cgo})/2} = \gamma_t \times \text{Exposure}_{go} \times \mathbb{1}[c = \text{Spain}] + \delta_{cgo} + \delta_{got} + u_{cgot}, \tag{6}$$

where M_{cgot} denotes country c imports of product g from country-of-origin o in year t. Thus, our dependent variable is a mid-point growth rate relative to the corresponding average value of imports in our sample period. We include time-invariant product fixed effects denoted by δ_{cgo}, and time-varying fixed effects at the market level, denoted by δ_{got}.

Our parameter of interest, γ_t, measures the impact of Spanish loan loss provisions on Spanish imports relative to that of other countries. Notice that our triple difference-in-differences approach allows us to identify this parameter controlling for market-specific shocks in a fully flexible way,

[7] From 2008 onward, the representativeness of our Balance of Payments data along the country and product dimensions declines due to a change in the reporting procedure (see Prades and Villegas-Sanchez (2022) for more details). Therefore, we use 2006 as the baseline year to compute our product × country of origin exposure and match it with BACI data trade flows. For all other measures of exposure, i.e., bank, firm, and aggregate market exposures defined in the text, we always use 2011 data.

incorporating time-varying fixed effects at this level, making our identifying assumption less demanding. Indeed, our specification eliminates the potential concern that our market level exposure to Spanish regulations is associated with market-specific trends taking place around the implementation of loan loss provisions. Thus, our identifying assumption is that, absent the policy, the difference between Spanish imports of high versus low exposure markets would have evolved in similar trends as the difference in other countries. Moreover, our final specification considers a set of importers that are similar to Spain. Specifically, we consider importers that belong to the European Union and other advanced economies as those considered by Autor et al. (2013).[8] By restricting our sample to comparable importers, we aim to control for demand shocks that might be taking place around the implementation of loan loss provisions.

[Table 6]

We report our results in Table 6. Column (1) shows that one standard deviation higher market exposure is associated with a 3.3 percent decline in Spanish imports relative to that of other countries in a naive specification with market-importer and year fixed effects. Column (2) shows a similar effect in a more saturated specification where we control for product and exporter shocks including the corresponding time-varying fixed effects. Our benchmark specification reported in column (3) includes time-varying market fixed effects and indicates that one standard deviation higher exposure leads to a 3 percent decline in Spanish imports relative to other countries' imports of the same markets. Finally, column (4) uses the aforementioned set of comparable countries, including EU founders and other developed economies that are potentially exposed to similar demand patterns, and finds a smaller but still statistically significant impact of the policy on Spanish imports.

[Figure 6]

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

Figure 6 plots the event study graph associated with the average effect in our benchmark specification. We find that our measure of market exposure has statistically null effects on Spanish imports before the policy, consistent with our identifying assumption, while there is a persistent decline in Spanish imports from markets that are highly exposed, relative to other countries' imports, after the policy. Overall, our results indicate that reallocation is limited across Spanish firms. Thus, the decline in firm-level imports reported in previous sections generate a decline in total Spanish imports relative to other countries.

We now study the aggregate implications of our documented decline of Spanish imports. Our main goal is to understand to what extent Spain's trade partners can attenuate this contraction, for example, by reallocating sales towards other countries after the reduction in Spanish imports. We proceed in two steps. First, we aggregate our data up to the product $\times$ country-of-origin level and construct a measure of aggregate exposure as follows:

$$\text{Aggregate Exposure}_{go} = \frac{X_{go\,\text{Spain}}}{X_{go}} \times \text{Exposure}_{go}. \tag{7}$$

We use 2011 data, i.e., before the policy adoption, to compute this measure. Thus, for markets to be highly exposed to the regulation, it is required for Spanish importers to depend on highly treated banks, and also for Spain to be a big buyer in these markets.

Second, we construct a panel of exports by country-of-origin and product using BACI data and estimate the impact of the policy by comparing the evolution of exports from markets that were more exposed to the policy relative to exports from markets that were less exposed, as indicated by our aggregate measure of exposure. Thus, we estimate the following difference-in-differences equation:

$$\frac{X_{got} - \overline{X}_{go}}{(X_{got} + \overline{X}_{go})/2} = \rho_t \times \text{Aggregate Exposure}_{go} + \delta_{go} + \delta_{gt} + \delta_{ot} + u_{got}, \tag{8}$$

where X_{got} denotes country o's exports of product g in year t and $\overline{X}_{go}$ is the average value in our

sample period. We include time-invariant fixed effects at the market level. Moreover, we control for time-varying shocks at the product and country-of-origin levels by including the corresponding time-varying fixed effects. Thus, our parameter of interest ρ_t, which measures the cross-border effects of Spanish loan loss provisions, is identified by comparing total exports in highly exposed markets relative to less exposed ones, before and after the regulation. Standard errors are clustered at the market level.

[Table 7]

We report our results in Table 7. Column (1) shows that, in a naive specification with market and year fixed effects, exports of markets with one standard deviation higher exposure exhibit a 5.6 percent contraction after the policy. Column (2) accounts for time-varying shocks taking place at the product level and shows a similar impact. Our benchmark specification, where we control for product and country shocks by including the corresponding time-varying fixed effects, is reported in column (3). One standard deviation higher exposure leads to a 3.2 percent reduction in exports, albeit statistically insignificant at conventional significance levels. Notice that this specification includes the same set of time-varying fixed effects as column (2) in Table 6. Overall, our results suggest that Spain's trade partners cannot attenuate the contraction in Spanish imports. Instead, markets that are more exposed to Spanish regulations exhibit a decline in total global exports after the shock.

[Figure 7]

Figure 7 plots the event-study graph associated with our average effect. We observe that the decline in exports of markets that are highly exposed occurs after the policy implementation. Exports of differently exposed markets evolved in parallel trends before 2011, consistent with our identifying assumption. Our estimation results suggest that loan loss provisions had spillover effects on other countries through international trade linkages.

Now, we explore the drivers of our estimated cross-border effects. Notice that Spain's trade partners can potentially attenuate the contraction in their exports in two ways. First, exporters may offer better terms to Spanish importers, for example, by extending the required length between delivery and repayment through trade credit, which could alleviate the credit constraints faced by Spanish firms. Second, exporters might reallocate sales to other destinations, compensating for the decline in demand from Spain. To estimate the role of these adjustment mechanisms, we keep the size of the demand shock constant and conduct a heterogeneity analysis at the exporter and product dimensions.

We begin by exploring the role of country-specific characteristics that are associated with trade costs. In principle, higher trade costs create a stronger need for external financing for exporters, making them less likely to improve trade credit conditions. For instance, exporters located farther from Spain face higher variable trade costs, as longer shipment times increase the need for external financing, thereby reducing their ability to offer better trade credit terms. Similarly, exporters in countries that do not speak Spanish may face higher fixed trade costs, as exporting to Spain requires investing in overcoming language barriers. Lastly, countries without a Free Trade Agreement (FTA) with Spain may encounter higher tariffs and non-tariff barriers, which further raise the external financing needs of exporters and diminish their ability to adjust credit terms to alleviate the impact of the policy.

[Table 8]

Our results are reported in Table 8. The decline in exports is concentrated among exporters that are far from Spain, do not speak Spanish, and do not have a Free Trade Agreement (FTA) with Spain. For example, columns (1) and (2) show that one standard deviation higher exposure has null effects if the country of origin is close to Spain, i.e., below the median distance to Spain, while it reduces exports by 11 percent if the country is far. Similarly, columns (3) to (6) indicate that one standard deviation higher exposure has null effects on countries speaking Spanish and having an FTA with Spain, while the effect is negative for the remaining countries. Finally, column

(7) shows that the contraction in exports is 18 percent for countries that are far from Spain and do not speak Spanish, and column (8) shows that the reduction is 10 percent in countries that are far and do not have an FTA. Overall, our results are consistent with higher trade costs associated with distance, language, and FTAs limiting the ability of exporters to attenuate the contraction of Spanish imports.

We then explore the role of product-specific attributes that might determine trade flows' reallocation. In principle, if Spain plays a significant role in the demand for a given product, it would be difficult for exporters to find new markets and reallocate sales. We test this hypothesis by computing the share of Spain's purchases in the world total imports of each product. Then, we define that Spain is a main buyer of a given product if this share is above the median. Moreover, if a product is homogeneous, such as commodities, it would be relatively easy to reallocate trade flows across countries. On the other hand, if a product is highly heterogeneous (i.e., countries purchase different varieties of it), exporters would face stronger difficulties in reallocating trade flows away from Spain. We leverage BACI data to calculate an implicit price for each HS 6-digit product and country pair by dividing the total value by the total weight. We then compute the variance of these prices at the HS 2-digit product level. We define homogeneous products as those whose price dispersion is below the median, while heterogeneous products are those whose price dispersion is above.

[Table 9]

We report our results in Table 9. Columns (1) and (2) report the effect of one standard deviation higher aggregate exposure on exports depending on the role of Spain in world total imports. We observe that the decline in exports is 5.1% among products that have Spain as a main buyer, while there is no decline when Spain is a small buyer. Our results suggest that exporters can completely offset the contraction in Spanish imports when other markets are large enough. Columns (3) and (4) show the role of product heterogeneity. When product prices are more dispersed (i.e., products are more heterogeneous), exports decline by 9%. On the other hand, exports remain stable when

products are relatively homogeneous. Our results indicate that countries find it easier to reallocate homogeneous products, completely offsetting the contraction in Spanish imports. Overall, our findings suggest that exporters face frictions related to the market size of the country suffering the demand shock and the product particularities when they intend to smooth demand shocks happening in a trading partner country.

We conclude by testing the role of Spanish banks in shaping our documented cross-border effects. Spanish banks operate in different countries and finance firms engaged in international trade. Thus, our estimation can partially reflect a reduction in business loans provided by Spanish banks in foreign countries, similar to that documented by Tripathy (2020). By including exporter-year fixed effects, we already control for the presence of Spanish banks in foreign countries. However, our trade channel can still be amplified by the Spanish footprint in foreign markets. For example, if Spanish banks are specialized in firms exporting to Spain (Paravisini et al. (2023)), the impact of our market exposure would be larger. To understand the role of this financial channel, we use BankFocus data and track Spanish banks' footprint in foreign countries. We then split our data into two groups depending on whether the country of origin hosts Spanish banks or not.

[Table 10]

Our estimation results are reported in Table 10. Column (1) shows a strong contraction in exports of countries where Spanish banks operate, while column (2) shows a negative, albeit statistically insignificant, contraction in exports of countries without Spanish banks. Thus, the demand shock generated by the Spanish regulation is amplified by the presence of Spanish banks. Our results are consistent with bank specialization. Under this framework, Spanish lenders are more competitive in providing credit to firms exporting to Spain, which allows them to gain market share in this segment. Thus, when loan loss provisions hit, highly exposed markets experience a bigger contraction in total shipments, as most of their exports are financed by Spanish lenders who are directly affected by the regulation.

As we discussed previously, our results are not driven by Spanish banks operating in foreign

markets. Columns (3) to (5) explore the evolution of exports in locations where these banks do not operate. Our results show that distance, language, and FTA play a crucial role in explaining the contraction of exports in these markets. It is worth mentioning that while the amplification of our cross-border spillovers documented in column (1) is limited to a small set of countries, the trade channel itself is strong in most locations.

Overall, our results suggest that bank regulations can have cross-border spillover effects through international trade linkages. First, following the unexpected increase in loan loss provisions, we find a decline in Spanish total imports from highly exposed markets relative to other countries' imports. This result indicates that less exposed firms were not able to offset the contraction of highly exposed companies within Spain. Second, we find that highly exposed markets exhibited a contraction in total exports, which indicates that export reallocation away from Spain was also limited. Finally, we document that trade costs, Spain's market size, and product characteristics play a crucial role in explaining these spillover effects, with the presence of Spanish banks in foreign markets further amplifying them.

5 Conclusions

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

We investigate this by examining the sudden and unexpected increase in loan loss provisions for Spain's construction and real estate sectors in 2012. Using granular datasets–including credit registry information on Spanish exporters and importers, the quasi-universe of firm-level trade flows, and bilateral trade data–we estimate the impact of this policy on various outcomes. Specifically, we explore its effects on (1) credit supply to firms engaged in international trade, (2) firm-level import demand and export supply, and (3) overall Spanish imports and total exports from Spain's

trade partners.

First, using data from the Spanish Central Credit Register (CIR), we show that the increase in loan loss provisions led to tighter lending standards for firms involved in international trade. These firms experienced significant reductions in credit supply and faced constraints in substituting credit through other bank lending relationships.

Second, by linking CIR data with Spanish firm-level trade flow data, we assess the policy's impact on firm-level trade outcomes. Our results show a substantial contraction in trade flows after the policy implementation–both at the intensive and extensive margins–supporting the existence of a trade finance channel. We find stronger and more persistent effects for importers than for exporters. Moreover, when weighting the regressions with market trade flows, we do not find an effect on exports, but we do find an effect on imports, suggesting that only market-level imports responded to the regulation.

Finally, using BACI data on trade flows by country of origin, destination, and product, we examine the extent of import reallocation within Spain and among Spain's trade partners. Our findings indicate limited reallocation of imports both within Spanish firms and across Spain's trade partners, particularly among those expected to face higher trade costs when exporting to Spain–such as more distant partners, those with greater tariff and non-tariff barriers, and those without a common language. We also find that these results remain strong even in countries where there is no participation of Spanish banks. Additionally, reallocation is possible when products are relatively homogeneous and when Spain is a small participant in world total imports, indicating that exporters face frictions related to product-specific adjustments and market size when finding new destinations to reallocate trade flows.

In a context where firms already navigate significant uncertainty due to tariffs and geopolitical tensions, banking regulations represent an additional–and often overlooked–source of trade volatility. The results in this paper highlight the need for enhanced communication and coordination across jurisdictions to mitigate the potential cross-border spillovers of domestic regulatory policies.

References

Abowd, J. M., Kramarz, F., and Margolis, D. N. (1999). High wage workers and high wage firms. *Econometrica*, 67(2):251–333.

Ahn, J. and Sarmiento, M. (2019). Estimating the direct impact of bank liquidity shocks on the real economy: Evidence from letter-of-credit import transactions in Colombia. *Review of International Economics*, 27(5):1510–1536.

Aiyar, S., Calomiris, C. W., Hooley, J., Korniyenko, Y., and Wieladek, T. (2014). The international transmission of bank capital requirements: Evidence from the UK. *Journal of Financial Economics*, 113(3):368–382.

Almunia, M., Antràs, P., Lopez-Rodriguez, D., and Morales, E. (2021). Venting out: Exports during a domestic slump. *American Economic Review*, 111(11):3611–62.

Amiti, M. and Weinstein, D. E. (2011). Exports and financial shocks. *Quarterly Journal of Economics*, 126(4):1841–1877.

Attanasio, O., Goldberg, P. K., and Pavcnik, N. (2004). Trade reforms and wage inequality in colombia. *Journal of Development Economics*, 74(2):331–366.

Autor, D. H., Dorn, D., and Hanson, G. H. (2013). The China syndrome: Local labor market effects of import competition in the United States. *American Economic Review*, 103(6):2121–68.

Bahaj, S. and Malherbe, F. (2024). The cross-border effects of bank capital regulation. *Journal of Financial Economics*, 160.

Baskaya, Y. S., Binici, M., and Kenç, T. (2017). International banking and cross-border effects of regulation: Lessons from Turkey. *International Journal of Central Banking*, 13(1):317–373.

Bolton, P., Freixas, X., Gambacorta, L., and Mistrulli, P. E. (2016). Relationship and transaction lending in a crisis. *The Review of Financial Studies*, 29(10):2643–2676.

Bolton, P. and Oehmke, M. (2018). Bank resolution and the structure of global banks. *The Review of Financial Studies*, 32(6):2384–2421.

Bonaccorsi di Patti, E. and Sette, E. (2016). Did the securitization market freeze affect bank lending during the financial crisis? Evidence from a credit register. *Journal of Financial Intermediation*, 25:54–76.

Borchert, L., De Haas, R., Kirschenmann, K., and Schultz, A. (2023). Broken relationships: Derisking by correspondent banks and international trade. Working Paper 285, European Bank for Reconstruction & Development.

Buch, C. M. and Goldberg, L. (2017). Cross-Border Prudential Policy Spillovers: How Much? How Important? Evidence from the International Banking Research Network. *International Journal of Central Banking*, 13(S1):505–558.

Chor, D. and Manova, K. (2012). Off the cliff and back? Credit conditions and international trade during the global financial crisis. *Journal of International Economics*, 87(1):117–133.

Cortés, K. R., Demyanyk, Y., Li, L., Loutskina, E., and Strahan, P. E. (2020). Stress tests and small business lending. *Journal of Financial Economics*, 136(1):260–279.

Del Prete, S. and Federico, S. (2014). Trade and finance: Is there more than just 'trade finance'? Evidence from matched bank-firm data. *Bank of Italy, Temi di Discussione No. 248*.

Demir, B., Michalski, T. K., and Ors, E. (2017). Risk-based capital requirements for banks and international trade. *The Review of Financial Studies*, 30(11):3970–4002.

Dogan, A. and Hjortso, I. (2024). The role of finance for export dynamics: Evidence from the UK. *CEPR Discussion Paper No. 19027*.

Eaton, J., Kortum, S., and Kramarz, F. (2011). An anatomy of international trade: Evidence from French firms. *Econometrica*, 79(5):1453–1498.

Faia, E. and Weder di Mauro, B. (2016). Cross-border resolution of global banks: Bail-in under single point of entry versus multiple points of entry. *Centre for Economic Policy Research, CEPR Discussion Papers, 11171*.

Fajgelbaum, P. D., Goldberg, P. K., Kennedy, P. J., and Khandelwal, A. K. (2020). The return to protectionism. *The Quarterly Journal of Economics*, 135(1):1–55.

Gaulier, G. and Zignago, S. (2010). BACI: International Trade Database at the Product-Level. The 1994-2007 Version. Working Papers 2010-23, CEPII research center.

Gutiérrez, E. and Moral-Benito, E. (2024). Trade and credit: Revisiting the evidence. *Review of International Economics*, 32(3):1149–1173.

Jiménez, G., Ongena, S., Peydró, J.-L., and Saurina, J. (2017). Macroprudential Policy, Countercyclical Bank Capital Buffers, and Credit Supply: Evidence from the Spanish Dynamic Provisioning Experiments. *Journal of Political Economy*, 125(6):2126–2177.

Kabir, P., Matray, A., Müller, K., and Xu, C. (2024). Exim's exit: The real effects of trade financing by export credit agencies. *NBER Working Paper No. 32019*.

Khwaja, A. I. and Mian, A. (2008). Tracing the impact of bank liquidity shocks: Evidence from an emerging market. *American Economic Review*, 98(4):1413–42.

Korinek, A. (2017). Currency wars or efficient spillovers? A general theory of international policy cooperation. *IMF Working Papers, WP/17/24*.

Manova, K. (2013). Credit constraints, heterogeneous firms, and international trade. *Review of Economic Studies*, 80(2):711–744.

McCaig, B. and Pavcnik, N. (2018). Export markets and labor allocation in a low-income country. *American Economic Review*, 108(7):1899–1941.

Moreira, P. D. and Monteiro, J. (2023). The Impact of a Higher Cost of Credit on Exporters: Evidence from a Change in Banking Regulation. Working Papers 202320, Banco de Portugal, Economics and Research Department.

Niepmann, F. and Schmidt-Eisenlohr, T. (2017). International trade, risk and the role of banks. *Journal of International Economics*, 107(C):111–126.

Paravisini, D., Rappoport, V., and Schnabl, P. (2023). Specialization in bank lending: Evidence from exporting firms. *The Journal of Finance*, 78(4):2049–2085.

Paravisini, D., Rappoport, V., Schnabl, P., and Wolfenzon, D. (2015). Dissecting the effect of credit supply on trade: Evidence from matched credit-export data. *The Review of Economic Studies*, 82(1 (290)):333–359.

Prades, E. and Villegas-Sanchez, C. (2022). Made in spain: Import switching and productivity. Mimeo.

Reinhardt, D. and Sowerbutts, R. (2015). Regulatory arbitrage in action: Evidence from banking flows and macroprudential policy. *Bank of England, 546*.

Segura, A. and Vicente, S. (2019). Bank Resolution and Public Backstop in an Asymmetric Banking Union. *Temi di Discussione, 1212*.

Tripathy, J. (2020). Cross-border effects of regulatory spillovers: Evidence from Mexico. *Journal of International Economics*, 126:103350.

Xu, C. (2022). Reshaping global trade: The immediate and long-run effects of bank failures. *The Quarterly Journal of Economics*, 137(4):2107–2161.

Figures and tables

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 credit information as of the end of 2011. In Panel C, bank variables are calculated using supervisory financial statements as of the end of 2011. All variables are defined in Appendix B.

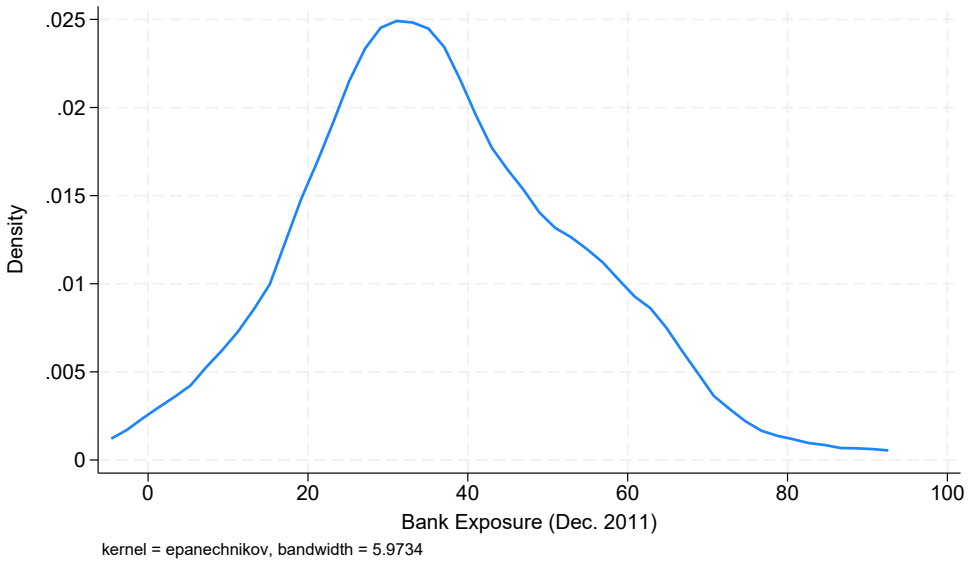


Figure 1: Bank Exposure: Kernel Density Estimate

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.

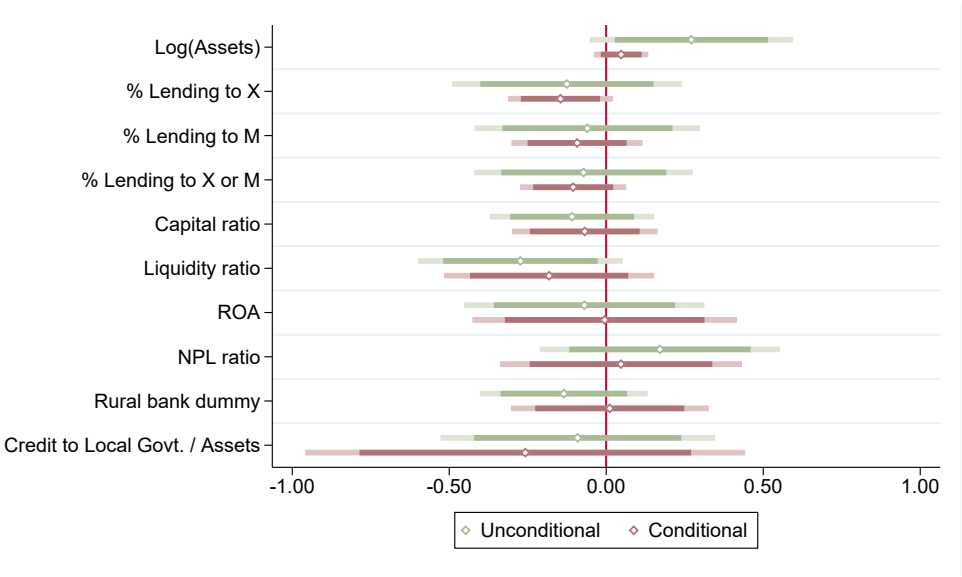


Figure 2: Bank Covariate Balance

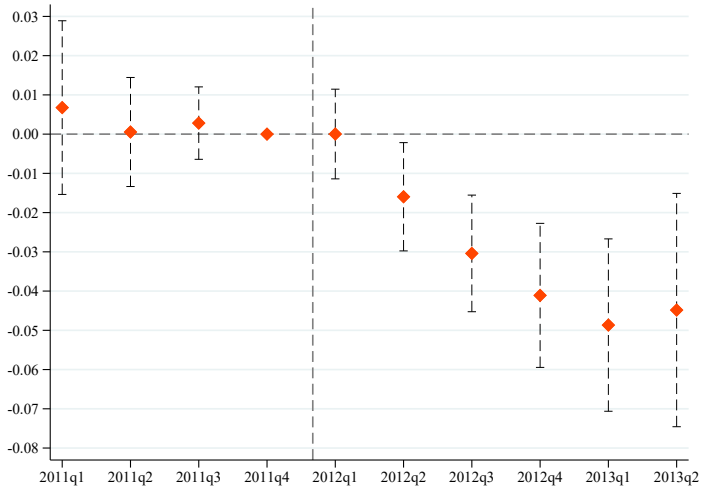
This figure shows coefficient estimates along with 95% confidence intervals (darker bars) and 99% confidence intervals (lighter bars) for the impact of a one standard deviation increase in bank exposure across different variables. All variables are standardized to have zero mean and a standard deviation 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 Exporting and Importing Firms, Bank-Firm Level Analysis

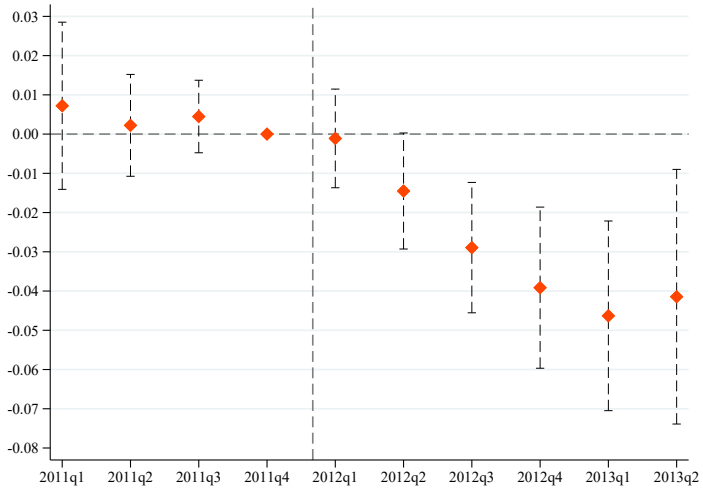
Panel A:	Intensive Margin					
Dep. Variable: Log(Credit)	$X+M$		X		M	
	(1)	(2)	(3)	(4)	(5)	(6)
Exposure × *Policy*	-0.024**	-0.030**	-0.025**	-0.031**	-0.025**	-0.031**
	(0.011)	(0.012)	(0.011)	(0.012)	(0.011)	(0.013)
Controls×time	No	Yes	No	Yes	No	Yes
Firm-time FE	Yes	Yes	Yes	Yes	Yes	Yes
Bank-firm FE	Yes	Yes	Yes	Yes	Yes	Yes
Obs.	1,288,007	1,288,007	973,386	973,386	962,963	962,963
R^2	0.97	0.97	0.97	0.97	0.97	0.97

Panel B:	Extensive Margin					
Dep. Variable: Termination	$X+M$		X		M	
	(1)	(2)	(3)	(4)	(5)	(6)
Exposure × *Policy*	0.015**	0.016*	0.014*	0.015	0.016*	0.019*
	(0.007)	(0.010)	(0.008)	(0.010)	(0.008)	(0.010)
Controls	No	Yes	No	Yes	No	Yes
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes
Obs.	137,800	137,800	103,957	103,957	102,788	102,788
R^2	0.53	0.58	0.51	0.56	0.52	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) include all exporting and importing firms, whereas columns (3) and (4) include only exporters, and columns (5) and (6) include only importers. *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 Exporters



Panel B: Lending to Importers

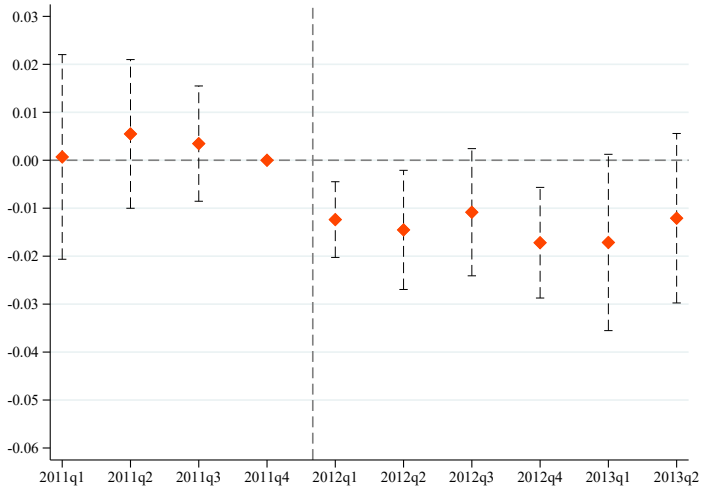
Figure 3: Impact on Lending to Exporting and Importing Firms at the Intensive Margin

This figure plots the event study associated with specification (1), where we replace *Policy* with quarter dummies. Panel (a) includes only exporters, while panel (b) consider only importers. 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.

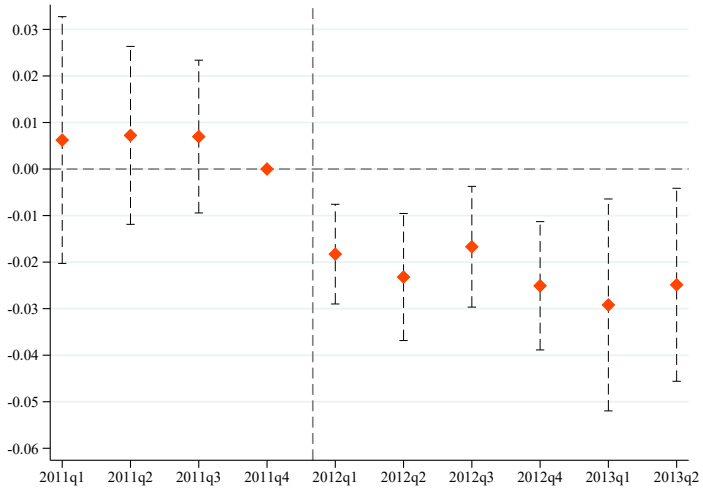
Table 3: Impact of Provisioning Shift on Total Bank Debt to Exporting and Importing Firms, Firm Level Analysis

Dep. Variable: Log(Credit)	$X+M$		X		M	
	(1)	(2)	(3)	(4)	(5)	(6)
Exposure × *Policy*	-0.017***	-0.022***	-0.012**	-0.016**	-0.019***	-0.028***
	(0.005)	(0.006)	(0.005)	(0.007)	(0.006)	(0.007)
Controls×time	No	Yes	No	Yes	No	Yes
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes
Time FE	Yes	No	Yes	No	Yes	No
$\hat{\alpha}_{f,t}$	No	Yes	No	Yes	No	Yes
Obs.	316,925	316,925	230,099	230,099	228,786	228,786
R^2	0.98	0.98	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) include all exporting and importing firms, whereas columns (3) and (4) focus only on exporters, and columns (5) and (6) on importers. 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), (4), and (6) include estimated firm-quarter fixed effects obtained from specification (1), while regressions in columns (1), (3), and (5) 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 Exporters



Panel B: Lending to Importers

Figure 4: Impact on Total Bank Debt to Exporting and Importing Firms

This figure plots the event study associated with specification (2), where *Policy* is replaced with quarter dummies. Panel (a) includes only exporters, while panel (b) consider only importers. 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

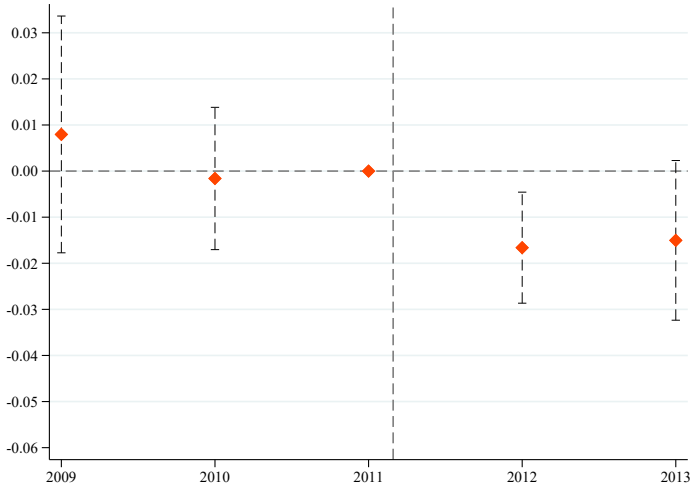
	Mid-point growth		Entry Dummy		Exit Dummy	
	X	M	X	M	X	M
	(1)	(2)	(3)	(4)	(5)	(6)
Exposure × *Policy*	-0.020**	-0.036***	0.000	-0.007**	0.009**	0.014***
	(0.009)	(0.011)	(0.003)	(0.003)	(0.004)	(0.004)
Product-Country-Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Province-Industry-Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Product-Country-Firm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

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 exports (imports) of product g to (from) country c and the 5-year average of firm f's exports (imports) of the same product to (from) 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. $***\ p < 0.01$, $**\ p < 0.05$, $*\ p < 0.10$.

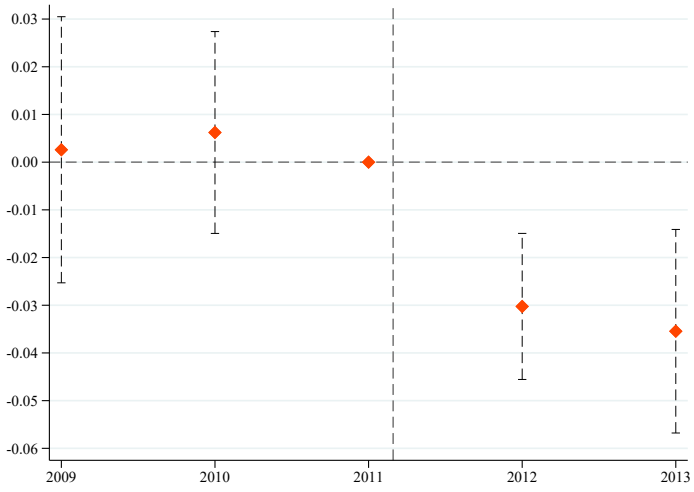
Table 5: Impact of Provisioning Shift on Additional Trade Outcomes

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

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 exporter (importer) number of trade partners, number of products shipped (imported), and total value of exports (or imports). 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. $***$ $p < 0.01$, $**$ $p < 0.05$, $*$ $p < 0.10$.



(a) Exports



(b) Imports

Figure 5: Impact of Provisioning Shift on Exports and Imports 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 exports (or imports) growth of good g to (or from) country c, relative to the year before the policy implementation (2011). Panel A presents the estimates for exporters, whereas Panel B presents the estimates for importers. 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 6: Impact of Provisioning Shift on Spanish Imports Relative to Other Countries

	Imports			
	Mid-point growth			
	All countries			Comparable countries
	(1)	(2)	(3)	(4)
$Exposure_{go} \times \mathbb{1}[c = \text{Spain}] \times Post_t$	-0.033***	-0.030***	-0.030***	-0.008***
	(0.002)	(0.002)	(0.002)	(0.002)
Observations	3,141,210	3,141,210	3,141,180	297,500
Fixed Effects				
Exporter × Importer × Product	Yes	Yes	Yes	Yes
Year	Yes	No	No	No
Product × Year	No	Yes	No	No
Exporter × Year	No	Yes	No	No
Exporter × Product × Year	No	No	Yes	Yes

This table presents the regression results for the mid-point growth rate of country c's imports of product g from country o relative to its five-year average. The analysis is based on a product-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 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 countries, while column 4 focuses on a set of comparable countries, including those in Autor et al. (2013). All variables and comparable countries are defined in Appendix B. Standard errors shown in parentheses are clustered by product and country of origin.
$***$ $p < 0.01$, $**$ $p < 0.05$, $*$ $p < 0.10$.

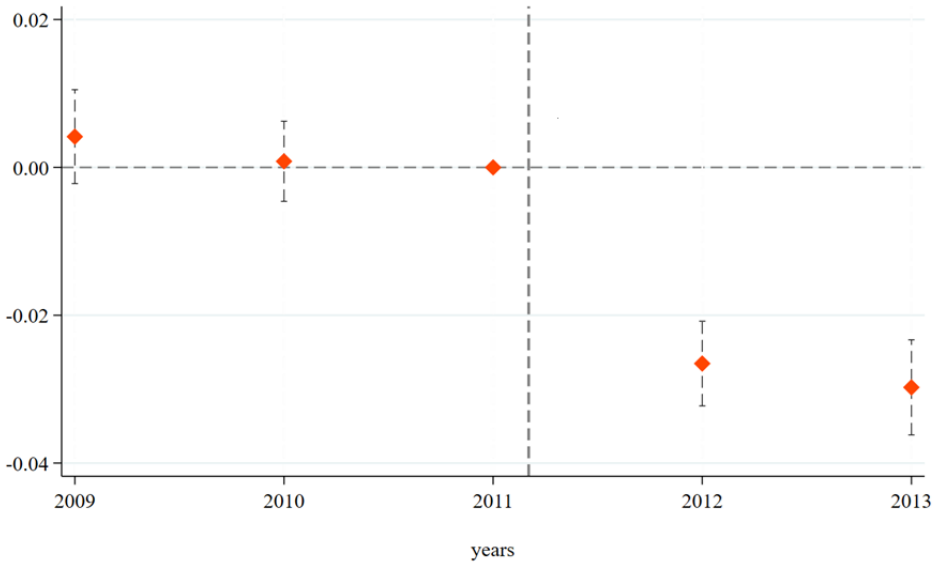


Figure 6: Event Study for the Average Effect of Product Exposure to Provisioning Shift on Spanish Imports

This figure plots coefficient estimates from equation (6), which coincides with a modified version of 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: Spillover Effects of the Provisioning Shift on Spain's Trading Partners' Exports

	Exports		
	Mid-point growth		
	(1)	(2)	(3)
$Agg.\ Exposure_{go} \times Post_t$	-0.056***	-0.059***	-0.032
	(0.019)	(0.019)	(0.025)
Observations	24,900	24,900	24,770
Fixed Effects			
Exporter × Product	Yes	Yes	Yes
Year	Yes	No	No
Product × Year	No	Yes	Yes
Exporter × Year	No	No	Yes

This table presents the regression results for the mid-point growth rate of country o's total exports of product g relative to its five-year average. The analysis relies on country o's product-level measure of exposure and includes various fixed effects, as specified in equation (8). Exposure is calculated based on country o's product exposure, as defined in equation (5), and scaled by Spain's share in country o's total exports of that product, following equation (7). The fixed effects included in each regression are detailed 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.
$***\ p < 0.01$, $**\ p < 0.05$, $*\ p < 0.10$.

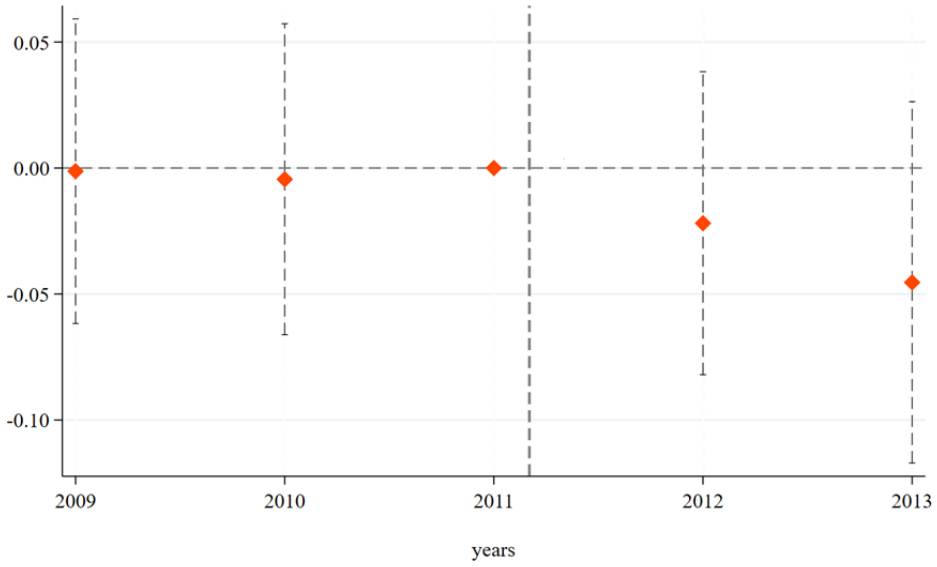


Figure 7: Event Study for the Average Spillover Effect on Spain's Trading Partners' Exports Due to the Provisioning Shift

This figure plots coefficient estimates from equation (8), which coincides with a modified version of our benchmark specification in column 3 of Table 7. Each dot is the coefficient on the interaction of the country's o - product exposure, as in equation equation (7), and year indicators. The dashed lines indicate the 2.5%–97.5% confidence interval, with standard errors clustered by product and country of origin.

Table 8: Heterogeneous Spillover Effects of the Shift in Loan Provisioning, Country Characteristics

	Exports: Mid-point growth rate							
	Close to Spain		Spanish Speaking		Has a FTA		Far & Not:	
	Yes	No	Yes	No	Yes	No	Spanish	FTA
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
$Agg.\ Exposure_{go} \times Post_t$	0.008	-0.109**	-0.009	-0.056	-0.007	-0.054	-0.178*	-0.102**
	(0.030)	(0.045)	(0.045)	(0.034)	(0.032)	(0.040)	(0.096)	(0.046)
Observations	12,565	12,070	3,185	21,395	13,370	11,265	9,140	10,075
Fixed Effects								
Exporter × Product	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Product × Year	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Exporter × Year	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

This table presents regression results for the mid-point growth rate of country o's total exports of product g relative to its five-year average, across different subsamples based on the characteristics of the exporting country and its trade relationship with Spain. The analysis relies on country o's product-level measure of exposure and includes various fixed effects, as specified in equation (8). Exposure is calculated using country o's product exposure, as defined in equation (5), scaled by Spain's importance in country o's total exports of that product, following equation (7). The fixed effects included in each regression are detailed in the lower part of the table. Columns (1) and (2) divide the sample into countries above and below the median distance to Spain. Columns (3) and (4) split the sample into Spanish-speaking and non-Spanish-speaking countries. Columns (5) and (6) classify countries based on whether they have a trade agreement with Spain. Finally, columns (9) and (10) focus on countries that are above the median distance to Spain and additionally either do not have Spanish as an official language or do not have a trade agreement with Spain, respectively. 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 9: Heterogeneous Spillover Effects of the Shift in Loan Provisioning, Product Characteristics

	Exports: Mid-point growth rate			
	Spanish share		Price dispersion	
	High	Low	High	Low
	(1)	(2)	(3)	(4)
$Agg.\ Exposure_{go} \times Post_t$	-0.051	0.010	-0.091*	-0.006
	(0.034)	(0.043)	(0.050)	(0.033)
Observations	10,320	10,275	10,205	10,420
Fixed Effects				
Exporter × Product	Yes	Yes	Yes	Yes
Product × Year	Yes	Yes	Yes	Yes
Exporter × Year	Yes	Yes	Yes	Yes

This table presents regression results for the mid-point growth rate of country o's total exports of product g relative to its five-year average, across different subsamples based on the characteristics of the exported product. The analysis relies on country o's product-level measure of exposure and includes various fixed effects, as specified in equation (8). Exposure is calculated using country o's product exposure, as defined in equation (5), scaled by Spain's importance in total exports of country o's product, following equation (7). The fixed effects included in each regression are detailed in the lower part of the table. Columns (1) and (2) split the sample based on whether Spain's share of global purchases for good g is above or below the median. Columns (3) and (4) divide the sample according to whether the product's price dispersion is above or below the median. Price dispersion is measured as the HS2-level variance of implicit prices, computed at the HS6-digit product level for each country. 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 10: Heterogeneous Spillover Effects of the Shift in Loan Provisioning, Spanish Banks Presence

	Exports: Mid-point growth rate				
	Spanish Banks		No Spanish Banks		
	Yes	No	Far	Diff. Lang.	Not FTA
	(1)	(2)	(3)	(4)	(5)
$Agg.\ Exposure_{go} \times Post_t$	-0.076**	-0.021	-0.113**	-0.168	-0.105**
	(0.033)	(0.031)	(0.049)	(0.108)	(0.051)
Observations	4,340	20,295	9,990	8,730	8,610
Fixed Effects					
Exporter × Product	Yes	Yes	Yes	Yes	Yes
Product × Year	Yes	Yes	Yes	Yes	Yes
Exporter × Year	Yes	Yes	Yes	Yes	Yes

This table presents the regression results for the mid-point growth rate of country o's exports of product g relative to its five-year average. The analysis is based on country o's product-level measure of exposure and includes different sets of fixed effects, as specified in equation (8). Exposure is calculated using equation (5) and scaled by the importance of Spain in the total exports of country o's product, following equation (7). The fixed effects included in each regression are listed in the lower part of the table. Columns 1 and 2 divide the sample into countries with and without Spanish banks. Columns 3 to 5 focus on countries without Spanish banks, further distinguishing between (i) countries above the median distance to Spain (column 3), (ii) non-Spanish-speaking countries (column 4), and (iii) countries without a trade agreement with Spain (column 5). 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 Additional Tables and Figures

Table A.1: Effect of Shift in Provisions on Lending to Importing and Exporting Firms, Bank-Firm Level Analysis Accounting for Bank Specialization

Dep. Variable: Log(Credit)	$X+M$		X		M	
	(1)	(2)	(3)	(4)	(5)	(6)
Exposure × *Policy*	-0.030**	-0.030***	-0.031**	-0.032***	-0.031**	-0.031**
	(0.012)	(0.011)	(0.012)	(0.011)	(0.013)	(0.012)
Q_2 × Policy		0.010		0.010		0.014
		(0.010)		(0.010)		(0.011)
Q_3 × Policy		-0.001		-0.002		-0.002
		(0.007)		(0.007)		(0.008)
Q_4 × Policy		-0.017**		-0.017**		-0.022**
		(0.008)		(0.008)		(0.008)
Controls×time	Yes	Yes	Yes	Yes	Yes	Yes
Firm-time FE	Yes	Yes	Yes	Yes	Yes	Yes
Bank-firm FE	Yes	Yes	Yes	Yes	Yes	Yes
Obs.	1,288,007	1,288,007	973,386	973,386	962,963	962,963
R^2	0.97	0.97	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) include all exporting and importing firms, whereas columns (3) and (4) include only exporters, and columns (5) and (6) include only importers. 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), (4), and (6), 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 exports or imports. 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 exports or imports. 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 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 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.2: Effect of Shift in Provisions on Lending to Tradable and Non-tradable firms, Bank-Firm Level Analysis

Dep. Variable: Log(Credit)	*All Firms* (1)	$X+M$ (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.3: Effect of Shift in Provisions on annual Firm-level Outcomes

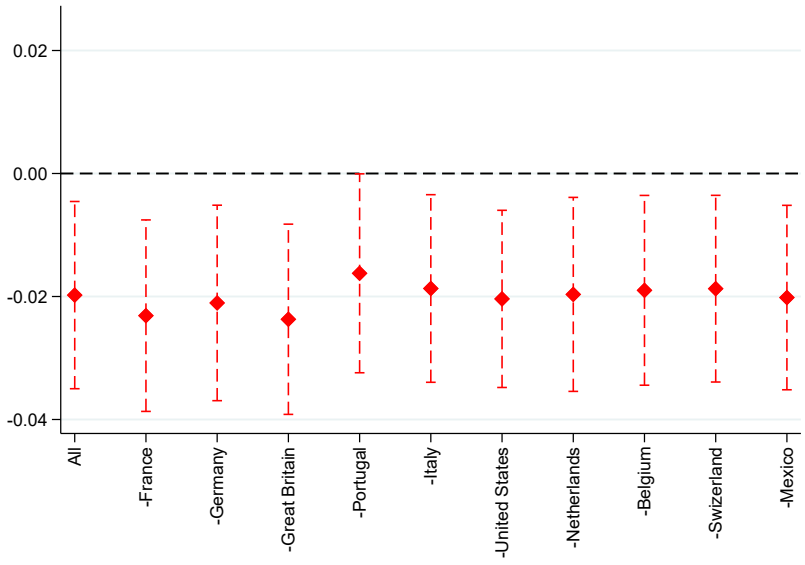
	Total Debt	Employment	Tangible Assets
	(1)	(2)	(3)
Exposure	-0.024***	-0.009**	-0.012**
	(0.008)	(0.003)	(0.006)
Firm controls	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes
Province FE	Yes	Yes	Yes
Main Buyer FE	Yes	Yes	Yes
Obs.	16,363	16,363	16,363
R^2	0.01	0.03	0.02

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 debt, 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.
$***$ $p < 0.01$, $**$ $p < 0.05$, $*$ $p < 0.10$.

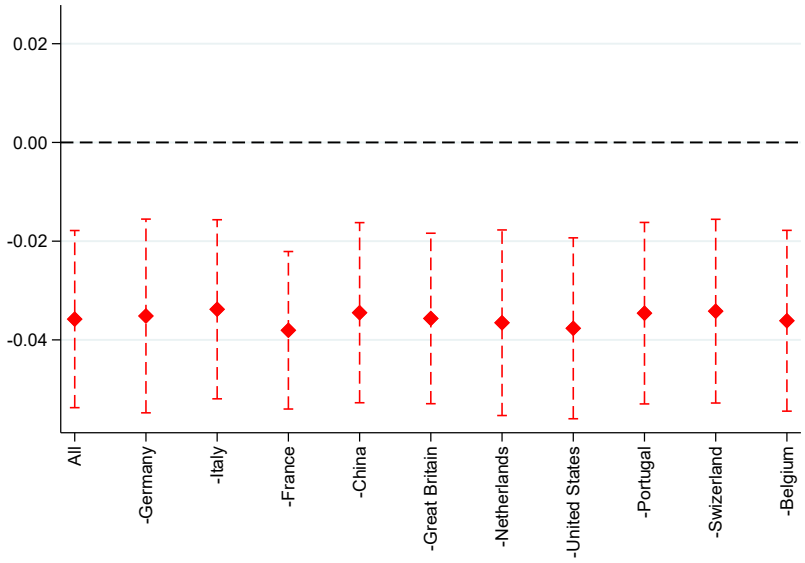
Table A.4: Bank-Firm Relationship Characteristics and Trade Flows

Panel A:	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
R^2	649,050	649,050	649,050	649,050	649,050
Obs.	0.17	0.17	0.17	0.17	0.17
Panel B:	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
R^2	558,540	558,540	558,540	558,540	558,540
Obs.	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.
$***\ p < 0.01$, $**\ p < 0.05$, $*\ p < 0.10$.



(a) Exports



(b) Imports

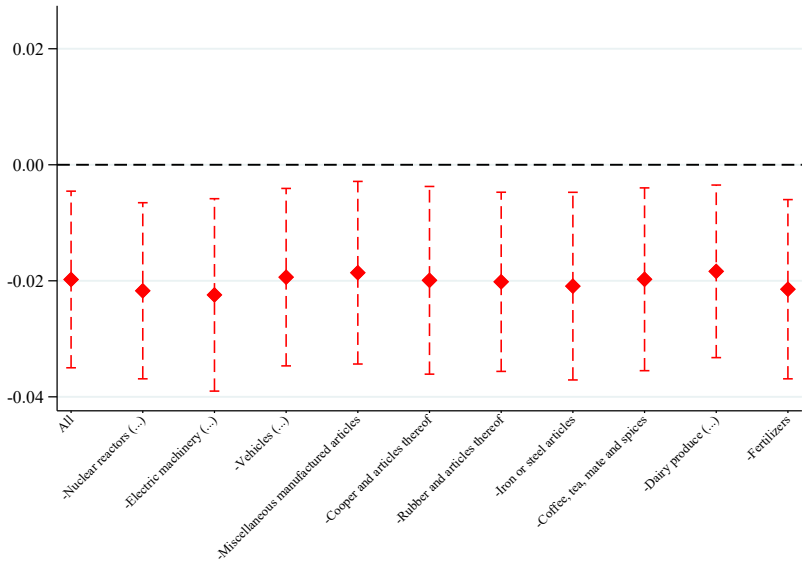
Figure A.1: Sensitivity Analysis to Main Destination and Origin Countries

The figure presents a sensitivity analysis of our baseline results in specification (4). In Panel (a), we present the sensitivity analysis for exports after sequentially excluding each of the top 10 main destinations for Spanish exports. In Panel (b), we present the analysis for imports after sequentially excluding each of the top 10 main origin countries for Spanish imports. 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.

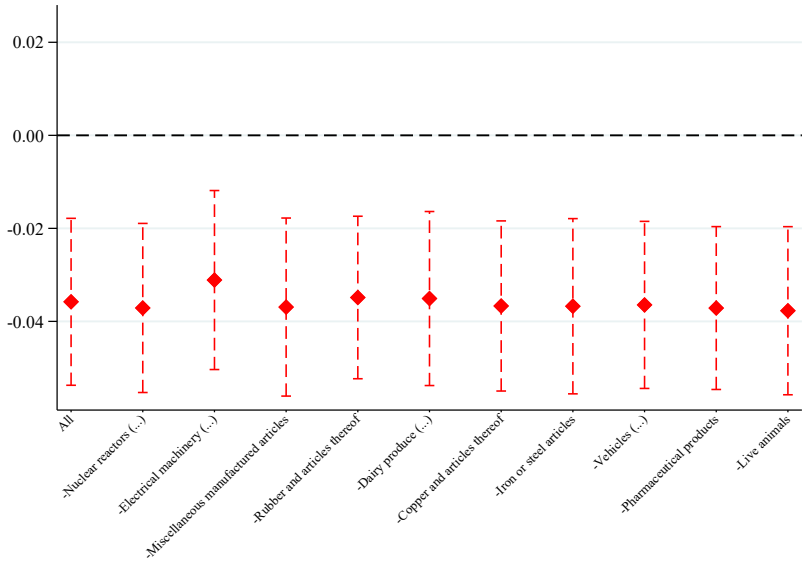
Table A.5: Impact of Provisioning Shift on Firms' International Trade Flows, Weighted Regressions

	Mid-point growth			
	Unweighted		Weighted	
	X	M	X	M
	(1)	(2)	(3)	(4)
$Exposure \times Policy$	-0.020**	-0.036***	-0.018	-0.035**
	(0.009)	(0.011)	(0.013)	(0.014)
Product-Country-Year FE	Yes	Yes	Yes	Yes
Province-Industry-Year FE	Yes	Yes	Yes	Yes
Product-Country-Firm FE	Yes	Yes	Yes	Yes
R-squared	649,050	558,540	649,050	558,540
Observations	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 exports (imports) of product g to (from) country c and the 5-year average of firm f's exports (imports) of the same product to (from) 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 exported and imported 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.
$***\ p < 0.01$, $**\ p < 0.05$, $*\ p < 0.10$.



(a) Exports



(b) Imports

Figure A.2: Sensitivity Analysis to Main Export and Import Products

The figure presents a sensitivity analysis of our baseline results in specification (4). In Panel (a), we present the sensitivity analysis for exports after sequentially excluding each of the top 10 main exported products of Spanish firms. In Panel (b), we present the analysis for imports after sequentially excluding each of the top 10 main imported products for 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.

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 and BankFocus)

- *Close to Spain*: If the origin country is below the median distance to Spain.
- *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.
- $Heterogeneous\ products$: If the product's price dispersion 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.
- *Spanish Banks*: If Spanish banks operate in the country.