EXIM's Exit: The Real Effects of Trade Financing by Export Credit Agencies*

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Abstract

We study the role of Export Credit Agencies—the predominant tool of industrial policy—on firm behavior by using the effective shutdown of the Export-Import Bank of the United States (EXIM) from 2015–2019 as a natural experiment. We show that a \$1 reduction in EXIM trade financing reduces exports in an industry by approximately \$4.5. The impact on firms' total revenues implies that the export shock has positive pass-through to domestic sales, and firms contract investment and employment. We document that EXIM trade financing helps to overcome two key constraints: firms' financing constraints and contractual frictions in importer markets, indicating that even in well-developed financial markets, trade financing is plausibly undersupplied by private banks. Consistent with this evidence of efficiency gains, we find that EXIM reduced capital misallocation, with higher ex-ante marginal revenue product of capital firms expanding more. These results provide a framework for the conditions under which Export Credit Agencies can boost exports and firm growth, and can act as a tool of industrial policy without necessarily leading to a misallocation of resources.

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1 Introduction

Export Credit Agencies (henceforth "ECAs") are public or semi-public institutions that aim to promote exports and ultimately boost domestic output, investment and employment by providing exporters with trade financing. These institutions are ubiquitous, operating in over 90 countries across the income spectrum that account for more than 92% of world trade. They are the predominant tool of industrial policy around the world, especially for advanced economies (Juhász, Lane, Oehlsen and Pérez, 2022).

Despite their widespread adoption, however, there is limited evidence on whether ECAs are effective at creating trade and real economic activity, and on whether they can do so while efficiently allocating capital domestically.

In this paper, we study the causal effect of an ECA using a natural experiment of the temporary shutdown of the Export-Import Bank of the United States (EXIM) from 2015 to 2019. During the shutdown, EXIM's supply of trade financing collapsed by 84% relative to prior years. Because firms and industries differed in their prior degree of reliance on EXIM, we can compare the evolution of their outcomes before and after the shutdown to causally identify the impact of EXIM's shutdown on exports, revenues, investment, and employment with a difference-in-differences empirical design.

How ECAs such as EXIM affect the real economy is theoretically ambiguous and has been subject to a heated policy debate. The economic case in favor of ECAs is straightforward: exporting requires considerable upfront financing that could be under-supplied by the private market due to contractual frictions, which are particularly high across country borders. As a result, even in the presence of profitable demand from foreign customers, firms may have to forgo exporting due to lack of financing. By providing an alternative to private markets, ECAs help firms to overcome these financing constraints, thereby boosting exports and potentially spurring economic growth.

The case against ECAs typically relies on the argument that firms capable of exporting would do so regardless of access to ECA funding. First, at the firm level, ECA funding, like other public spending programs earmarked for specific activities (e.g., facilitated lending, tax subsidies, direct aid), may go to businesses that do not need it, which would result in a pure profit windfall. For example, firms may continue to invest in R&D even without innovation tax credits, and business tax incentives can increase firms' profits without stimulating investment or job creation (e.g., Slattery and Zidar, 2020). As ECA financing specifically targets exporters—which tend to be larger and more productive and therefore less likely to be financially constrained—it is particularly likely to function as a windfall transfer and fail to alter firm export behavior. In the US, the argument that EXIM provided this sort of "corporate welfare" at the expense of taxpayers was one of the main justifications for the 2014 shutdown.

Second, at the industry level, even if ECA funding benefits some firms, it may come at the expense of non-recipient firms, resulting in the reallocation of market share while leaving total exports unchanged. Together, ECAs would at best reallocate export market share among domestic firms or at worst provide inframarginal transfers to well-connected firms at the expense of taxpayers.

Moreover, even supposing that ECAs were indeed able to raise the overall exports of the economy, any positive effects may still be offset by the costs of increasing input misallocation in the domestic economy. Indeed, if ECAs primarily allocate capital to firms with a lower marginal revenue product of capital, misallocation would increase, which would lower the economy's total factor productivity (TFP) and potentially lower output (e.g., Hsieh and Klenow, 2009; Moll, 2014; Baqaee and Farhi, 2020; Bau and Matray, 2023).

In the first part of the paper, we directly assess whether EXIM is able to generate additional trade for the US, net of market share reallocation among US firms. We estimate the marginal impact of the shutdown on exports from 2010 to 2019 using bilateral customs data, which record the annual value of exports disaggregated by product and destination country. To measure the importance of EXIM trade financing for a given product, we compute the ratio of EXIM financing relative to the product's total value of exports. Before the shutdown, EXIM's trade financing accounted for 0.8% of the value of US exports, with substantial variation across products.

Our empirical strategy compares changes in US exports of a given product that received EXIM support sold to a given destination with the exports of those same products to the same destinations by other developed countries. Using this within-product variation in EXIM intensity means that we do not compare the evolution of different products and therefore are not assuming that all product sales would have evolved similarly absent the shutdown. We also do not require a random allocation of EXIM financing across products nor randomness in the timing of the shutdown itself. Instead, our identifying assumption is that there were no US-specific product-level shocks correlated with EXIM exposure that occurred exactly at the same time as the shutdown.

We find that the shutdown led to a large decline in US exports of EXIM-dependent products. There are no differential pre-trends, followed by a relative decline of affected products that starts precisely after the shutdown in 2015 and persists all the way through 2019, the year EXIM was allowed to fully resume its activities.

We have several reasons to believe that we identify the causal effect of the shutdown rather than a correlation between the shutdown and a general decline in US exports in EXIM-supported products starting in 2015. First, our results are robust to the inclusion of product-by-year, destination-by-year, and product-by-destination-by-year fixed effects, indicating that they cannot be explained by differential exposure to demand or supply shocks correlated with the ex-ante intensity of EXIM trade financing. Second, the shutdown was arguably not driven by economic considerations, but rather by the Tea Party's political strategy of systematically blocking the President's policies and nominations in Congress. Third, the distribution of our point estimates is tightly concentrated around the baseline when we exclude individual industries, implying that our effects are not driven by specific industries such as transportation, or those that might have been affected by the 2018 "trade war" with China. Fourth, our analysis of the firm-level effects of the shutdown allows us to directly control for US-specific industry shocks and product shocks.

The average elasticity of the impact of EXIM's shutdown on a product's exports implies that a $1 decrease in the supply of EXIM trade financing lowers exports by approximately $4.5. This result indicates that EXIM financing was marginal for US exports even at the aggregate product level where business stealing might have been large. We decompose this overall effect on exports into changes on the intensive and extensive margins. By extensive margin, we mean that a product enters a new destination (entry) or leaves an existing destination (exit) during the shutdown. We find that the intensive margin accounts for 80% of the overall effect, while the remaining 20% on the extensive margin is entirely driven by relatively less entry, while exit remains unaffected. These results are consistent with the interpretation that trade financing reduces a variable cost for exporting, which drives the intensive margin, and that it reduces a sunk cost that exporters must incur once to enter a market, which drives the extensive margin changes in entry but not exit (e.g., Das, Roberts and Tybout, 2007; Xu, 2022).

The impact on product exports shows that the supply of EXIM trade financing creates net additional trade for the US. However, it is still possible that EXIM has a limited or even negative effect on the domestic economy for two reasons. First, EXIM-backed firms may be able to partially compensate their export market losses with domestic sales. Second, if EXIM increases the misallocation of capital across firms in the economy such that there is a reduction in aggregate TFP, then these additional costs could outweigh any average benefit.

To better understand the impact of EXIM's shutdown on firms, we first examine its effect on firm-level maritime exports, for which we observe products and destination countries. We hand-match EXIM financing contracts to firms and define treatment as having received EXIM support prior to the 2014 shutdown. Econometrically, the firm-level bilateral exports analysis allows us to use within-US-industry variation and to control for product and destination shocks. This firm-level analysis directly relaxes the identifying assumption in the aggregate bilateral trade analysis that EXIM's shutdown is not correlated with unobserved US-industry specific shocks.

With these direct effects on firm-level exports in hand, we next turn to understanding the impact on the domestic economy by studying the set of publicly listed firms that generate the majority of exporting activity, for which we observe all balance sheet and income statement items. We find that EXIM's shutdown reduced the total revenues (foreign and domestic) of EXIM-backed firms by an average of 12% relative to non-supported exporting firms. These estimates remain quantitatively similar and statistically significant after including additional firm-level controls such as firms' lobbying behavior, ex-ante profitability, and size. As additional robustness checks, we show that the results are unchanged if we exclude the top recipients of EXIM financing, individual industries, or industries that are reliant on government contracts in general. We find similar effects when we restrict our sample to only exporting firms, and to the subset that is most likely affected by the prolonged nature of the shutdown. The latter analysis further tightens the empirical strategy by comparing *within* the set of EXIM-financed firms.

Given the elasticity of the effects of EXIM's shutdown on firm exports and total sales, we calculate that the shock to firms' exports has a positive pass-through to domestic sales of approximately 3% to 7%. This positive pass-through implies that, in our setting, classic trade models featuring constant marginal costs and a separation across the different markets in which firms operate do not fit the data well. Instead, the results are consistent with models of within-firm scope and scale (e.g., Ding, 2024), which can emerge from financing frictions and the presence of internal capital markets (e.g., Stein, 1997; Lamont, 1997).

Following the loss in revenues that EXIM-dependent firms experience, we next trace out how these firms adjust capital and labor. We find that on average, EXIM-financed firms see a relative drop in capital of -14% and in employment of -10%. By contrast, firms' profit margins are not affected. In conjunction, our results show that EXIM financing affects real activity and does not merely generate windfall profits for beneficiaries.

Having established the real impact of EXIM's financing on the margin for both the average firm and industry, in the second part of the paper, we turn to understanding the channels underlying the effect of EXIM on trade flows. Guided by the institutional details of EXIM's operations, we provide empirical evidence that the effects of the shutdown were particularly large along two dimensions. First, firms that were ex-ante financially constrained—i.e., those that had low access to external financing relative to output—experienced the largest losses. Second, trade with destinations that faced higher contractual frictions, for instance due to low rule of law (e.g., Nunn, 2007) or were perceived to be riskier (e.g., Hassan, Schreger, Schwedeler and Tahoun, 2023), also systematically contracted more.

Our findings that EXIM was able to benefit firms that were ex-ante more constrained by financial and cross-border contractual frictions points to its ability to generate efficiency gains, and suggests that it may be able to improve capital allocation in the economy. To systematically analyze the (in)efficiency costs of EXIM's shutdown, we develop an empirical framework that draws on the misallocation literature, in which frictions generate distortions in how inputs are allocated across firms. With this framework, it is possible to interpret the cross-sectional effects of EXIM shutdown as a systematic increase in input cost wedges that disproportionately affected firms that had ex-ante high marginal revenue product of capital (henceforth "MRPK").

We directly estimate the effect of EXIM's shutdown on capital misallocation using the Bau and Matray (2023) methodology, which identifies the within-firm changes in investment across high and low MRPK firms. We consistently find that EXIM's shutdown particularly affected the investment of high rather than low MRPK firms, indicating that a cut in EXIM's financing *increased* capital misallocation. Our findings are not dependent on the exact functional form of the firm production function or measure of input cost wedge: for robustness, we employ additional MRPK measures from Hsieh and Klenow (2009) and Baqaee and Farhi (2019*a*), which use different methods to compute firm wedges, and which make different assumptions about firm production functions. While our findings speak only to changes in misallocation among publicly listed firms, these firms receive much of EXIM's financing and contribute to a large share of aggregate output. It is therefore plausible that our findings on the allocation of capital would extend to the overall economy.

In light of these results, it is natural to ask whether EXIM's ability to reduce input cost wedges implies superior lending technology relative to private banks. Our evidence suggests a more nuanced interpretation. EXIM operates in segments where private banks are "unable or unwilling" to private financing due to rational profit-maximizing behavior. These gaps can emerge because banks deal with asymmetric information and incomplete contracts (likely to be large in trade financing) and have to satisfy incentive compatibility constraints, or because international banks have certain market power that allows them to charge high markups, which would directly generate capital misallocation across borrowers.[1] In both cases, profit-maximizing banks optimally constrain the quantity of credit relative to a sovereign government agency that has access to additional enforcement mechanisms (e.g., the Paris Club) and values a social objective in addition to pure profits, which creates room to improve the allocation of capital.

An additional key consideration in evaluating EXIM's efficiency is whether its ability to finance exports and reduce capital input wedges relies on government funding by distortive taxes. Empirically, that does not appear to be the case: EXIM's balance sheets show that it profitably returned on average $50 million annually to the US Treasury during our sample period. The profitiability is not due to EXIM receiving a subsidized cost of capital but instead appears consistent with strong enforcement mechanisms resulting in low default rates (0.3%). Combined with the theoretical prediction that EXIM's dual mandate of fostering broader social outcomes while maximizing profits would lead it to optimally charge lower (but still non-negative) markups compared to purely profit-maximizing banks, these factors likely explain why private banks, with many additional lines of

[1] International trade is primarily financed by highly specialized international banks, and since 2012, there has been a steady retreat in global banking in all jurisdictions (Borchert, De Haas, Kirschenmann and Schultz, 2023). Cavalcanti, Kaboski, Martins and Santos (2023) presents theory and evidence that bank market power generates capital misallocation, as private banks maximize profits by constraining the supply of credit despite entrepreneurs having high returns to capital.

business, may not have found it optimal to capture this market during EXIM's shutdown, despite EXIM's ability to operate profitably.

Our results on the efficiency of EXIM should nonetheless also be interpreted within the institution's current scale and scope: EXIM is relatively small compared to the size of the exporting sector, and it is plausible that there are positive-return exporting projects to finance. Expanding the size of EXIM indiscriminately would likely lower the positive effects we find.

We conclude by discussing how ECAs may operate as a tool for broader industrial policy motives. Our framework clarifies that ECAs can target social wedges in the economy while continuing to meet their own output objectives to the extent that those wedges correlate positively with firm and importer-market financing frictions. In addition, because trade financing can target specific firm-product-destination market transactions, it can be applied selectively so as to minimize introducing other costly distortions. However, whether ECAs are in fact successful in targeting social wedges that meet broader industrial policy objectives is a question for future research.

Related literature. First, export credit agencies are one of the most important tools of industrial policy, so our work contributes to a growing literature that uses modern empirical methods or provides new theories on how industrial policy affects firms and economic development (e.g., Juhász, 2018; Itskhoki and Moll, 2019; Criscuolo, Martin, Overman and Van Reenen, 2019; Kantor and Whalley, 2019; Garin and Rothbaum, 2022; Juhász, Lane, Oehlsen and Pérez, 2022; Lane, 2023; Choi and Levchenko, 2024).

We also contribute to research examining how institutions and market structure in international trade affect resource allocation (Khandelwal, Schott and Wei, 2013) and firm behavior (e.g., Bernard, Redding and Schott, 2011), particularly in the presence of policy uncertainty (Pierce and Schott, 2016). This literature has so far mostly focused on the role of tariffs, while in contrast we focus on the supply of trade financing from an export credit agency in a developed economy.[2] We show that policies alleviating financing frictions can have first-order effects on economic activity in the tradable sector, just like tariffs, with these effects being particularly pronounced for trade with destinations that private firms perceive as risky (Hassan, Schreger, Schwedeler and Tahoun, 2023). This suggests that export credit agencies play a crucial role in overcoming market frictions in international trade, especially where private markets are most constrained.

Second, we contribute to the empirical literature on finance and trade. Existing work has primarily focused on how changes in the provision of private credit affects firms' export activity (e.g., Amiti and Weinstein, 2011; Paravisini, Rappoport, Schnabl and Wolfenzon, 2014; Demir,

[2]Recent papers on the role of tariffs include Amiti, Redding and Weinstein (2019); Fajgelbaum, Goldberg, Kennedy and Khandelwal (2019); Costinot, Rodriguez-Clare and Werning (2020); Cox (2022); Antras, Fort, Gutiérrez and Tintelnot (2024); Handley, Kamal and Monarch (2024). See also the literature reviewed in Harrison and Rodriguez-Clare (2010).

Michalski and Ors, 2017; Xu, 2022; Beaumont and Lenoir, 2023; Friedrich and Zator, 2023; Bruno and Shin, 2023), and how banking networks can affect trade patterns (Michalski and Ors, 2012; Niepmann and Schmidt-Eisenlohr, 2017*a*,*b*; Xu and Yang, 2024).[3]

Our paper contributes to this literature in two ways. First, we examine a shock specific to trade financing rather than an all-encompassing credit supply shock. We can therefore identify the effect of trade financing on firm activity separately from a broader effect of changes in financing frictions that would affect firm production in general, and by extension, its exporting behavior. Second, our context focuses on the role of government-backed export credit and assesses both its impact on average firm outcomes as well as the allocation of capital.

We also relate to the literature studying the real effects of export credit agencies and their provision of trade financing on firms. Existing work has almost entirely relied on firm-level correlations between exports and subsidized credit, investigating the case studies of, among others, Germany (Felbermayr and Yalcin, 2013; Heiland and Yalcin, 2021), Austria (Badinger and Url, 2013), Pakistan (Zia, 2008; Defever, Riaño and Varela, 2020), and Korea (Hur and Yoon, 2022).[4] In contrast to these studies, the natural experiment of EXIM's shutdown allows us to estimate the causal effect of export credit agency support in an economy with a well-developed capital market and lower risk of political capture. Our results also indicate that export credit subsidies can have first-order effects on *firms*, particularly when they were plausibly financially constrained.

Kurban (2022) and Benmelech and Monteiro (2023) study the US EXIM bank, where the former compares US exports across US industries and finds that EXIM positively impacted exports, while the latter provides a case study on Boeing in relation to one of the four EXIM programs.[5] Relative to these papers, we make three contributions. First, we study the allocative effect of EXIM's shutdown both in the aggregate and at the firm level under milder identifying assumptions, which allows us to provide clean estimates of the causal effect of EXIM. Second, we study how EXIM affects both the average firm and average industry, and we also analyze its distributional effect and provide theoretically-grounded estimates of its impact on misallocation. Third, we develop a general framework backed by empirical evidence to assess whether and why ECAs can have a positive effect on aggregate output.

Finally, our paper relates to recent work on trade and misallocation, where our contribution is to show how a policy focused on trade impacts misallocation in the economy more broadly

[3]An earlier literature studied how external finance dependence affects exports, in particular by relying on the Rajan and Zingales (1998) measure of "external finance dependence." For surveys of this literature, see Foley and Manova (2015) and Leibovici, Szkup and Kohn (2022).

[4]Zia (2008) and Agarwal et al. (2023) are exceptions that provide causal evidence on the role of export credit programs in Pakistan and Sweden respectively. Zia (2008) finds that the program affected publicly-listed firms' profit rates but not their investment, and that these firms were the main recipient of government support, suggesting that there was more capital misallocation due to "political capture." Agarwal et al. (2023) uses a regression discontinuity design on a marketing campaign of the Swedish ECA and finds a positive effect on exports.

[5]Our results are quantitatively identical when we remove Boeing.

(e.g., Khandelwal, Schott and Wei, 2013; Edmond, Midrigan and Xu, 2015; De Loecker, Goldberg, Khandelwal and Pavcnik, 2016; Brooks and Dovis, 2020; Berthou, Chung, Manova and Bragard, 2020; Finlay, 2021; Bai, Jin and Lu, 2024). Because ECAs can lower misallocation by reducing financing frictions, we contribute to the literature on financial frictions and misallocation, which shows theoretically how these frictions lead to capital misallocation (e.g., Buera, Kaboski and Shin, 2011; Midrigan and Xu, 2014; Moll, 2014), and empirically how government interventions can mitigate it (e.g., Bau and Matray, 2023).

2 Institutional Context and Theory

This section discusses the importance of financing for export sales and the role of export credit agencies in supplying trade financing. We provide an overview of the Export-Import Bank of the United States (EXIM) and its shutdown from 2015–2019. We also discuss a theoretical framework for how ECA financing impacts firm investment decisions.

2.1 Importance of Financing for Trade

Working capital necessity and default risk. Firms need working capital between the time they pay for their inputs and the time they receive payment from their buyers for final goods sold. This need is financed either by the customer (if the product is paid in advance) or by the supplier (if it is paid upon receipt). In each case, the party that extends the financing bears counterparty payment default risk. If the buyer provides trade credit, it bears the risk that the seller may deliver a flawed product or no product at all. If the seller does, it bears the risk that the buyer will not pay after receiving the goods.

Export sales are transactions with distant counterparties operating in different legal jurisdictions. We refer to "trade financing" as the overall financing needed for an export sale to occur. Relative to domestic sales, (international) trade financing entails both a higher need for working capital as well as higher expected costs of customer default.

The higher working capital need arises from the longer time lag between the time when goods are shipped and when they are received and paid for relative to domestic sales (Feenstra, Li and Yu, 2013). The higher expected cost of default is due both to the probability of default being potentially higher (for instance because of heightened asymmetric information) and to loss recovery being more difficult across different legal jurisdictions. Schmidt-Eisenlohr (2013) and Antras and Foley (2015) provide models of cross-border contractual frictions and how they impact international trade financing arrangements.

Role for financial intermediaries. Firms can obtain capital for their trade financing needs by either self-financing with cash reserves or by borrowing externally. If firms have sufficient cash reserves, they can self-finance during the production-shipment phase and absorb the costs of default when it occurs. However, perpetually maintaining a sufficiently high cash buffer to cover trade financing needs is prohibitively costly for most firms. The lack of cash reserves for self-financing generates a role for financial intermediaries, reinforced by the fact that these financial intermediaries may be able to provide financing at a lower cost than firms' cost of capital.

Frictional financial markets. In the presence of contractual frictions, or if the banking market is not competitive, a firm may be financially constrained. For concreteness, we consider two specific types of frictions.

First, standard *firm-specific contractual frictions* between banks and firms arising from asymmetric information (e.g., Stiglitz and Weiss, 1981; Holmstrom and Tirole, 1997) or incomplete contracts that prevent firms from pledging future cash flows (Banerjee and Newman, 1993) would cause banks to optimally ration their credit supply in order to maximize expected profits.

Second, *importer-specific frictions*, which can be specific to particular foreign customers or the destination country overall, could emerge for two reasons: (i) higher asymmetric information and different contractual environments; and (ii) higher markups charged by banks with market power.[6] Both cases would also lead banks to optimally reduce the quantity of credit they supply. In the first case, constraining quantities lowers the default probability by satisfying the incentive compatibility constraint, and in the second case, it increases the profitability of each unit of capital lent.

2.1.1 Export Credit Agencies

Export credit agencies (ECAs) are public or quasi-public institutions that act on behalf of national governments to provide trade financing to firms in order to promote exporting. They are widespread across the world: we identify over one hundred active ECAs that operate in countries that account for 92% of the value of world exports. We provide more details on ECAs in Appendix D.1.

Role of ECAs. ECAs relax the constraints on financing exports through two primary types of products: loans and insurance. The first type of product takes the form of either direct loans or loan guarantees, which can be extended to either the exporter or the importer. A direct loan addresses working capital needs while a loan guarantee is issued in conjunction with a commercial bank in which an ECA's role is to guarantee payment in the case of borrower default. By significantly

[6] Bank market power in this setting is likely higher than in the domestic credit market because of the costly fixed cost investment and knowledge necessary to finance international trade. Indeed, banks often need trusted international correspondents or subsidiaries and knowledge of their counterparties' credit and legal environment, in addition to being able to comply with international regulations that impose costly additional layers of due diligence and oversight. In the case of default, banks engage in costly contractual enforcement across borders. A natural outcome of high and heterogeneous fixed costs would be a market that is heavily concentrated and dominated by a few large banks, as is observed empirically (Niepmann and Schmidt-Eisenlohr, 2017*a*; Paravisini, Rappoport and Schnabl, 2023).

reducing the riskiness of the loan, guarantees reduce the cost of borrowing or make it possible for a loan to be extended at all.

Economically, ECA financing reduces financing frictions overall, regardless of whether the exporter or importer formally receives it. When financing is extended to the exporter, the ECA directly relaxes the seller's financing constraint, which allows it to indirectly relax the buyer's constraint. When the importer receives the financing, the ECA financing relaxes the buyer's constraint, which allows it to implicitly extend financing to the exporter and indirectly relax the exporter's constraint. In both cases, ECA financing alleviates the frictions that prevented the profitable international transaction from occurring.

The second type of product is insurance, primarily issued for payment default by the importer. By reducing the expected cost of defaulting on an exports sale, an ECA lowers the bank's required return on extending credit to an exporter. The insurance product is typically extended to the exporting firm, and the price of insurance reflects the recovery rate net of cost.

2.1.2 EXIM's Implementation Framework and Institutional Design

Established during the New Deal, the Export-Import Bank of the United States is the country's official export credit agency, and its mandate is to support jobs in the US through export financing.[7] We highlight the main elements of EXIM that are important for our analysis here, and we provide an in-depth discussion of its institutional background in Appendix D.2.

Market role and positioning.

- Market segmentation: Its core business model centers on providing financing in markets where private lenders are "unable or unwilling" to operate.[8] One of the key eligibility requirements is that the *firm has not secured trade financing on the private market.*

  This operating model means that EXIM is a complementary financing source rather than a competitor to private financial institutions. The market segmentation precludes EXIM from "cream skimming" the market for trade financing.

Operational constraints. EXIM also operates under a unique set of constraints that distinguish it from both private banks and typical government agencies.

- Profitability requirements: International organizations like the OECD and WTO as well as domestic US federal law require that EXIM operates profitably, i.e., at a price above its own

[7]EXIM's initial mission in 1934 was to support both exports and imports. The bank subsequently focused on exports, although the name remained unchanged. We analyze EXIM's role in its modern incarnation as a source of export financing.

[8]We outline the different products offered by EXIM in detail in Appendix D.2.2.

marginal cost (Appendix D.1). EXIM charges interest on loans and fees on insurance and guarantees to offset the expected cost of default, the cost of borrowing from the US Treasury, and other operational expenses.[9]

In addition, since XX, EXIM has operated with a strict cap on of XX% on its default rate.[10] The default rate is defined as the value in default (counting late payments and renegotiations) relative to total authorizations at any given time. Breaching the default rate cap causes the bank to be immediately and fully shut down by Congress.

EXIM appears to have successfully operated within these constraints and has returned an average annual profit of $50 million to the US government in our sample period.

- Fixed lending capacity: Unlike a regular bank, EXIM cannot accumulate its profits in reserves to expand its activity over time. Every year, it submits justifications for its budget, which must be approved by the President and Congress. Its budget allocation, which is held in an account at the Treasury, finances the subsequent year's activity. This political process means that EXIM operates with an extreme form of "balance sheet constraints" that reflects the budgeting process rather than investment opportunities.

Institutional advantages. As a government agency, EXIM also has access to diversification and recovery technologies that the private sector does not have.

- Risk coverage capabilities: EXIM provides comprehensive trade insurance that covers both commercial and political risks, and in particular includes coverage that is explicitly excluded from private contracts. This primarily includes country-level risks such as regime changes, capital controls, military events, or natural disasters. In addition, EXIM's coverage tends to have longer terms and higher coverage percentages.

- Enforcement & recovery capabilities: EXIM has access to loss recovery technologies that the private sector does not have. For example, it can participate in Paris Club negotiations for sovereign debt restructuring, which allows it to convert commercial claims into sovereign obligations. It also has the ability to declare defaults on sovereign obligations and to coordinate with other government agencies to pursue claims. Legally, EXIM has standing in international courts and thus can pursue claims against debtor assets in foreign jurisdictions and has authority to seize those assets if necessary.

[9]EXIM does not receive a subsidy on its cost of borrowing: it pays a higher interest rate to the Treasury than the 30-year Treasury bond rate, which is the US government's cost of long-term borrowing. The 30-year rate is also substantially higher than the deposit and wholesale funding rates that banks pay to raise funds.

[10]During the Covid pandemic beginning 2020, the default rate cap was temporarily raised to 4%.

Takeaway. EXIM is designed to fund profitable but liquidity-constrained export projects, particularly in markets where exporters face financial barriers.

2.1.3 The 2015 Shutdown of EXIM's Operations

Two events in July 2015 led to a significant disruption in EXIM's operations. First, on July 1st, EXIM's charter, which requires periodic re-authorization by Congress, was allowed to lapse for the first time since the agency's inception in 1934. Second, on July 20th, the Bank's board of directors lost its quorum, which was necessary for most of EXIM's activities.[11]

The lapse in EXIM's charter was primarily caused by a political dispute in the highly polarized environment following the 2012 Presidential election and the 2014 midterm elections. EXIM's lack of board quorum, which lasted for much longer than the initial shutdown, was led by Republican Richard Shelby, the chair of the Senate Banking Committee at the time, opposing all nominees for EXIM board positions during the second Obama Administration. An article in the New York Times on February 2016 described Shelby as having the "distinction of running the only committee in the Senate that has not acted on a single nominee in this Congress."[12] While Congress re-authorized EXIM's charter on December 4th, 2015, the board quorum was not restored until May 8th, 2019. We provide more details in Appendix D.2.3.

The lapse of EXIM's charter and the lack of board quorum had dramatic consequences on the agency's ability to provide financing after July 2015, as shown in Figure 1.

2.2 Theoretical Predictions

In Appendix XX, we develop a one-period model in which firms maximize their profits from foreign sales by choosing their capital investment for exporting, financed through private market and/or ECA debt. The model generates predictions on how firm investment and profit rates respond to changes in the supply of trade financing from export credit agencies.

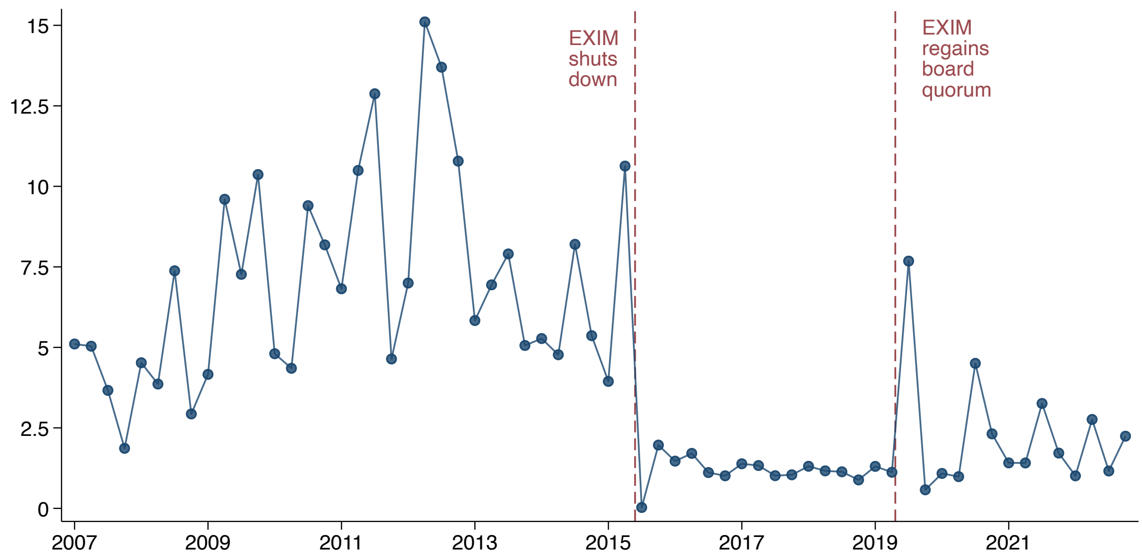
The key intuition is that if ECAs offer financing at a lower cost than the market, financially unconstrained firms will not expand but will instead treat the subsidized financing as a windfall, increasing their profit rates. In contrast, constrained firms will use ECA financing to expand until they become unconstrained.

From this framework, we derive several empirical predictions. First, access to ECA financing increases firm size only if firms are constrained in their exporting activity; otherwise, there is no causal impact on investment. Second, when firms are unconstrained and ECA financing is infra-

[11] EXIM board members serve a pre-determined term. Potential board members are nominated by the President, assessed by the Senate Banking Committee, and brought to the full Senate for a vote.

[12] https://www.nytimes.com/2016/02/24/us/politics/anxious-for-re-election-senator-richard-shelby-refuses-to-act-on-banking-nominations.html

Figure 1: EXIM's Supply of Trade Financing



Notes: This figure plots the quarterly amount of new trade financing issued by EXIM in $ billions and shows the effect of EXIM's temporary shutdown and lack of board quorum.

marginal, profit rates will rise while if firms are constrained and ECA financing is more expensive than private alternatives, profit rates will decline.

3 Data and Empirical Strategy

3.1 Data

We use four main data sources: (1) loan authorizations by EXIM; (2) an annual panel of origin country-by-product-by-destination country exports; (3) firm-level transaction-level (product-by-destination) export data from Datamyne; (4) firm-level variables from various sources including balance sheets and outcomes from Compusta.

EXIM authorization data. We use comprehensive records of EXIM loan authorizations and disbursements originating from 2007 to 2022, obtained from a FOIA request. These records include the date of authorization, the amount disbursed, the export product, and the exporting firm. Products are reported at the NAICS-4 level so we convert to HS-4 using the concordances provided by Pierce and Schott (2012).

Aggregate product export data. We construct a panel of bilateral trade flows at the origin-destination-product-year level. We use the trade flows reported in BACI (Gaulier and Zignago, 2010), which cleans and accounts for irregularities in the raw COMTRADE bilateral trade data. We define products at the HS-6 digit level, which contains 5,047 distinct products, exported to 220 distinct destinations. We use a time-consistent definition of products from the 2007 vintage in order to account for updates to product classifications.

Firm export data. We measure exports at the firm level using data from Datamyne, a private vendor that collects and cleans maritime bills of lading.[13] We hand-match firms in Datamyne to EXIM's loan portfolio using company names combined with information on the firms' location and types of exports (see Appendix C.1 for more details). Datamyne provides detailed information on individual shipments, including product codes, destination countries, and the weight of the shipped products (see Appendix C.4 for more details).

Firm data. We measure outcomes for publicly listed firms incorporated and located in the US, which we observe in Compustat. We restrict ourselves to non-financial, non-governmental US firms with positive assets and revenues.

We hand-match firms in Compustat to EXIM's authorizations using the firm's name, address, and product industry. Publicly listed firms account for around half of the value of authorizations. From Compustat, we take real outcomes such as overall firm size (total assets), employment, capital, and total sales (the sum of all domestic and foreign sales), and financial measures such as leverage and return on assets. We provide a detailed description of the cleaning and definition of the variables in Appendices C.1, C.2, and C.3.

In order to identify whether a firm is an exporter, in addition to maritime exports, we use three proxies. First, in Compustat historical segment data, we flag firms that report non-domestic sales in the geographic segment data. Second, from Hoberg and Moon (2017), we identify firms that report international activities in their 10-Ks. Third, we flag firms that report positive taxes on foreign income.

We measure lobbying activity using LobbyView (Kim, 2018) and use the firm identifier to match this information to Compustat.

Table 1 reports descriptive statistics for the matched firm level dataset covering 2010–2019. 5.2% of our firm-year observations are from firms that received EXIM financing before the shutdown. The average firm has revenues of $3.9 billion; one quarter of those sales are generated abroad.

3.2 Identification Strategy

3.2.1 Aggregate Exports

We study whether EXIM creates net trade for the US using aggregate customs data where we specify that exporting activity evolves in the following way:

$$Y_{p,o,d,t} = \beta EXIM_{p,o} \times Post_t + \theta_{p,o,d} + \gamma_{p,d,t} + \delta_{o,t} + \varepsilon_{p,o,d,t} \tag{1}$$

[13]These data have previously been used by Cavallo, Gopinath, Neiman and Tang (2021) and Lashkaripour and Lugovskyy (2022), among others.

Table 1: Summary Statistics

	Mean	Std. Dev.	p25	Median	p75
EXIM	0.05	0.22	0.00	0.00	0.00
Exporter	0.73	0.44	0.00	1.00	1.00
Total revenues	3,946.31	17,142.27	49.62	430.18	2,085.41
Employees	12.29	56.94	0.16	1.37	7.08
Tangible Capital	2,720.56	15,032.01	17.93	172.72	1,040.00
Intangible Capital	2,483.42	11,337.79	43.25	243.15	1,123.51
Total assets	4,754.64	19,424.28	68.31	489.75	2,360.14
Share foreign sales	0.26	0.28	0.00	0.17	0.45
MRPK	4.28	5.02	1.14	2.51	4.91
Profit margin	-0.45	1.58	-0.05	0.06	0.13
ROA	-0.05	0.29	-0.05	0.06	0.11
Dividend intensity	0.11	3.26	0.00	0.00	0.11
Leverage	0.29	0.29	0.03	0.22	0.44
Observations	28,468				

Notes: This table presents summary statistics for the main firm sample. The EXIM indicator variable takes the value of 1 if a firm was supported by an EXIM loan before the lapse in its authorization (July 1st 2015). Total revenues, Employees, Tangible Capital, Intangible Capital, and Total assets are reported in thousands. Profit margin is operating income (income before extraordinary items plus depreciation and amortization) over total revenues. ROA is EBITDA over assets. Dividend intensity is dividends over EBITDA. Leverage is long-term debt plus debt in current liabilities divided by total assets. Variables that are calculated as ratios are winsorized at the 5% level.

where $Y_{p,o,d,t}$ is the value of exports of product p, originating from country o, to destination country d, at time t. To account for the possibility of exporters, destinations, and products systematically differing in unobserved ways, we include the vector of fixed effects $\theta_{p,o,d}$, which is the unit of observation each period, to remove all level differences across origin-destination countries and products. $\gamma_{p,d,t}$ absorbs demand shocks for product-destinations and $\delta_{o,t}$ accounts for exporting country supply shocks. β captures the evolution of exports for treated versus control units within an exporter-product-destination cell, i.e., its cumulative change relative to the pre-period.

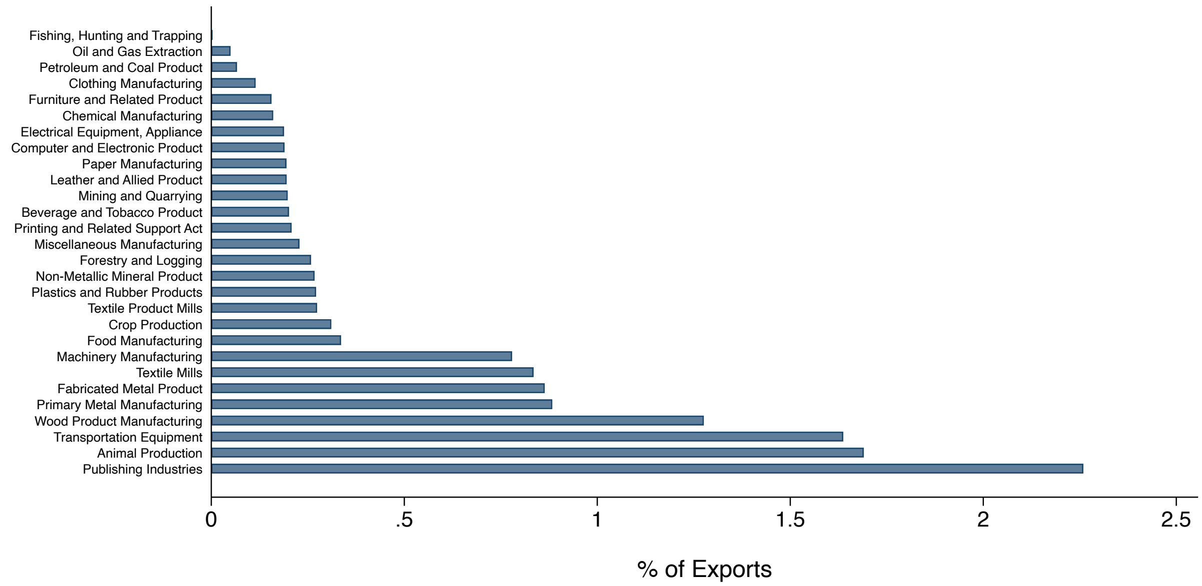
Estimating the impact of EXIM support on exports aggregated at the origin-product level means that β captures the total effect after accounting for any potential business stealing between EXIM-backed and non-EXIM-backed firms. β therefore reflects the policy object of interest, which is total exports net of market share reallocation.

EXIM dependency $EXIM_{p,o}$ is defined as the average amount of EXIM trade financing a product received over 2007–2010, scaled by export flows in that product. Since EXIM is a US institution, $EXIM_{p,o}$ is by definition always equal to zero for non-US exporters ($EXIM_{i,US,t} = 0$ for $o \neq US$). Formally, $EXIM_{p,o} = \sum_{t=2007}^{2010} \sum_{i \in p} EXIM_{i,US,t} \Big/ \sum_{t=2007}^{2010} Export_{p,US,t}$ where i denotes an individual EXIM loan and p denotes an HS-4 product.

The collapse of EXIM financing during the shutdown means that the ex-ante cross-sectional variation in EXIM dependency ($EXIM_{p,o}$) captures the drop in the supply of EXIM financing to each product.[14] One attractive feature of this construction is that it is plausibly exogeneous

[14] As explained in Section 2.1.1, EXIM predominantly provides two broad types of financial products: loans and

Figure 2: EXIM Financing Intensity By Industry (%)



Notes: This figure plots the intensity of EXIM support (EXIM financing in dollars scaled by US exports in dollars) at the NAICS-3 level for all industries that received at least one dollar from EXIM over the period 2007–2010. In Appendix Figure C.1, we plot the distribution at the NAICS 4-digit level, which we convert into HS-4, that we use for the estimation.

to export dynamics after 2015 that are not directly related to EXIM dependency. We plot the distribution of treatment intensity across 3-digit industries in Figure 2, which shows the substantial variation across sectors.

Our estimation includes the relevant control group of countries o that have similar export patterns to the US (e.g., Autor, Dorn and Hanson, 2013; Hombert and Matray, 2017), and that do not rely on EXIM.[15] By including trade flows from these countries, we are able to tightly control for unobserved demand shocks by including product-destination-year fixed effects ($\gamma_{p,d,t}$) and exporter supply shocks by including origin-year fixed effects ($\delta_{o,t}$).

We estimate equation (1) using a specification in first differences:

$$\Delta Y_{p,o,d,t} = \beta EXIM_{p,o} \times Post_t + \gamma_{p,d,t} + \delta_{o,t} + \varepsilon_{p,o,d,t} \tag{2}$$

where $\Delta Y_{p,o,d,t}$ is now the *change* of exports relative to a reference year, which we choose to be 2014, the year prior to the shutdown. The only difference between equations (1) and (2) is that since we

insurance. The variable $EXIM_{p,o}$ measures the total effect of EXIM trade financing coming from both types of products. While it is theoretically possible to estimate the impact of each EXIM program separately, doing so would require having as many instruments as EXIM programs. Given that in practice firms often received financing under both types of programs, it is likely that even firms that were only financed under one program prior to 2015 would have obtained financing under another program if the shutdown did not happen. In Appendix Table A.6, we show that the estimated effects are very similar for each type of support, although for the reasons discussed, we do not interpret these as separate mechanisms.

[15]The list includes: Australia, Denmark, Finland, Germany, the UK, Japan, New Zealand, Spain, and Switzerland. Appendix Table A.1 provides robustness when we define similar countries based on their export patterns prior to 2014 by using the cosine similarity of the vector of their export market shares across product-destinations.

are using the first difference operator, the time invariant exporter-product-destination fixed effects ($\theta_{p,o,d}$) from equation (1) no longer need to be included. All the other fixed effects remain since they are time-varying. We cluster standard errors at the HS-4 product level, which is the level of the shock (Cameron and Miller, 2015).

We unpack the average DID coefficient β from equation (2) with an event study specification that estimates the effect of $EXIM_{p,o}$ every year relative to the omitted year (2014):

$$\Delta Y_{p,o,d,t} = \beta_t EXIM_{p,o} + \gamma_{p,d,t} + \delta_{o,t} + \varepsilon_{p,o,d,t} \tag{3}$$

Accommodating entry and exit in the trade data. Trade data exhibits substantial entry and exit at the market (destination-product) level. These changes on the extensive margin, which appear as zeroes on the intensive margin, raise challenges when estimating regressions in a balanced panel with a log transformation of trade flows.[16]

The trade literature has therefore relied either on estimating the intensive and extensive margins separately (e.g., Roberts and Tybout, 1997), or on using non-linear count estimators like poisson (e.g., Silva and Tenreyro, 2006). However, such estimations are unable to deliver the full elasticity (in the case of estimating results on the intensive and extensive margin separately), or they do not allow for aggregation or decomposition along different margins (in the case of non-linear estimators). As a result, these approaches do not make it possible to directly compare the relative magnitudes of the intensive and extensive margin effects.

We overcome these challenges by following the methodology introduced by Beaumont, Matray and Xu (2024) that shows the aggregation properties of the midpoint growth rate in the context of trade data. In order to handle entry and exit in a well-defined manner that ensures this aggregation property, we create a balanced panel including every export market (product-destination) that is present at any point during the sample period, and we fill missing observations, which reflect changes to the extensive margin, with zero. We then compute the dependent variable $\Delta Y_{p,o,d,t}$ as:

$$\Delta Y_{p,o,d,t} = \frac{Y_{p,o,d,t} - Y_{p,o,d,t=2014}}{[Y_{p,o,d,t} + Y_{p,o,d,t=2014}] \times 0.5}$$

The midpoint growth specification has two important and appealing properties.[17] First, it handles entry and exit of markets without relying on ad hoc transformations of the log function, or on other non-linear estimators. Second, it ensures that the coefficients at the origin-product-

[16] While transformations of the log function have been used to accommodate zeros (e.g., log(x+1) or the arcsin-log function), they can lead to biased estimates because they are sensitive to small variations around zero and are not invariant to the unit measurements for a value (Cohn, Liu and Wardlaw, 2022; Chen and Roth, 2024).

[17] Fonseca and Matray (2024) provides a detailed explanation and an application to firm entry and exit across cities and industries.

destination level aggregate exactly to any higher level, as long as correct weights are used, which is not possible with non-linear functions.[18] This second property makes it possible to estimate how a shock affects the aggregate growth of the LHS variable, and it explicitly shows how control variables that are possible to include at more disaggregate levels of observation impact estimated coefficients at higher levels.

Identifying assumptions and threats to identification. Our identifying assumption is that products that received more EXIM financing in the pre-period were not subsequently differentially exposed to unobserved shocks specific to the US that are correlated with a product's EXIM dependency, conditional on the rich set of fixed effects. This identifying assumption does not require random assignment of EXIM financing, nor does it require that products have similar characteristics in levels. Rather, we rely on the standard parallel trends assumption that outcomes for treated and control exporters of specific products would have trended similarly absent the shutdown.

We can visually assess the plausibility of the parallel trend assumption using event study estimates with the sequential addition of controls. The lack of differential trends prior to EXIM's shutdown would indicate that any unobserved differences correlated with EXIM financing that could be confounding our estimates needed to have been irrelevant before 2015 (otherwise we would observe pre-trends) and only to have mattered afterwards.

A threat to identification in the baseline equation with no additional fixed effects would be that products that receive more EXIM financing face demand shocks or changes in the risks exporters face when selling to specific countries. For example, a country may levy a tariff on products that receive more EXIM financing in the US. An important advantage of the bilateral trade data is that it allows us to control finely for such confounders (which would be absorbed by $\gamma_{p,d,t}$) so that we only compare the exports of the same HS-6 product to the same destination at the same time. Differences in the estimated β with and without these controls are informative about the extent to which such unobserved demand shocks might bias the estimate.

The remaining threat to identification is an unobserved shock to US products that correlates with EXIM exposure and occurs exactly when EXIM shuts down. Examples of such shocks would be a tariff that is levied specifically on US products but not on the same product from other developed countries, or a change in ECA financing from the other developed countries used in our control groups that is not caused by EXIM's shutdown, but which still correlates with the distribution of US products receiving EXIM financing. It is worth noting, however, that our estimates remain causally valid even if other countries adjust their ECA financing in response to EXIM's shutdown

[18]This property is made possible by weighting the regression with the denominator of the midpoint to recover the aggregate growth, or by defining weights as the share of the denominator in a higher level cell. To be precise, what we mean by "aggregate" is not the general equilibrium effect of a shock, but simply how a micro shock shows up in the overall rate at the economy-wide level.

(e.g., through strategic competition). In those cases, β_t captures the total causal effect of EXIM's shutdown operating through two channels: the first direct effect of tightening US exporters' financial constraints, and the second indirect effect of inducing strategic responses from foreign competitors.

Including a US-product-by-year fixed effect relaxes the identifying assumption and narrows our analysis to capturing the first direct impact of EXIM's shutdown. While that is not possible with country-by-industry level data, the firm-level bilateral exports analysis that we outline in the next section has within-industry variation and allows us to fully saturate the specification with exporter-by-product-by-destination-by-year fixed effects, which absorbs all unobserved demand shocks that are specific to US exporters. Product-level policy changes by other countries (not implemented in direct response to EXIM's shutdown) are accounted for in this specification. Identification is achieved by comparing exposed and unexposed US firms exporting the same product to the same destination. In our analysis of overall firm-level effects, we can include industry-by-year fixed effects to similarly absorb the threat to identification in the industry-level analysis.

3.2.2 Firm-level Effects

At the firm level, we estimate regressions of the following form:

$$\Delta Y_{i,j,t} = \beta EXIM_i \times Post_t + \gamma_{j,t} + Exporter_{i,t_0} \times \delta_t + X_{i,t_0} \times \delta_t + \varepsilon_{i,j,t} \tag{4}$$

where $\Delta Y_{i,j,t}$ is the growth rate of various firm outcomes for firm i in industry j at time t relative to the year 2014.[19] $EXIM_i$ is an indicator variable that takes the value one if firm i received trade financing from EXIM during the pre-shutdown period. β captures the semi-elasticity of firm outcomes to the supply of EXIM trade financing. It is estimated by comparing outcomes for firms that relied on EXIM financing relative to firms that did not, during the post-shutdown period relative to the pre-shutdown period.

The event study version is estimated using the following specification:

$$\Delta Y_{i,j,t} = \beta_t EXIM_i + \gamma_{j,t} + Exporter_{i,t_0} \times \delta_t + X_{i,t_0} \times \delta_t + \varepsilon_{i,j,t} \tag{5}$$

As in equation (2), we do not include time invariant unit fixed effects (firms in this case) because the dependent variables are measured in differences. This strategy ensures that we remove time-invariant heterogeneity across firms, and in particular accounts for possible ex-ante differences in characteristics between treated and control firms. Industry-by-year fixed effects $\gamma_{j,t}$ restrict the

[19]Since we work at the firm level and study the effect of EXIM on within-firm changes, we do not need to accommodate entry and exit as we do with disaggregated trade data, and we therefore use a standard growth rate defined as $(Y_{i,t}\text{-}Y_{i,2014})/Y_{i,2014}$. All growth rates are winsorized at the 5% level. We show the results are very similar when we use the midpoint growth rate and when we winsorize outliers in different ways in Appendix Table A.8.

identifying variation to comparing firms within the same industry each period and controls for time-varying unobserved heterogeneity across industries, such as differences in industry cycles or shocks correlated with industry-level EXIM exposure.

$Exporter_{i,t_0}$ is an indicator variable that takes the value of one if firm i reported positive EXIM trade financing, foreign sales in Compustat Segment, exports in Datamyne, or taxable foreign income over the pre-shutdown period. $Exporter_{i,t_0} \times \delta_t$ restricts the identifying variation to exporting firms that would be eligible for EXIM financing and are similarly exposed to worldwide aggregate demand shocks. $X_{i,t_0} \times \delta_t$ is a vector of firm characteristics defined prior to 2014, where each characteristic is separately interacted with year fixed effects. We cluster standard errors at the level of the shock, which is firm-level.

The firm-level analysis also allows us to leverage an additional aspect of EXIM's institutional context following its initial full shutdown. During the period when EXIM lacked a quorum on its Board of Directors, it was not able to approve large transactions. We use this variation in loan size dependency within the set of EXIM-dependent firms, which additionally refines the comparison between control and treated groups.

Figure 3 shows that treated and control firms are very similar along most observable dimensions. We plot the average (normalized) differences and confidence intervals at the 95% and 99% levels for various observable ex-ante characteristics. These differences are estimated unconditionally, conditional on exporter fixed effects, and conditional on industry and exporter fixed effects.

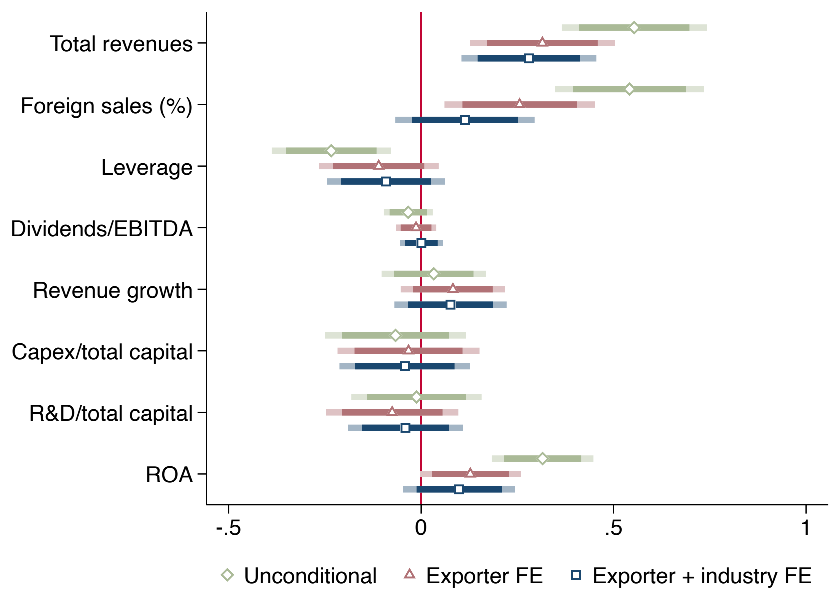
Unconditionally, treated and control firms are different, which is to be expected given that only exporters are eligible for EXIM support by definition. Once we include exporter fixed effects, the difference between treated and control firms for most variables is statistically insignificant at conventional levels (the red bars), with the exception of total revenues. Including industry fixed effects, as we do in our baseline specification, yields point estimates for the standardized differences that are almost equal to zero (the blue bars) and are well below the threshold for covariate balance of 0.20 recommended by Imbens and Rubin (2015).

Along the remaining significantly different dimension of firm size, treated and control firms still share a large overlap in size, which ensures that effects can be identified across firms of similar size. In addition, treated and control firms are similar in terms of the share of foreign sales, financing frictions proxied by their leverage and dividends intensity (defined as dividends over EBITDA). They also have similar growth rates of their sales and investment intensity (both in terms of physical investment and R&D), and they have similar ROA.

Identifying assumptions and threats to identification. Our identifying assumption is that there is no unobserved shock to EXIM-supported firms, conditional on the rich set of controls, that would impact their outcomes after 2015. As before, we do not need random assignment for EXIM support nor similarity in levels between EXIM backed and non-backed firms.

Our firm-level data also allow us to use a quarterly frequency to test whether the EXIM shutdown began to affect firms precisely in mid-2015, which helps to alleviate the concern that correlated shocks may particularly affect EXIM-dependent firms. We can also control for firms being in the same industry-geography and for a battery of additional firm characteristics (balance sheet characteristics, lobbying activities, government contract dependency), interacted with time fixed effects, which absorb the impact of unobserved shocks that are correlated with these characteristics. For example, the inclusion of total asset tercile-by-year fixed effects ensures that our coefficient of interest β_t is not driven by differences in time-varying unobserved shocks to smaller or larger firms, and controlling for firm lobbying behavior ensures that the effects are not due to a shock to the value of political connections.

Figure 3: Firm Covariate Balance



Notes: This figure shows coefficient estimates and 95% (darker bars) and 99% (lighter bars) confidence intervals of the difference between treated and control firms for different variables. All variables are normalized to have a mean of zero and a standard deviation of one, and ratios are winsorized at the 5% level. "Unconditional" refers to the sample comparing treated firms to all untreated firms without conditioning on any fixed effects. "Exporter" indicates that the firm has either received EXIM support, reported foreign sales in Compustat Segment, has positive exports in Datamyne, or reports taxable foreign income. "Industry" is defined at the SIC2 level.

4 Average Effects of EXIM's Shutdown

Our first set of results examines whether the supply of trade financing by EXIM is able to create additional trade for the US. In the aggregate, we find that EXIM's exit leads to a sizable decline in exports of products that received more financing prior to the shutdown. We then trace out the effect of this contraction in foreign sales to firms on their exports, total revenues, investment, and hiring decisions. We find that the shutdown had sizable negative impacts on firm real outcomes without affecting profit margins, consistent with EXIM financing shifting marginal decisions instead of being a profit windfall.

4.1 Average Effects of EXIM's Shutdown on Exports

We begin by estimating equation (2) at various levels of aggregation. We weight the regressions using the value of the denominator of the midpoint growth rate in the origin-product (HS-4)-year cell such that we capture the effect of EXIM shutdown on aggregate exports.[20]

Table 2 reports the results. Columns 1–3 demonstrate the aggregation property of the estimator developed in Beaumont, Matray and Xu (2024) and show that the estimated β recovers exactly the same point estimate and standard errors whether we work at the origin $\times$ (HS-4) product level, the origin $\times$ (HS-6) product level, or at the origin $\times$ (HS-6) product $\times$ destination level, as long as we include the same set of fixed effects, weight the regressions appropriately, and cluster standard errors correctly.[21]

Column 4 adds (HS-6) product $\times$ year fixed effects while column 5 adds (HS-6) product $\times$ destination $\times$ year fixed effects. In this last case, we identify the effect of EXIM's shutdown by comparing different origin countries exporting exactly the same product to the same country at the same time. The point estimate is stable and if anything slightly larger and more significant after controlling for market (destination-product) specific shocks (-4.49 in column 1 vs -5.13 in column 5). This result implies that the exposure to EXIM is uncorrelated with demand shocks or with market specific risk shifters.

Since both the dependent and the independent variables are scaled by dollars of exports, the coefficient on $EXIM_{p,o} \times Post_t$ has a straightforward interpretation as a dollar pass-through. The value of -4.49 means that a \$1 change in EXIM trade financing generates a change of -\$4.49 in total exports at the product level.

Finally, in column 6, we replace the continuous measure of EXIM exposure with a discretized measure. This allows us to weaken the identifying assumption behind our DID by (i) no longer assuming constant linear dose responses (Callaway and Sant'Anna, 2021), and by (ii) eliminating the impact of outliers in treatment values. We use 0.45% as a threshold, which approximately

[20] Due to the granularity of the distribution of export values, the law of large numbers may no longer apply, which creates an inference problem when using such weighting (see a discussion of this general problem for the broader applied macro literature in Chodorow-Reich (2020)). We address this issue by winsorizing the extreme values of the weights at 5%, and report the robustness of the results when we equal weight the data, winsorize at 1%, or use time-invariant weights in Appendix Table A.2.

[21] Weights in this case are computed in the following way: Define $A_{o,p,d,t} = (Y_{o,p,d,t} + Y_{o,p,d,t=pre}) \times 0.5$. At the origin×HS-6×destination×year, each cell is weighted by: $A_{o,hs6,t} \Big/ \left(\sum_{hs6 \in [o,hs4,t]} A_{o,hs6,t} \right)$. This guarantees that the equation provides an equal weighting at the origin×HS-4×year level. We then multiply this weight by $A_{o,p=hs4,t}$ to preserve the definition of β as measuring the effect of EXIM on aggregate exports. This last part does not affect the (dis-)aggregation property of our estimator.

corresponds to the top quartile of EXIM exposure in the distribution across US products.

Because the independent variable is now a dichotomous variable, the interpretation of the coefficient of interest becomes a semi-elasticity. The coefficient -0.061 implies that EXIM's shutdown reduces exports of products highly exposed to EXIM funding relative to less exposed products by 6.1%. The average EXIM support for the group of products with an exposure above 0.45% is approximately 1%, which implies an elasticity of -6.2 (-6.1%/1%). Econometrically, the similarity in magnitude with our estimate of -5.13 (column 5) means that the assumption of a linear effect of the dosage treatment is reasonable, but if anything underestimates the true effect of the effect of EXIM's shutdown on total exports.

Table 2: Impact on US Product Exports

Dependent variable	Exports					
Level of aggregation	HS-4	HS-6	HS-6×Destination	HS-6×Destination		
	(1)	(2)	(3)	(4)	(5)	(6)
$\text{EXIM}_{p,o} \times \text{Post}_t$	-4.49	-4.49	-4.49	-4.20	-5.13	
	(1.60)	(1.60)	(1.60)	(1.67)	(2.28)	
	[0.0050]	[0.0050]	[0.0050]	[0.012]	[0.024]	
$\text{EXIM}_{p,o} \geq 0.45\% \times \text{Post}_t$						-0.061
						(0.019)
						[0.0017]
Fixed Effects						
Origin×Year	✓	✓	✓	✓	✓	✓
Product (4-digit)×Year	✓	✓	✓	—	—	—
Product (6-digit)×Year	—	—	—	✓	—	—
Product (6-digit)×Destination×Year	—	—	—	—	✓	✓
Observations	109,208	8,541,850	24,143,761	24,143,761	24,143,761	24,143,761

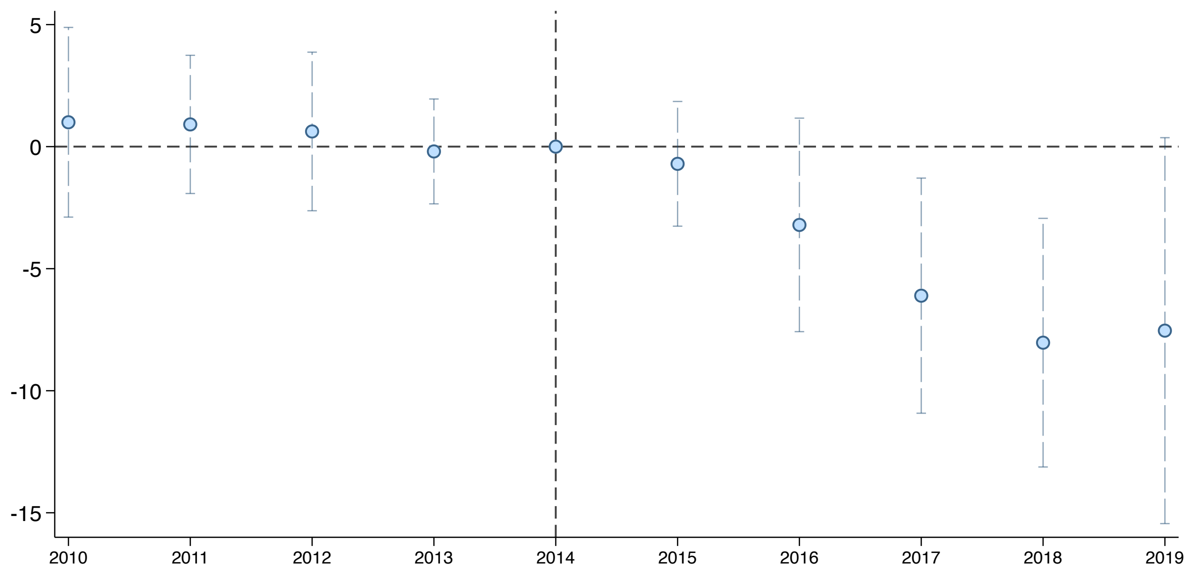
Notes: This table reports estimates on the effect of EXIM's shutdown on aggregate exports at the product-by-destination level taken from BACI. The dependent variable is the exports growth rate of origin country o (exporter) to destination country d (importer) of product p at time t relative to 2014 (the year prior to the shock), and is defined as $\Delta Y_{p,o,d,t} = (Y_{p,o,d,t} - Y_{p,o,d,2014})/[(Y_{p,o,d,t} + Y_{p,o,d,2014}) \times 0.5]$. The sample includes a control group of other exporter countries o with similar export patterns as the US. EXIM intensity (EXIM_{po}) in columns 1-5 is defined as the total amount of EXIM (in \$) over total exports (in \$) over the period 2007–2010. In column 6, $\text{EXIM}_{po} \geq 0.45\%$ is an indicator variable for a product being in the top quartile of treatment value. In columns 1–3, the coefficients and standard errors are identical by construction of the midpoint growth estimator (Beaumont, Matray and Xu, 2024). Standard errors are clustered at the HS-4 level and are reported in the line below the point estimate in parenthesis, and p-values are reported in brackets below them.

In Figure 4, we plot the yearly point estimate and the 95% confidence intervals of the annual event study. Consistent with the identifying assumption, we find an absence of differential pre-trends prior to the shock, and a progressive decline throughout the period of EXIM's shutdown, with only a slight reduction in the gap in the last year, when EXIM regains its full status.

Our specification tightly controls for product-by-destination (time-varying) demand shocks that might be correlated with EXIM's shutdown, as long as such demand shocks are not also exporter-by-product specific. An example of such a shock would be tariffs levied specifically on products from the US that also normally receive EXIM trade financing.

We think such a demand shock is unlikely to explain our results for three reasons. First, the "tariff trade war" between China and the US did not begin until 2018, well after the exports of EXIM-dependent products start to decline (Figure 4). Second, in Appendix Figure B.1 we plot the distribution of point estimates and t-stats from a series of 173 distinct regressions where we remove each 3-digit product one-by-one. The tight distribution of point estimates around the average effect we report in Table 2 implies that the results are not driven by a few products, which is inconsistent with certain products being both affected by specific demand shocks and by EXIM's shutdown. Third, our firm-level evidence where we study the effect of EXIM *within* US exporters shipping the same product to the same destination (Table 4) directly addresses this possibility.

Figure 4: Event Study of Impact of EXIM's Shutdown on US Product Exports



Notes: This figure plots the point estimates and 95% confidence intervals of the effect of EXIM's shutdown on aggregate exports at the (6-digit) HS-by-destination level from the event study defined in equation (3) with product-destination-year and origin country-year fixed effects. The dependent variable is the exports growth rate of origin country o (exporter) to destination country d (importer) of product p at time t relative to 2014 (the year prior to the shock), and is defined as $\Delta Y_{p,o,d,t} = (Y_{p,o,d,t} - Y_{p,o,d,2014})/[(Y_{p,o,d,t} + Y_{p,o,d,2014}) \times 0.5]$. The sample includes a control group of other exporter countries o with similar export patterns as the US. EXIM intensity (EXIM_{po}) is defined as the total amount of EXIM (in \$) over total exports (in \$) over the period 2007–2010. Standard errors are clustered at the product level.

Decomposing the margins of adjustment. Because EXIM is a trade financing specific shock and not a generic firm-level credit shock, its shutdown allows us to learn more about the exact nature of financing in the trade cost function.

Motivated by trade models where firms face both fixed and variable export costs (Ghironi and Melitz, 2005), we decompose export growth at the product-year level into three additive margins: intensive (export growth to a destination we observe both before and after 2014), entry (export growth to destinations not present before 2014) and exit (export growth to destinations we no longer observe after 2014).

Formally, we define $I_t = d : Y_{p,t} > 0$ as the set of destinations to which a product is exported in year t. The set of destinations served in year t and in year 2014 is given by $I_{t \cap 2014} = \{d : d \in I_t, d \in I_{2014}\}$; the set of destinations that appears in t but were not served in 2014 is denoted $I_{t \setminus 2014} = \{d : d \in I_t, d \notin I_{2014}\}$. Lastly, the set of destinations served in 2014 but that disappears in t is denoted $I_{2014 \setminus t} = \{d : d \notin I_t, d \in I_{2014}\}$.

This allows us to decompose the growth g of export of product p at time t relative to 2014 as:

$$g^{2014}[Y_{p,t}] = \sum_{d \in p} g^{2014}[Y_{p,d,t}] = \underbrace{g[Y_{d \in I_{\cap} 2014}]}_{\text{intensive margin}} + \underbrace{g[Y_{d \in I_{t \setminus 2014}}]}_{\text{entry margin}} + \underbrace{g[Y_{d \in I_{2014 \setminus t}}]}_{\text{exit margin}} \tag{6}$$

Table 3 shows the results of this decomposition. We find that the decrease in exports is mostly driven by the intensive margin, which explains between 90% (4.04/4.49, odd columns) to 80% (0.044/0.054, even columns), depending on whether EXIM exposure is measured continuously or dichotomously, respectively.

This pattern is consistent with several theoretical trade financing models in which finance enters directly into exporters' cost functions as additional iceberg trade costs that scale with exported quantities, for instance to maintain their customer relationships or to acquire new customers (e.g., Arkolakis, 2010; Beaumont and Lenoir, 2023).

At the extensive margin, all the decline is accounted for by EXIM dependent products having relatively lower entry. By contrast, the exit margin is unaffected both economically and statistically. The observed asymmetry between entry and exit also suggest trade financing involves significant upfront sunk costs, consistent with prior work (e.g., Das, Roberts and Tybout, 2007; Xu, 2022). This interpretation is also supported by literature on market entry mechanisms showing how trade financing has a critical role in allowing firms to learn about foreign market specificities (Koenig, 2009; Berman, Rebeyrol and Vicard, 2018; **?**).

Interpretation of magnitudes. The coefficient estimated in Table 2 is between 4 and 5. Two points are important to stress. First, this is the effect on *revenues* (the value of exports) and not on *profits* for the firm or the bank.

Second, this magnitude is in line with expected working capital multiplier. Exporting typically generates working capital needs of 20–25% of foreign revenues. This concretely means that exporters must be able to pay \$0.20–0.25 upfront to generate each new \$ of foreign sales.

4.2 Average Effects of EXIM's Shutdown on Firm Outcomes

At this point, we are able to reject both that EXIM is inframarginal, and that EXIM has no net effects because of export market share reallocation across US firms. Nonetheless, it is still possible that EXIM's shutdown has a limited effect on firm investment and employment if EXIM-backed

Table 3: Decomposing Impact on Exports into Intensive and Extensive Margins

Dependent variable	Exports							
Margin	All		Intensive		Exit		Entry	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
$\text{EXIM}_{p,o}\times\text{Post}_t$	-4.49		-4.04		0.51		-0.96	
	(1.60)		(1.47)		(0.43)		(0.47)	
	[0.0050]		[0.0060]		[0.24]		[0.043]	
$\text{EXIM}_{p,o}\geq 0.45\%\times\text{Post}_t$		-0.054		-0.044		0.00000051		-0.011
		(0.019)		(0.016)		(0.0036)		(0.0059)
		[0.0035]		[0.0082]		[1.00]		[0.072]
Fixed Effects								
Origin×Year	✓	✓	✓	✓	✓	✓	✓	✓
Product (4-digit)×Year	✓	✓	✓	✓	✓	✓	✓	✓
Observations	109,208	109,208	109,208	109,208	109,208	109,208	109,208	109,208

Notes: These regressions are estimated at the origin×product (HS-6) level. The dependent variable is the exports growth rate of origin country o (exporter) to destination country d (importer) of product p at time t relative to 2014 (the year prior to the shock), and is defined as $\Delta Y_{p,o,d,t} = (Y_{p,o,d,t} - Y_{p,o,d,2014})/[(Y_{p,o,d,t} + Y_{p,o,d,2014}) \times 0.5]$. The sample includes a control group of other exporter countries o with similar export patterns as the US. *Intensive margin* is defined as exports to destination countries that we observed in the pre and post periods. *Exit* is defined as exports to destinations that are only present prior to 2014 (inclusive), but not afterwards. *Entry* is defined as exports to destinations not present prior to 2014 (inclusive) but that appear afterwards. EXIM intensity (EXIM_{po}) is defined as the total amount of EXIM (in \$) over total exports (in \$) over the period 2007–2010. In the even numbered columns, $\text{EXIM}_{po} \geq 0.45\%$ is an indicator variable for a product being in the top quartile of treatment value. Standard errors are clustered at the HS-4 level and are reported in the line below the point estimate in parenthesis, and p-values are reported in brackets below them.

firms are able to compensate the loss of their exports by increasing their domestic sales.

To examine this question, we now turn to studying the impact of the shutdown on firms. We start by confirming that EXIM's shutdown lowered firm exports using the universe of maritime exports that we observe in Datamyne, and we show that results are similar when we restrict to the subset of listed firms. We then turn to the sample of publicly listed exporters for which we can study additional firm outcomes like capital investment and employment. While our focus on publicly listed firms does not allow us to estimate a full decomposition of EXIM's shutdown on the US economy, exporting is an activity concentrated among large firms, and Compustat firms account for approximately 80% of aggregate exports, so we believe that we capture the majority of the relevant economic activity.[22]

[22]The US Census Bureau, which collects the customs trade data, does not report firms' equity status. We infer public firms' contribution to total US exports using the following estimates: approximately 70% of listed firms (i.e., approximately 2,000 firms) are exporters, and the top 2,000 exporters in the US contribute 80% of the value of exports. Assuming that the largest exporters are also publicly listed, we arrive at our final value of 80%. A more conservative assumption that the top 500 exporters in the US are publicly listed (and none of the other publicly listed firms are exporters) generates a value of 60%.

4.2.1 Effect on Firm Exports

We observe firm exports at the product by destination level in Datamyne. We measure exports using Twenty-foot Equivalent Units (TEU), a standard unit for maritime cargo. To handle the dimensionality of firm-by-product-by-destination data, we collapse the data into two periods: an average pre-shutdown period (2010–2014) and an average post period (2015–2019). Because of the large number of entries and exits at this level, we use the same Beaumont, Matray and Xu (2024) method as in Table 2, with appropriate weights.[23]

Table 4 reports the results. Column 1 shows the relative effect on exports during the shutdown for EXIM-dependent firms. In columns 2 to 4, we progressively include more fixed effects to control for unobserved demand shocks that might correlate with the treatment. In column 5, we restrict the data to the sample of listed firms that we match with Datamyne. Columns 4 and 5 show that the effect of EXIM's shutdown remains the same when we tightly control for product-by-destination-by-time fixed effects. Relative to the results in the aggregate customs data, this firm-level analysis with just US exporters allows us to control for even finer types of demand shocks, such as those generated by country-specific tariff shocks (e.g., China tariff shocks on certain American products). Using this within-product variation therefore eliminates the reliance on the identifying assumption in Table 2, where we study aggregate exports in the BACI data.

In terms of economic magnitudes, EXIM financing accounts for approximately 3.6% of maritime exports for treated firms. The point estimate of -0.17 implies an average impact of -5.0 on export sales, which is similar to the magnitude estimated in the aggregate product exports data.

4.2.2 Effect on Total Revenues

Baseline effect. To test whether the shutdown and contraction in exports affect firms' total revenues, we begin by estimating the compact β coefficient in equation (4) that captures the average change in total revenues for EXIM-backed relative to non-backed firms over the post period (2015–2019) relative to the pre-period. Table 5 reports our results.[24] Column 1 is estimated with the sparsest set of controls: only year fixed effects. Column 2 includes industry-by-year fixed effects to account for the potential correlation between the treatment exposure and unobserved industry shocks (e.g., differential demand shocks). Column 3 is our preferred specification that includes both industry-by-year and exporter-by-year fixed effects, with the latter controlling for the correlation between the treatment with other trade-related shocks.

[23] We show in Appendix Table A.3 that results are robust to using different measures of maritime exports and in Appendix Table A.4 to other alternative weights.

[24] For all the DID analyses, we weight the regressions by firm revenue using the same strategy as in the aggregate product exports data to ensure comparability of the results across datasets. The coefficient are, if anything, larger with other weighting schemes or no weights: see Appendix Table A.7.

Table 4: Impact on Firm Maritime Exports

Dependent variable	Maritime Exports				
Sample	Listed + private firms				Listed firms
	(1)	(2)	(3)	(4)	(5)
$\text{EXIM}_i \times \text{Post}_t$	-0.19	-0.18	-0.19	-0.17	-0.25
	(0.023)	(0.022)	(0.022)	(0.021)	(0.046)
	[6.7e-16]	[8.9e-16]	[2.0e-17]	[2.3e-15]	[0.000000071]
Fixed Effects					
Post	✓	—	—	—	—
Product×Post	—	✓	—	—	—
Destination×Post	—	—	✓	—	—
Product×Destination×Post	—	—	—	✓	✓
Observations	1,979,189	1,979,189	1,979,189	1,979,189	153,977

Notes: This table reports the estimated effects of EXIM's shutdown on firms' maritime exports. Data are collapsed as an average pre (up to 2014) and post period (2015–2019). Growth rates are based on the Beaumont, Matray and Xu (2024) estimator, and defined as $\Delta Y_{i,t} = (Y_{i,t} - Y_{i,t\leq 2014})/[(Y_{i,t} + Y_{i,t\leq 2014}) \times 0.5]$. $Post_t$ is an indicator variable equal to 1 for the years 2015 to 2019. $EXIM_i$ is an indicator variable that equals 1 if the firm received trade financing from EXIM over the pre-shutdown period. Product fixed effects are at the HS-4 level, and destination fixed effects are at the country level. Standard errors are clustered at the HS-4 level, and are reported in the line below the point estimate in parenthesis, and p-values are reported in brackets below them.

The estimated effect of the EXIM shutdown on total revenues is stable across the different set of controls and is always significant at the 1% level, ranging from a difference of 17% in column 1 to 12% in column 3.

In columns 4 to 8, we include some robustness exercises. Column 4 includes a battery of additional firm-level controls: the fiscal month of firms' reporting of their annual accounts, firm size (tercile of assets), firm leverage and profitability, and firm lobbying expenditure (measured from Lobbyview data), all interacted with year fixed effects.

Columns 5 to 7 show that the effect of EXIM's shutdown is not driven by certain parts of the sample. Column 5 excludes non-exporting firms from the sample and finds identical point estimates to the specifications that isolates the identifying variation among exporters by including an exporter-by-year fixed effect (column 3).[25] In column 6, we exclude the ten firms with the highest reliance on EXIM support in the pre-period, which includes Boeing.[26] In column 7, we remove all industries that are in the top tercile of dependence on government spending, where we construct this dependence by regressing monthly stock returns for each industry on the measure of policy uncertainty specifically related to government policies and fiscal policies from Baker, Bloom and Davis (2016). The fact that the point estimate remains unaffected indicates that the

[25] We do not remove non-exporting firms from our baseline sample because they still participate in the estimation of the other fixed effects (e.g., industry-by-year), and later in the paper in the computation of distribution of financing frictions, which ensures that our sample distribution will not be biased by the exclusion of certain firms.

[26] The list also includes: Cytosorbents Corp, Energy Recovery Inc, Everspin Technologies Inc, Full Spectrum Inc, Imping Inc, Mycelx Technologies Corp, Optical Cable Corp, Stereotaxis Inc, and Xtera Communications Inc.

estimated effect is not driven by a broader shock on government spending that would affect firms more dependent on such generic spending, but instead is specific to EXIM's shutdown.

Finally, in column 8, we estimate a triple difference where we interact the DID variable with an indicator variable that takes the value one if the firm received a large loan from EXIM prior to its shutdown. This test is motivated by the fact that larger loans require approval by the Board of Directors, which was not possible during the long period without a quorum. We measure large loans as those in the top tercile of the loan distribution, and we interact all the fixed effects with an indicator variable that equals one if the firm received any EXIM loan prior to the shutdown.

The inclusion of the EXIM-by-year fixed effect now controls for any time-varying unobserved shocks that might be specific to the selection of EXIM-dependent firms, as it forces the coefficient of interest on the triple difference variables to be estimated *within* EXIM-dependent firms.[27] The coefficient and standard error is nearly identical to the baseline effect that we estimate in column 3, implying that the effect of EXIM's shutdown we estimate is unlikely driven by potential endogeneous selection of firms receiving EXIM in the first place.[28]

In all cases, the point estimates are quantitatively similar, indicating that our estimation of the effect of EXIM's shutdown on firm total revenue is unlikely to be driven by other unobserved time-varying shocks correlated with these controls and our treatment or by specific firms.

Figure 5 plots the yearly coefficients of β_t and 95% confidence intervals of the growth of total revenues relative to 2014 for the dynamic event study in equation (5), controlling for the full set of firm characteristics (industry, exporter status, size, leverage, profitability).[29] Appendix Figure B.3 shows the event study in the quarterly data, which allows us to define the shock *within* 2015. As in our baseline specification, the figure shows visual evidence of the absence of differential pre-trends before the shock: sales of EXIM-supported firms trended similarly for firms not supported by EXIM up to the second quarter of 2015 (the last quarter prior to EXIM's shutdown), and diverged only after mid-2015. Afterward, treated firms' total revenues decline significantly relative to control firms and remain lower throughout the post period.

This persistent decline in total revenues implies that (i) treated firms are not able to fully compensate the loss of their foreign sales by an increase in domestic sales, and (ii) treated firms are not able to compensate the loss of their EXIM financing with an increase in trade financing at commercial, profit-maximizing banks, for the entire duration of the shutdown.

[27] The primary DID coefficient $EXIM \times post$ is no longer identified, as it is now colinear with the fixed effects.

[28] The triple difference specification likely underestimates the true effect of EXIM's shutdown as it relies on the strong assumption that absent the shutdown, only firms that received a large loan initially prior to 2014 would have continued to do so, and firms that received a smaller loan would have never obtained a larger loan. The necessity of this stronger assumption is why we view this test as a robustness and do not use this specification as our baseline.

[29] Appendix Figure B.2 reports robustness for the firm event study when we progressively include the different fixed effects and firm controls, and it transparently shows that the point estimates are barely affected as we control for more unobserved heterogeneity.

Table 5: Impact on Firm Total Revenues

Dependent variable	Total Revenues							
Sample	All				Excl. non Exporter	Excl. top 10 recipients	Excl. policy dep. industries	All
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
$\text{EXIM}_i \times \text{Post}_t$	-0.17	-0.13	-0.12	-0.10	-0.12	-0.12	-0.11	
	(0.033)	(0.035)	(0.035)	(0.035)	(0.036)	(0.035)	(0.041)	
	[0.00000012]	[0.00028]	[0.00072]	[0.0045]	[0.0010]	[0.00079]	[0.0050]	
$\text{EXIM (Large loans)}_i \times \text{Post}_t$								-0.096
								(0.045)
								[0.032]
Fixed Effects								
Year	✓	—	—	—	—	—	—	—
Exporter×Year	—	—	✓	✓	✓	✓	✓	—
Industry×Year	—	✓	✓	✓	✓	✓	✓	—
Fiscal month×Year	—	—	—	✓	—	—	—	—
Size×Year	—	—	—	✓	—	—	—	—
Balance sheet controls×Year	—	—	—	✓	—	—	—	—
Lobbying×Year	—	—	—	✓	—	—	—	—
EXIM×Industry×Year	—	—	—	—	—	—	—	✓
EXIM×Exporter×Year	—	—	—	—	—	—	—	✓
Observations	25,174	25,174	25,174	24,511	18,438	25,109	20,151	25,174

Notes: This table reports the estimated effects of EXIM's shutdown on firms' total revenue growth. The dependent variable is the growth rate relative to 2014 (the year prior to the shock) defined as $\Delta Y_{i,t} = (Y_{i,t} - Y_{i,2014})/Y_{i,2014}$. $Post_t$ is an indicator variable equal to 1 for the years 2015 to 2019. $EXIM_i$ is an indicator variable that equals 1 if the firm received trade financing from EXIM over the pre-shutdown period. Exporter fixed effect is an indicator variable that equals 1 if the firm reports positive EXIM financing, foreign sales in Compustat Segment, exports in Datamyne, or taxable foreign income before 2014. Industries are SIC-2. Column 5 excludes from the sample firms that are not exporting prior to the shutdown, column 6 removes the top ten firms with the highest reliance on EXIM support in the pre-period from the sample. Column 7 removes industries that are most dependent on government policies. Finally, in column 8 we interact *EXIM* × *Post* with a dummy *Large loans* that takes the value one if the loan was in the top tercile of EXIM loan distribution prior to its shutdown, as these loans were particularly affected by the loss of the bank's board quorum. In this case, we control for *EXIM* with exporter-by-year and industry-by-year, which explains why *EXIM* × *Post* is no longer identified. Standard errors are clustered at the firm level and are reported in the line below the point estimate in parenthesis, and p-values are reported in brackets below them.

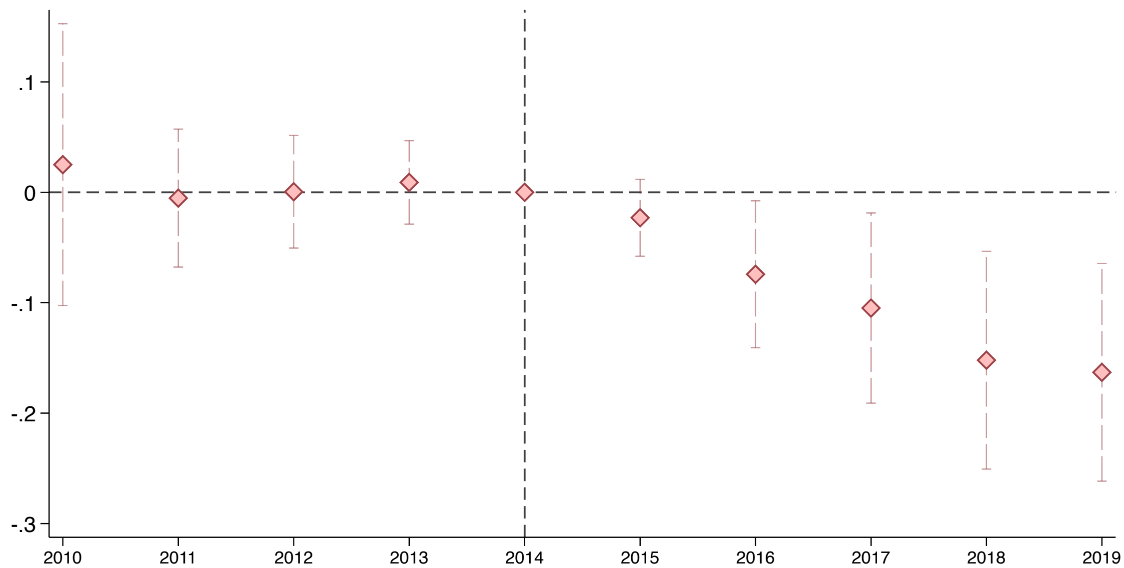
Interpretation of magnitudes. Given that in our sample, the average treated firm received financing from EXIM amounting to approximately 2.4% of its total revenues, a back of the envelope computation implies that in the firm data, \$1 of EXIM financing translates into approximately \$4.9 of additional revenues (4.9 = 12%/2.4%).

We calculate the pass-through of the effect of EXIM on domestic sales from export sales as the ratio of the elasticities of sales: $\frac{\epsilon^{Domestic}}{\epsilon^{Exports}}$. We rewrite this ratio of elasticities in the following way: $\frac{\epsilon^{Domestic}}{\epsilon^{Exports}} = \frac{\Delta Domestic}{\Delta Exports} \times \frac{Exports}{Domestic}$, where Δ denotes the dollar change in sales in response to EXIM while "*Exports*" and "*Domestic*" denote initial levels of sales.

The accounting identity $\Delta TotalRevenues = \Delta Exports + \Delta Domestic$ implies that $\Delta Domestic = \Delta TotalRevenues - \Delta Exports$. From our previous estimations, we have that $\frac{\partial \text{Total revenues}}{\partial \text{EXIM}} = \hat{\beta}^{Compustat} = 4.9$ and $\frac{\partial \text{Exports}}{\partial \text{EXIM}} = \hat{\beta}^{US\ exports} = 4.49$, so $\frac{\partial \text{Dom}}{\partial \text{EXIM}} = 0.51$. This allows us to write that $\frac{\partial \text{Dom}}{\partial \text{EXIM}} \times \frac{\partial \text{EXIM}}{\partial \text{Exports}} = \frac{\partial \text{Dom}}{\partial \text{Exports}} \approx \frac{\Delta \text{Dom}}{\Delta \text{Exports}} = \frac{0.51}{4.49}$.

In order to calculate $\frac{Exports}{Domestic}$ (the share of export sales relative to domestic sales), we follow Bernard, Jensen, Redding and Schott (2018), which finds that export sales account for approx-

Figure 5: Event Study Impact of EXIM's Shutdown on Firm Total Revenues



Notes: This figure plots the point estimates and 95% confidence intervals of the effect of EXIM's shutdown on firm total revenues from equation (5) with industry-by-year and exporter-by-year fixed effects. The dependent variable is the growth rate relative to 2014 (the year prior to the shock) defined as $\Delta Y_{i,t} = (Y_{i,t} - Y_{i,2014})/Y_{i,2014}$. Standard errors are clustered at the firm level.

imately 20% among all firms that have at least one dollar of exports. Given that exporting is mostly concentrated among larger firms and that Compustat firms are larger than the average firm, this share is likely higher in our sample. For instance, the share of foreign revenues in Compustat segment is approximately 40%. Taking these two values as bounds, we calculate that $\frac{Exports}{Domestic} \in [0.25 - 0.66]$.[30]

Implication for firm production function and comparison with the literature. Together, these magnitudes implies a pass-through of foreign to domestic sales of 2.8% to 7.5%. While the positive spillover between foreign markets and the domestic market is at odds with the canonical Melitz (2003) model of firm-level trade that features constant marginal cost, it is consistent with models of intra-firm spillovers, particularly those emerging from financing frictions and internal capital markets.[31]

Our finding of positive spillovers is particularly likely to reflect the role of financing frictions, given that EXIM designs its program to service financially constrained firms (Table 7 and Appendix Section D.2). When firms face financing constraints and use internal capital markets to finance projects across different markets, theory predicts positive spillovers between markets Stein (1997). In our context, the reduction in exports acts as a negative cash-flow shock for treated firms, tight-

[30]If exports is 25% of total revenue, domestic sales is 100%-20% = 80%, hence $\frac{Exports}{Domestic} = \frac{0.20}{0.80} = 0.25$. If instead, exports is 40% of total revenue, we have that $\frac{Exports}{Domestic} = \frac{0.40}{(1-0.40)} = 0.66$

[31]Constant marginal costs implies that demand shocks in one market do not affect a firm's sales in another market.

ening their financing constraints and affecting their domestic sales.[32] While financing frictions are likely a relevant channel, other mechanisms that could generate such intra-firm spillovers include shared inputs like knowledge transfer or vertical supply linkages.[33]

Our result differs from Almunia, Antràs, Lopez-Rodriguez and Morales (2021), which finds a negative pass-through when studying Spanish firms during the Great Recession. There are two important distinctions. First, Almunia, Antràs, Lopez-Rodriguez and Morales (2021) studies spillovers from domestic shocks to foreign sales, while we examine the opposite direction. To the best of our knowledge, all studies examining pass-through from foreign to domestic sales have found positive spillovers similar to our results in both direction and magnitude: France (Berman, Berthou and Héricourt, 2015), the US (Ding, 2024), and Denmark Jakel (2022).[34] Second, while Almunia, Antràs, Lopez-Rodriguez and Morales (2021) studies an aggregate shock affecting all Spanish exporters during the Great Recession, we examine variation across firms based on their differential access to EXIM financing. Our focus on financing-induced variation may better isolate the role of firm-specific financial constraints in driving the pass-through effects.

Additional robustness. We provide several additional sets of robustness showing that the results are not driven by specific firms or industries. In Appendix Figure B.5 and Figure B.6, we report the distribution of coefficients and t-stats from a series of 336 distinct regressions, where we remove each 4-digit industry one-by-one. The point estimates and t-stats are tightly distributed around the average values reported in Table 5 and Figure 5, showing that the results are not driven by any industry in particular. In Appendix Table A.5 we also show that using more granular industry groupings when defining fixed effects produces similar results.

4.2.3 Effect on Additional Firm Outcomes

Given that EXIM-financed firms experience a decline in total revenues after EXIM's exit, it is likely that the shutdown also affects the accumulation of production factors (capital and labor). We use the same specification as in equation (4) and replace firm revenue growth with firms' change in

[32] Similar effects have been documented in other settings: oil conglomerates reduced investment in non-oil segments post oil-shock Lamont (1997), and multi-establishment firms in the US adjusted employment in specific counties in response to shocks from distant counties Giroud and Mueller (2019).

[33] For reduced form evidence and structural estimation of shared non-rival knowledge input see Ding (2024), which provides empirical evidence of positive spillovers between export shocks and sales across multi-industry firms. Vertical supply linkages are studied for instance in Desai, Foley and Hines (2009) or Boehm, Flaaen and Pandalai-Nayar (2019).

[34] Systematically testing the asymmetry between the domestic to foreign passthrough vs the foreign to domestic passthrough is impossible in our setting, but we view that as fruitful avenue for future research. One possible source of difference is that conceptually, the existence of increasing marginal cost is justified in Almunia, Antràs, Lopez-Rodriguez and Morales (2021) by the existence of large pre-determined and fixed factors in the overall production function. To the extent that domestic sales account for a larger part of the firm sales and is what determines most of the need in fixed factors while foreign sales is treated more as "marginal," it would be possible to have an asymmetric pass-through. This could also be in line with the fact that Spain during the Great Recession experienced a profound domestic recession, implying that Spanish firms faced a complete halt in their domestic sales, leaving them no choice but to aggressively discount their products abroad.

capital, labor, and operating profit margins (EBIT over revenues).

Table 6: Impact on Firm Employment, Capital Accumulation, and Profit Margins

Dependent variable	Revenues	Tangible capital	Intangible capital	Employment	Profit margin
	(1)	(2)	(3)	(4)	(5)
$\text{EXIM}_i \times \text{Post}_t$	-0.12	-0.14	-0.19	-0.098	0.00024
	(0.035)	(0.044)	(0.047)	(0.032)	(0.0062)
	[0.00072]	[0.0014]	[0.000042]	[0.0025]	[0.97]
Fixed Effects					
Exporter×Year	✓	✓	✓	✓	✓
Industry×Year	✓	✓	✓	✓	✓
Observations	25,174	24,635	25,015	22,902	25,174

Notes: This table reports the estimated effects of EXIM's shutdown on various firm outcomes. Intangible capital is measured following Peters and Taylor (2017). Profit margin is measured as net income over revenues. The dependent variable is the growth rate relative to 2014 (the year prior to the shock) defined as $\Delta Y_{i,t} = (Y_{i,t} - Y_{i,2014})/Y_{i,2014}$. $Post_t$ is an indicator variable equal to 1 for the years 2015 to 2019. $EXIM_i$ is an indicator variable that equals 1 if the firm received trade financing from EXIM over the pre-shutdown period. Exporter fixed effect is an indicator variable that equals 1 if the firm reports positive EXIM financing, foreign sales in Compustat Segment, exports in Datamyne, or taxable foreign income before 2014. Industries are SIC-2. Standard errors are clustered at the firm level and are reported in the line below the point estimate in parenthesis, and p-values are reported in brackets below them.

Table 6 shows that EXIM's shutdown caused firms to both invest less and hire less. In column 2, we start by looking at tangible capital (property, plant and equipment). Column 3 shows the impact on intangible capital as computed by Peters and Taylor (2017). Intangible capital shrinks slightly more than tangible capital (-19% vs -14%), in line with the idea that intangible capital is more affected by financing frictions and therefore fluctuates more with firm revenues (e.g., Aghion, Askenazy, Berman, Cette and Eymard, 2012; Hombert and Matray, 2017). Column 4 shows the effect for employment. Across all outcomes, we find that EXIM-financed firms shrink relative to non-dependent firms. The notable exception is the profit margin, for which we find an economically small and statistically insignificant point estimate (column 5). Appendix Figure B.4 shows the event studies for each outcome.

5 Channels for EXIM's Impact

Our results establish that EXIM financing had real economic effects rather than merely generating windfall profits for well-connected firms or redistributing market share. This key finding demonstrates that EXIM provided a marginal source of funding that enabled additional economic activity rather than financing exports that would have occurred anyway.

In this part of the paper, we assess the potential channels for EXIM's ability to create net trade. We start by focusing on the elements of the institutional context that are likely to be particularly relevant: the financing needs of firms engaged in longer-maturity international transactions, and the contractual frictions emerging from country-specific risks. We then discuss other possible channels that could explain EXIM's impact on exports: its role in general export promotion, private banks' uncertainty about the duration of the shutdown, and learning-by-doing externalities.

First, EXIM's primary role is to alleviate firm financing frictions by "providing trade financing when the private sector is unable or unwilling to do so." These *firm financing frictions* can endogenously emerge out of adverse selection (e.g., Stiglitz and Weiss, 1981) or the inability of entrepreneurs to fully pledge their future cash flows (Banerjee and Newman, 1993; Holmstrom and Tirole, 1997). They are particularly high in the context of international trade in which long transactions times increase working capital needs.

Second, the cross-border nature of international trade can create *importer market* frictions where information asymmetries and contractual frictions are particularly severe and increase the risks of financing exports (e.g., Nunn, 2007; Alfaro, Antras, Chor and Conconi, 2019). These frictions can generate two types of challenges: exporters facing greater difficulty in screening solvent customers and providing trade credit (e.g., Biais and Gollier, 1997; Cuñat, 2007), and exporters encountering heightened holdup risks and challenges in enforcing contracts, especially those requiring relationship-specific investments (e.g., Williamson, 1979; Grossman and Hart, 1986; Hart and Moore, 1990).

The same cross-border frictions that impede firm-level trade financing also creates barriers for financial institutions themselves. They can impose high (and potentially heterogeneous) fixed costs of entry, leading to a heavily concentrated and specialized private market for trade finance and insurance. For example, the regulatory burden of operating across legal jurisdictions imposes substantial entry costs for banks, while profitable operations require in-depth knowledge local markets and legal systems. The compounding effect of both firm-level and institutional frictions would heighten EXIM's importance, particularly in these markets where private sector financing and insurance is already scarce, or where these institutions can charge higher mark-ups due to lack of competition.

We empirically analyze the role of each type of friction by estimating the heterogeneous effects of EXIM's shutdown by estimating triple difference regressions where we interact EXIM × Post with proxies of each type of friction:

$$\begin{aligned}\Delta Y_{i,j,t} = {} & \beta_1 EXIM_{i,j} \times Post_t \times I^{Constrained}_{i,j} + \beta_2 EXIM_{i,j} \times \delta_t \\ & + \; I^{Constrained}_{i,j} \otimes \left[\gamma_{j,t} + Exporter_{i,t_0} \times \delta_t + X_{i,t_0} \times \delta_t + \varepsilon_{i,j,t}\right] \end{aligned} \tag{7}$$

$\Delta Y_{i,j,t}$ denotes the growth rate of an outcome between t and 2014, $I^{Constrained}_{i,j}$ is an indicator variable that takes the value one if either firm i or industry j is constrained in the pre-period, and $\otimes$ is the outer product so that we include all possible combinations of the different terms.[35] The

[35] We have written equation (7) to allow for full flexibility in firm-by-industry outcomes, although empirically we

full set of fixed effects includes EXIM-by-year, which allows us to absorb systematic differences between treated and control units.

5.1 Firm Financing Frictions

We use four standard proxies to capture the degree of financial constraints. For each proxy, we sort the variable into terciles and create an indicator variable *Constrained* that takes the value of one if the firm is in the top tercile of the distribution.

Table 7 reports the results using firm leverage (e.g., Giroud and Mueller, 2017; Friedrich and Zator, 2023) in column 2, dividend payments intensity (e.g., Fazzari, Hubbard and Petersen, 1988) in column 3,[36] the Hoberg and Maksimovic (2015) measure based on the textual analysis of firms' 10-K filings in column 4, and the industry coverage ratio (current liabilities over EBITDA, motivated by the fact that EXIM's trade financing is a source of short-term working capital) in column 5.

We find that within the group of EXIM-dependent firms, those that are most constrained experience larger investment cuts. This aligns with both theory and EXIM's institutional design. This heterogeneity indicates that export financing is particularly important for firms with limited alternative funding sources, highlighting its role as a complement to private sector financing.

5.2 Importer Market Frictions

To understand the role of importer market contractual frictions, we first show that EXIM directs more financing to riskier countries, consistent with the theoretical channel that the frictions that deter private sector lending are higher in those markets. We then empirically estimate the role of importer market frictions for aggregate US product exports.

For the first exercise, we use quarterly measures of the perceived risk to transact with a country from Hassan, Schreger, Schwedeler and Tahoun (2023), which is constructed from textual analysis of the English-language quarterly earnings calls of all publicly listed firms operating around the world. We combine these risk measures with data on EXIM's country-level financial exposure, which we digitized from EXIM Annual Reports. These exposure measures capture the total outstanding value of EXIM-backed loans, guarantees, and insurance for each country.

Figure 6 shows the relationship between the amount of EXIM financing a country receives relative to the perception of its risks by all firms, residualized on country and year fixed effects. The strong positive relationship indicates that, holding fixed time-invariant country characteristics and accounting for shocks across years, EXIM systematically provides more support to precisely those markets where private sector firms perceive the highest risks. In Appendix Table D.2, we

will focus on constraints at either the firm i level or the industry j level.

[36] Dividend payments intensity is defined as dividends over EBITDA. To simplify the reading, we use 1 minus the top tercile for dividend intensity, since firms in the top tercile of dividend payments are *less* constrained.

Table 7: Role of Financing Frictions

Dependent variable	Investment				
Financing frictions proxy:		Leverage	Dividends intensity	Hoberg and Maskimovic (2015)	Coverage ratio
	(1)	(2)	(3)	(4)	(5)
$\text{EXIM}_i \times \text{Post}_t$	-0.12				
	(0.032)				
	[0.00017]				
$\text{EXIM}_i \times \text{Post}_t \times \text{I}_i^{\text{Constrained}}$		-0.16	-0.10	-0.12	-0.071
		(0.044)	(0.039)	(0.047)	(0.039)
		[0.00034]	[0.010]	[0.0097]	[0.068]
Fixed Effects					
Exporter×Year	✓	—	—	—	—
Industry×Year	✓	—	—	—	—
EXIM×Year	—	✓	✓	✓	✓
Fixed Effects (interacted)					
Exporter×Year	—	✓	✓	✓	✓
Industry×Year	—	✓	✓	✓	✓
Observations	24,635	23,994	23,963	22,294	24,635

Notes: This table reports the estimated effects of EXIM's shutdown on firms' investment. The dependent variable is the growth rate relative to 2014 (the year prior to the shock) defined as $\Delta Y_{i,t} = (Y_{i,t} - Y_{i,2014})/Y_{i,2014}$. $Post_t$ is an indicator variable equal to 1 for the years 2015 to 2019. $EXIM_i$ is an indicator variable that equals 1 if the firm received trade financing from EXIM over the pre-shutdown period. Exporter fixed effect is an indicator variable that equals 1 if the firm reports positive EXIM financing, foreign sales in Compustat Segment, exports in Datamyne, or taxable foreign income before 2014. Industries are SIC-2. Standard errors are clustered at the firm level and are reported in the line below the point estimate in parenthesis, and p-values are reported in brackets below them.

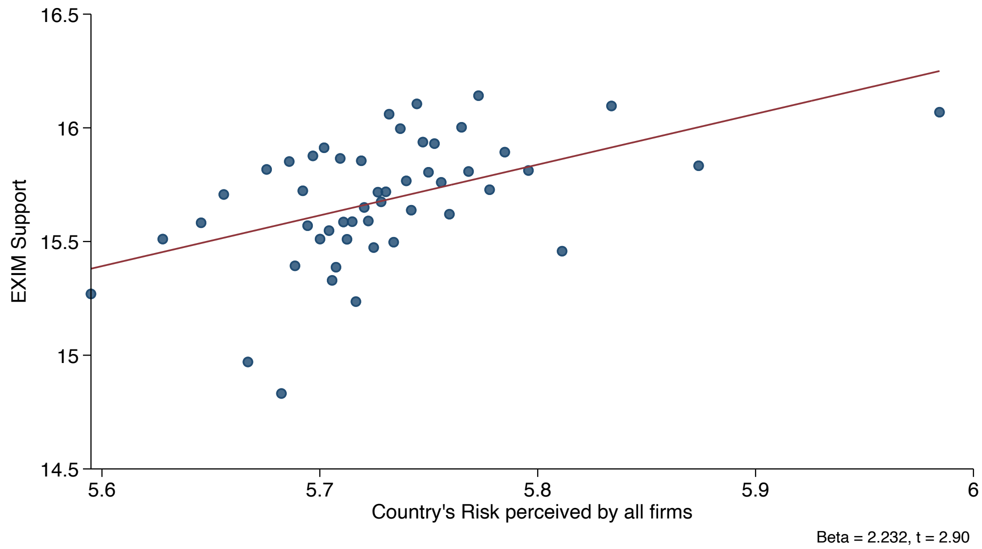
also report the relationships between exposure and risk perceptions by subsets of different types of firms. Strikingly, the effects are most relevant for financial and foreign firms, which are precisely the ones whose views are relevant for international trade and trade financing.

Next, we use three proxies for different dimension of market frictions at the importer level: the amount of firms' (perceived) risk of a country; the quality of rule of law in the importing country; and finally the financing frictions that importers in a country face.

The first proxy uses the Hassan, Schreger, Schwedeler and Tahoun (2023) measure, which we separate between all firms, financial institutions and foreign firms. The second friction, the likelihood of recovery, is proxied by the degree to which the importer country abides by rule of law, motivated by Nunn (2007). The measure is obtained from the Worldwide Governance Indicators (WDI) Database (Kaufmann, Kraay and Mastruzzi, 2010), which measures perceptions of trust and adherence to societal rules, including contract enforcement, property rights, police, courts, and the likelihood of crime and violence. The index is constructed such that a higher value corresponds to better governance.

Finally, we proxy the potential financing frictions faced by importers withthe financial development of their country, measured with outstanding private credit relative to GDP from the World

Figure 6: EXIM Support and Country Risk



Notes: This figure plots the relationship between the amount of EXIM support a country receives as a function of its perceived risks (by all firms), controlling for country and year fixed effects. Standard errors are clustered at the country level. The measure of perceived country risks comes from Hassan, Schreger, Schwedeler and Tahoun (2023).

Bank. We provide more details about these data in Appendix D.3.1.

Our triple differences regression specifications therefore relate changes in exports to exposure to the EXIM shutdown interacted with each proxy of importer market frictions. We create the indicator variable $I_d^{\text{Constrained}}$ that takes the value one if the importer country (destination d) is in the top two quintiles of the distribution of the proxy. We interact this indicator variable both with our main treatment variable ($\text{EXIM}_{p,o}\times\text{Post}_t$) and with all other fixed effects. In order to maintain tractability, we collapse the data into an average pre and post period. We therefore have fewer observations than in Table 2 by construction, but the coefficients remain similar.

One challenge when estimating such triple differences specifications is that the new sorting variable may be correlated with other characteristics of the importing country that would bias the triple differences, even if the DID is unbiased. Given that EXIM matters more for US exporters when export competition with other countries is fiercer, we include controls where we interact the DID variable ($\text{EXIM}_{p,o}\times\text{Post}_t$) with measures of competition intensity both at the country and country-by-product level.

Table 8 reports the results for the different proxies of importer market frictions. Since the variable $EXIM_i \times Post_t \times I_d^{Constrained}$ estimates the *marginal* effect of EXIM's shutdown when destination market frictions are high relative to when they are low, the negative sign indicates that the effect of the shutdown is two times larger when US firms export to countries with high frictions.[37]

[37] The total effect of EXIM's shutdown when the importer country has high frictions is the sum of the coefficients of $\text{EXIM}_i\times\text{Post}_t\times\text{I}_d^{\text{Constrained}}$ and $\text{EXIM}_{p,o}\times\text{Post}_t$.

Table 8: Role of Importer Market Frictions

Dependent variable	Exports				
Market frictions proxy:	Risk perception			Rule of law	Financial development
	Any	Financial	Foreign		
	(1)	(2)	(3)	(4)	(5)
$\text{EXIM}_{p,o} \times \text{Post}_t \times \text{I}_d^{\text{Constrained}}$	-2.08	-3.10	-2.28	-1.55	-2.05
	(0.96)	(1.21)	(1.05)	(0.90)	(0.98)
	[0.030]	[0.010]	[0.030]	[0.085]	[0.037]
Fixed Effects					
Product (6-digit)$\times$Destination$\times$Post$_t$	✓	✓	✓	✓	✓
Origin$\times$Post$_t \times \text{I}_d^{\text{Constrained}}$	✓	✓	✓	✓	✓
$\text{EXIM}_{p,o} \times \text{Post}_t$	✓	✓	✓	✓	✓
$\text{EXIM}_{p,o} \times \text{Post}_t \times \text{Controls}_{p,d}$	✓	✓	✓	✓	✓
Observations	1,677,054	1,677,054	1,677,054	3,471,365	3,275,185

Notes: This table reports estimates on the effect of EXIM's shutdown on aggregate exports at the product-by-destination level taken from BACI. Data are collapsed as an average pre (up to 2014) and post period (2015–2019). Growth rates are based on the Beaumont, Matray and Xu (2024) estimator, and defined as $\Delta Y_{i,t} = (Y_{i,t} - Y_{i,t\leq 2014})/[(Y_{i,t} + Y_{i,t\leq 2014}) \times 0.5]$. EXIM intensity ($\text{EXIM}_{p,o}$) is defined as the total amount of EXIM (in \$) over total exports (in \$) over the period 2007–2010. Country risk perception is from Hassan, Schreger, Schwedeler and Tahoun (2023), where it is defined as aggregated risk associated with a given country perceived by a certain subset of firms. "Rule of law" is the indicator from the Worldwide Governance Indicators (WDI) Database (Kaufmann, Kraay and Mastruzzi, 2010) measuring the overall quality of rule of laws and good governance in a country. "Financial development" is the ratio of private credit over coutry GDP and is from the World Bank. All regressions control for changes in import intensity by interacting $\text{EXIM}_{p,o} \times \text{Post}_t$ with country imports over GDP, import market share of product p in total imports, imports of product p over GDP, and the number of different exporters in a given market p, d. Appendix section D.3 provides further detail. Standard errors are clustered at the HS-4 level and are reported in the line below the point estimate in parenthesis, and p-values are reported in brackets below them.

5.3 Discussion of Other Potential Channels

While our analysis shows that financing and contractual frictions play a key role in explaining EXIM's effects on trade and firm outcomes, we also consider alternative mechanisms that could contribute to our findings. First, ECAs sometimes operate alongside broader export promotion initiatives, and although EXIM is primarily a financing institution rather than an export promotion agency, its activities could theoretically facilitate trade relationships and provide market intelligence. However, given EXIM's institutional focus on credit provision and risk mitigation rather than traditional export promotion activities such as trade missions or market research, we believe these promotional channels play at most a minor role in explaining our results.

A second potential channel relates to market uncertainty during EXIM's shutdown period. Private financial institutions may have hesitated to fill the gap in trade financing due to uncertainty about when EXIM would resume operations, leading to a "wait-and-see" approach in the trade finance market. This uncertainty channel could help to explain why private sector alternatives did not fully materialize during EXIM's absence. However, given that the shutdown lasted for many years, it is plausible that uncertainty was not the primary driver of private sector entry. Moreover, since EXIM is institutionally designed to operate only in market segments where private lenders are unable or unwilling to participate, the lack of entry is unlikely to be explained by fears of future competition with the agency.

A third potential channel operates through learning-by-doing effects in exporting, which is a classic motivation for industrial policy. At the firm-level, exporting experience can enhance productivity through improved management practices, technological upgrading, and better understanding of foreign markets (e.g., DeLoecker, 2013; Atkin, Khandelwal and Osman, 2017; Juhász, 2018). These internal learning effects suggest that temporary disruptions to export financing could have lasting impacts by interrupting firms' learning trajectories. Beyond individual firms, knowledge spillovers across firms—often called external economies of scale—could amplify these effects. When firms successfully export to new markets, they generate valuable information about foreign demand, regulatory requirements, and effective business practices that can benefit other potential exporters (e.g., Clerides, Lach and Tybout, 1998; Koenig, 2009; Fernandes and Tang, 2014; Monarch and Schmidt-Eisenlohr, 2023). Through these spillover channels, EXIM's financing could facilitate not just immediate exports but also the accumulation of export-specific knowledge capital both within and across firms.

Finally, we note our limitation in assessing the long-term persistence of these effects. Our study ends in 2019 in order to avoid conflating our estimates with the disruptions of the Covid pandemic. It is therefore not possible to speak to whether the effects would have persisted beyond the shutdown itself, which would suggest a role for mechanisms shown in Cox (2022) or Xu (2022). It is also possible that given enough time, there potentially would have been a full recovery as more private banks entered this market.

6 Implications for the Allocation of Capital

Our analysis of the channels through which EXIM affects trade and firm outcomes indicates that its impact varies systematically with underlying economic frictions, both at the firm level and at the destination market level. The presence of these heterogeneous effects suggests that EXIM's interventions generates efficiency gains by helping to overcome market imperfections that distort the allocation of capital. Given that capital misallocation is a key determinant of aggregate TFP, understanding how EXIM affects the distribution of capital across firms with different MRPK levels is crucial for evaluating its overall economic impact.

In this section, we formalize the analysis using a misallocation framework that allows for general heterogeneity in firm-level input cost wedges. Rather than relying on ad hoc firm characteristics, this approach provides a systematic way to evaluate how EXIM's operations affect allocative efficiency, as these input cost wedges encompass all underlying sources of export financing frictions.

6.1 Framework

We employ a formal framework where misallocation stems from heterogeneous wedges on input prices (e.g., Hsieh and Klenow, 2009; Baqaee and Farhi, 2020). Following Section D.4.2 and consistent with the results in Section 4.2.2, we model the effect of EXIM financing as a cost shifter that reduces the firm's cost of capital.

The firm's profit function is:

$$\Pi_i = p_i \times q_i(K_i) \quad - \quad (1 + \tau_i - EXIM_i) \times r_i \times K_i$$

where r_i is the (risk-adjusted) cost of capital for firm i, and τ_i is the potentially non-zero input wedge that governs the marginal return necessary to invest in an input, which introduces a gap between the firm's TFPQ and the firm's TFPR.[38] The firm's technological efficiency, i.e., its total factor productivity of quantity (TFPQ, usually denoted A in the production function), is embedded in $q_i(K_i)$ and is conceptually distinct from the firm's total factor productivity of revenue (TFPR), which also contains the firm's output price markup and the input cost wedge.[39]

It is crucial to stress that our analysis of whether EXIM improves the allocation of capital is *not* about whether EXIM finances firms with high or low TFPQ, but rather about whether EXIM finances firms facing ex-ante high or low wedges for a given level of TFPQ.

A profit-maximizing firm will invest and consume K_i units of capital until its marginal revenue returns $p_i \partial q_i(K_i)/\partial K_i$ are equal to its cost:

$$\underbrace{p_i \frac{\partial q_i(K_i)}{\partial K_i}}_{\text{MRPK = marginal revenue returns to capital}} \qquad = \quad \underbrace{(1 + \tau_i - EXIM_i) \times \ r_i}_{\text{Marginal cost of capital}} \tag{8}$$

When wedges are heterogeneous, it is possible to quantify how a policy or an institution like EXIM would affect treated industries' aggregate productivity via its effect on misallocation on a generic input x (capital in our setting) by using a first order approximation of the change in the treated industry's TFP (e.g., Petrin and Levinsohn, 2012; Baqaee and Farhi, 2019*b*; Bau and Matray, 2023). In this case, the TFP change in discrete time of the set of treated firms in industry

[38] We use the denomination "risk-adjusted cost of capital" rather than the generic "price of inputs" more commonly used in the misallocation literature to highlight the fact that dispersion in MRPK might come not from dispersion in wedges but instead mis-measurement in the dispersion of investment risks. As shown by David, Schmid and Zeke (2022), this can lead to over-estimate the amount of cross-sectional misallocation by up to 25%.

[39] In Section 2.1.1, we simplified notation and defined $f(.)$ as the *revenue* production function, which here is given by $p_i \times q_i(K_i)$. There, wedges are discussed in terms of shadow prices that explain the difference between the quantities a firm borrows and the price at which it can borrow.

J is given by:

$$\Delta TFP_{J,t} \approx \underbrace{\sum_{i \in J} \lambda_i \ \Delta \log A_i}_{\text{Technological efficiency}} + \underbrace{\sum_{i \in J} \lambda_i \ \alpha_i^x \ \frac{\tau_i^x}{1+\tau_i^x} \ \Delta \log x_i}_{\text{Allocative efficiency}} \tag{9}$$

where λ_i is the ratio of firm i's sales to industry J's net output, $\Delta \log A_i$ is the change in total factor productivity (TFPQ), α_i^x is the output elasticity with respect to x, τ_i^x is the level of firm-specific input wedges prior to the policy change, and $\Delta \log x_i$ is the change in the log input x consumed by firm i, which itself is endogenous to A_i. A derivation of this expression can be found in the appendix of Bau and Matray (2023).

We rewrite the "allocative efficiency" component of equation (9) and focus on capital below:

$$\sum_{i \in J} \lambda_i \ \alpha_J^k \ \frac{\tau_i}{1+\tau_i} \ \Delta \log K_i \tag{10}$$

$\Delta \log K_i$ is the growth rate in capital produced by the shock, λ_i is the share of a firm's sales in its industry (which is a scalar that does not affect the estimation of the reallocation of capital), and α_J^k is a production function parameter that is industry specific and therefore does not vary across firms within the same industry (or within a pre-determined cell such as an industry-by-size bin).

Equation (10) illustrates that an increase in the total amount of capital used by industry J—i.e., an increase in investment for the average firm—will not in itself mechanically increase industry TFP. The overall change in TFP can be negative if investment ($\Delta \log K_i > 0$) is concentrated among firms for which $\frac{\tau_i}{1+\tau_i} < 0$, such that the positive change in inputs is multiplied by a negative value. Since EXIM enters as an additional negative wedge, it may create or exacerbate allocative inefficiency by making it privately optimal for low MRPK firms to expand. Appendix D.5 illustrates this point graphically.

6.2 Estimating the Impact of EXIM on Misallocation

In theory, it is possible to assess if EXIM lowers or increases misallocation by directly correlating a firm's EXIM financing and its ex-ante wedges τ_i. Empirically, this requires measuring EXIM financing (which we directly observe), and the firm's τ_i (which we do not). Under the strong assumption that the empirical dispersion in MRPK is only produced by firms' heterogeneous wedges, it is possible to use equation (8) and the empirical variance of MRPK to recover the values of τ_i.

However, a well-documented empirical challenge of using cross-sectional dispersion in MRPK_i to infer τ_i is that the empirical dispersion in MRPK can also be correlated with other unobserved differences across firms, and therefore could be incorrectly attributed to differences in wedges. This upward bias in measures of misallocation has been shown to emerge from measurement error, model misspecification, volatility of productivity paired with the costly adjustment of inputs, or informational frictions and uncertainty.[40] In short: any unobserved heterogeneity across firms limits the researcher's ability to infer the firm wedge by inverting the empirical distribution of firms' MRPK.

We therefore adopt the methodology developed in Bau and Matray (2023), which controls for unobserved time-invariant differences across firms by estimating individual firms' heterogeneous changes in input usage to a policy. By restricting the estimation to using within-firm variation over time, this methodology requires milder identifying assumptions to estimate the effect of a policy on misallocation. Indeed, rather than attributing all the cross-sectional variation in MRPK to misallocation, this methodology studies how firms' input usage changes in relation to the firm's initial MRPK. This approach makes it possible to include firm fixed effects, which will account for all time invariant differences among firms that might generate MRPK dispersion in the data that is not directly related to the capital wedge, which is affected by the policy change. Therefore, even though Bau and Matray (2023) requires empirically estimating the initial distribution of MRPK, it is able to reduce the risk of wrongly attributing this empirical dispersion to misallocation by focusing solely on changes in firms' behavior.[41]

Measuring MRPK. In our baseline analysis, we construct MRPK in the data using the standard assumption in the production function estimation literature that firms have Cobb-Douglas revenue production functions and that within industries, MRPK can be approximated by the average return to capital:[42]

$$Revenue_{ijt} = TFPR_{ijt} K_{ijt}^{\alpha_j^k} \tag{11}$$

where i denotes a firm, j denotes an industry, and t denotes a year. $Revenue_{ijt}$, and K_{ijt} are measures of sales and capital and $TFPR_{ijt}$ is the firm-specific unobserved revenue productivity. In this case, $MRPK = \frac{\partial Revenue_{it}}{\partial K_{it}} = \alpha_j^k \frac{Revenue_{it}}{K_{it}}$. Thus, $\frac{Revenue_{it}}{K_{it}}$ provides a within-industry measure of MRPK, under the assumption that all firms in an industry share the same α_j^k.

In Appendix XX, we show that we obtain similar results when we fully estimate the production

[40] See Haltiwanger, Kulick and Syverson (2018) on model misspecification; Asker, Collard-Wexler and De Loecker (2014) and Kehrig and Vincent (2019) on costly adjustment of inputs; and David, Hopenhayn and Venkateswaran (2016) and David and Venkateswaran (2019) on informational frictions.

[41] Carrillo, Donaldson, Pomeranz and Singhal (2023) makes a similar argument for why looking at within-firm variation reduces mismeasurement in firm capital wedges. A somewhat related method would be to look directly at the changes in industry-level variance of (empirical) TFPR. While this method would also deal with the problem time invariant unobserved differences among firms that will produce dispersion in TFPR that are not related to dispersion in wedges, Bau and Matray (2022) shows that this change in industry variance in TFPR only identifies a change in misallocation in the data under the assumption of joint log-normality of TFPR and TFPQ, which in practice implies that firms with high and low capital wedges should react in the exact symmetric opposite way to the policy shock. Instead, the method we use allows for firms with high and low capital wedges to react differently. Detailed derivations and examples of cases where changes in industry variance in TFPR would be misattributed to changes in firm wedges when joint log-normality breaks can be found in Bau and Matray (2022).

[42] This assumption is for simplicity; the methodology accomodates any production function.

function following the control function approach of Olley and Pakes (1996), when we use the user-cost approach similar to Baqaee and Farhi (2019*a*), and if we compute the capital input cost wedge relative to other inputs under the assumption that the production function is a more general CES.

Estimating changes in misallocation from differential changes in capital allocation. Misallocation declines within industry J when the allocation of inputs changes such that TFP increases, which occurs when firms with high MRPK expand relatively more. We therefore directly estimate the differential response by firm type with the following regression:

$$\begin{aligned}
\Delta^{2014}[K_{i,j,t}] = {} & \beta_1 \ EXIM_i \times Post_{t\geq 2015} \times I_i^{High\ MRPK_{i\in j}} \\
& + \beta_2 \ EXIM_i \times Post_{t\geq 2015} \\
& + I_i^{High\ MRPK_{i\in j}} \otimes \left[\gamma_{j,t} + Exporter_{i,t_0} \times \delta_t + X_{i,t_0} \times \delta_t + \varepsilon_{i,j,t}\right] \qquad (12)
\end{aligned}$$

where $\Delta^{2014}[K_{i,j,t}]$ denotes the growth rate of capital between t and 2014, $I_i^{High\ MRPK_{i\in j}}$ is an indicator variable that takes the value one if firm i is above the industry (SIC 4-digit)-level median MRPK computed over 2010–2013, and $\otimes$ is the outer product so that we include all possible combinations of the different terms, which in particular allows for high MRPK firms to be on a different time trend.

β_1 measures the marginal effect of EXIM's shutdown on investment for firms with high MRPK relative to low MRPK. To the extent that $I_i^{High\ MRPK_{i\in j}} \approx I_i^{High\ \tau_i}$, equation (12) is the empirical counterpart to equation (10) (up to the two positive scalars). $\beta_1 < 0$ implies that capital differentially shrinks for firms with high ex-ante wedges, and capital misallocation rises. β_2 measures changes for low MRPK firms, and $\beta_1 + \beta_2$ measures the total effect on high MRPK firms. These coefficients therefore precisely capture the $\Delta \log K_i$ in equation (10) for high versus low τ_i firms.

This equation helps to clarify the advantage of our method relative to simply looking at the correlation between ex-ante MRPK and EXIM. Doing so would only estimate how EXIM matters for misallocation under the strict assumption that all the ex-ante cross-sectional variation in the empirical measures of MRPK is driven by variation in wedges. Instead, our method will identify effects on misallocation only if firms with ex-ante high MRPK differentially *change* the amount of capital they use, which we can interpret as EXIM changing the firm wedges, holding fixed all the other invariant characteristics that might correlate with the ex-ante measure of MRPK.

Identifying assumptions. Equation (12) is identified under the standard triple difference assumption that the *difference* between high and low MRPK firms have a parallel trend for EXIM financed vs. non-financed firms. This is a weaker identifying assumption than the one we require to estimate the average effect of EXIM in the DID setting. We do not need for high and low MRPK firms to be on the same parallel trend, since this is controlled for by the interaction of $I_i^{High\ \tau_i}$

with year fixed effects, nor do we require that EXIM-backed firms and non-backed firms evolve on parallel trends, since this is controlled for by $EXIM_i \times Post_{t\geq 2015}$.

A threat to identification would be a concurrent, unobserved shock to high MRPK firms that receive EXIM financing relative to low MRPK firms that receive financing, while high and low MRPK firms not backed by EXIM do not receive this shock.

Table 9 shows the results. We report the outcomes when we estimate separate regressions for a sample split by MRPK (columns 1, 2, 4, 5) or estimate a regression in the full sample with a triple interaction (columns 3 and 6). In the triple-difference regression, we directly control for EXIM-by-year fixed effects, which explains why the DID coefficient $EXIM_i \times Post_t$ is not estimated.

In columns 1–3, we estimate the change in capital across the MRPK distribution computed within the same industry. Firms with higher ex-ante MRPK are more affected by the shutdown of EXIM relative to low MRPK firms. While low MRPK firms are barely affected by the shock (6%, not statistically significant), high MRPK firms reduce their invesment by 17%, such that the difference between the two groups of firms increases by 12%.

These results indicate that capital contracts relatively more for high MRPK firms such that misallocation increases following EXIM's shutdown. We provide graphical evidence of this pattern in Figure 7. The figure shows a lack of pre-trends for both high and low MRPK firms, consistent with our identifying assumption, and it shows an increasing difference after EXIM's shutdown. The fact that only high MRPK firms react to EXIM's shutdown while low MRPK firms are mostly unaffected implies that the joint distribution of TFPR and TFPQ can no longer be log-normal.[43]

As we explain in our identifying assumption, our empirical design using within-firm changes in input allocation can identify changes in misallocation as long as the risk-adjusted cost of capital does not differentially change between high and low MRPK firms. However, even within an industry, high MRPK firms might reduce their investment more not because they now face lower wedges (a reduction in misallocation), but because their risk-adjusted cost of capital increased. This could be the case for instance if high MRPK firms are also smaller, and smaller firms face higher risks post EXIM shutdown.

Given this possibility, we provide robustness checks in columns 4–6 by sorting firms within their industry *and* quartile of size. We can include an interaction in the specification between all the fixed effects and the size-quartile fixed effects, implying that β_1 is now identified by comparing high vs. low MRPK firms that belong to the same industry and the same size bin. We find similar point

[43] The Sraer and Thesmar (2023) framework provides an alternative methodology for estimating changes in misallocation, but it also relies on the assumption that joint-normality is maintained after the policy shock. As detailed in Bau and Matray (2022), maintaining the joint log-normal distribution would imply that firms on both sides of the distribution react approximately to the same degree, such that the spread between high and low MRPK firms is reduced, while maintaining the average. The results in this paper provide additional empirical evidence in addition to, for instance, (Banerjee, Breza, Townsend and Vera-Cossio, 2020) or Bau and Matray (2023) in which this assumption is violated, and where it is necessary to use the Bau and Matray (2023) methodology.

estimates and if anything of larger magnitudes (18% vs. 12%).

Table 9: Impact on Capital Misallocation

Dependent variable	Investment					
MRPK sorting	SIC-4			SIC-4×Size quartile		
Sample	Low	High	All	Low	High	All
	(1)	(2)	(3)	(4)	(5)	(6)
$\text{EXIM}_i \times \text{Post}_t$	-0.056	-0.17		-0.041	-0.22	
	(0.038)	(0.055)		(0.042)	(0.062)	
	[0.14]	[0.0016]		[0.33]	[0.00042]	
$\text{EXIM}_i \times \text{Post}_t \times \text{I}_i^{\text{High MRPK}}$			-0.12			-0.18
			(0.067)			(0.074)
			[0.072]			[0.017]
Fixed Effects						
Exporter×Year	✓	✓	—	✓	✓	—
Industry×Year	✓	✓	—	—	—	—
Industry×Size quartile×Year	—	—	—	✓	✓	—
EXIM×Year	—	—	✓	—	—	✓
Fixed Effects (interacted)						
Exporter×Year	—	—	✓	—	—	✓
Industry×Year	—	—	✓	—	—	—
Industry×Size quartile×Year	—	—	—	—	—	✓
Observations	13,226	10,784	24,010	14,988	9,022	24,010

Notes: This table reports the estimated effects of EXIM's shutdown on firms' capital investment. MRPK is defined as average revenues over physical capital between 2010 and 2013. In columns 1–3, firms are sorted along their SIC-4 median. In columns 4–6, firms are sorted along the median of their SIC-4 × quartile of asset distribution. The dependent variable is the growth rate relative to 2014 (the year prior to the shock) defined as $\Delta Y_{i,t} = (Y_{i,t} - Y_{i,2014})/Y_{i,2014}$. $Post_t$ is an indicator variable equal to 1 for the years 2015 to 2019. $EXIM_i$ is an indicator variable that equals 1 if the firm received trade financing from EXIM over the pre-shutdown period. Exporter fixed effect is an indicator variable that equals 1 if the firm reports positive EXIM financing, foreign sales in Compustat Segment, exports in Datamyne, or taxable foreign income before 2014. Industries are SIC-2. Standard errors are clustered at the firm level and are reported in the line below the point estimate in parenthesis, and p-values are reported in brackets below them.

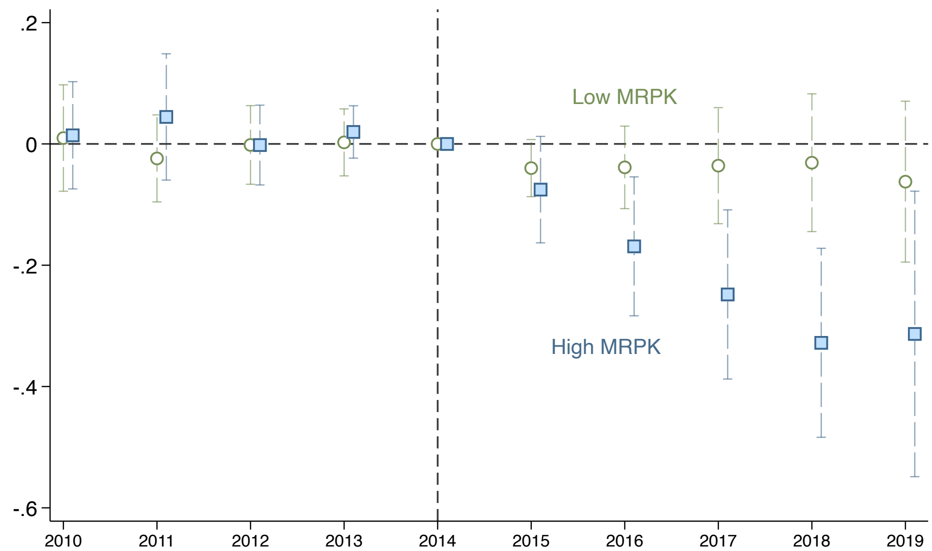
6.3 Interpretation of the Effects

Our results so far indicate that EXIM's shutdown increased capital misallocation among publicly listed firms. While we cannot speak to the effect on misallocation for the universe of firms, our results do not support the notion that EXIM's trade financing initially produced an inefficient allocation of resources.

We now discuss the structural interpretation of this result, and whether the reallocation of capital toward firms with lower marginal returns after EXIM's shutdown necessarily implies an increase in "*misallocation*." While this interpretation is not important for the empirical results per se, it may have different implications for the optimal design of export credit agencies in general.

Does $\beta_1 < 0$ imply that "misallocation" goes up? Our interpretation of results in Table 9 is

Figure 7: EXIM's Shutdown Amplifies Capital Misallocation



Notes: This figure plots the point estimate and 95% confidence intervals of investment for high and low MRPK firms when separately estimating equation (12) with industry-by-size, quartile-by-year, and exporter-by-year fixed effects. MRPK is computed as average revenues over physical capital between 2010 and 2013. "High MRPK" firms are firms with an MRPK value above their industry median. The dependent variable is the growth rate relative to 2014 (the year prior to the shock) defined as $\Delta Y_{i,t} = (Y_{i,t} - Y_{i,2014})/Y_{i,2014}$. Standard errors are clustered at the firm level.

that misallocation went down. A threat to this interpretation would be that the coefficient of the variable $EXIM_i \times Post_{t\geq 2015} \times MRPK_i$ is negative not because of a differential effect of EXIM's shutdown for firms with high vs. low wedges, but because it differentially affects the adjusted-risk cost of capital that exporting firms face.

Two points are worth discussing. First, even if the shutdown affected the risk-adjusted cost of capital, EXIM is able to increase overall output by reallocating capital toward high MRPK firms. Therefore, if a policy solely aims to maximize output, it does not matter whether EXIM acts on the allocation of capital by allowing high MRPK firms to expand because it reduces their input wedges or their risks more.

Second, to the extent that EXIM affects the average risk of investment, this effect is controlled for by the DID variable $EXIM_i \times Post_{t\geq 2015}$. Therefore, the only case where $EXIM_i \times Post_{t\geq 2015} \times MRPK_i$ would be negative not because of the *misallocation channel*, but because of the *risk-adjustment channel* is if EXIM reduces risks differentially for firms that initially faced higher risks (for instance if risk has some convexity). We view this as unlikely for two reasons:

1. In the firm level regression, we account for this possibility with the inclusion of a large set of firm controls interacted with year fixed effects to hold risk exposure constant, and show in particular that the misallocation results remain unchanged within size quartile.

2. In the aggregate product exports level regression, we include product-by-destination-by-year

fixed-effects, implying in this case that we identify the effect of EXIM on for exporters facing the same exporting risk, at the same point in time. Given that we find, if anything, larger point estimates (Table 2) after including those controls, β_1 can reasonably be interpreted as not being driven by a differential change in risk.

Our overall interpretation is thus that EXIM's larger effect on high MRPK firms is evidence that EXIM matters more for firms with higher wedges (τ).

Combined wedge, input wedge and output markup. So far, we have assumed that the only source of variation in MRPK among similar firms is the existence of an input wedge τ_i. However, it is also possible that firms might vary along their ability to change an output wedge μ_i. In this case, we can define an overall wedge as: $1 + \tau_i = \mu_i(1 + \tilde{\tau}_i)$, where $\tilde{\tau}_i$ is solely the input cost wedge, and μ_i is the output wedge. Our results do not take a stance on whether EXIM's shutdown increased misallocation by leading firms with ex-ante high MRPK to contract their investment more because it increased the firm input price wedge $\tilde{\tau}$ or because firms increased their output markup μ.

However, this additional decomposition is not necessary in our context for two reasons. First from the perspective of maximizing aggregate output in the economy, the decomposition of the overall wedge τ between μ and $\tilde{\tau}$ is irrelevant. Because the increase in output from an improved allocation of inputs are the same whether this improvement comes from capital being allocated more to firms with a higher transformation rate into output (high MRPK), or because firms with higher output wedges invest more, or because firms with higher input wedges invest more.

Second, standard macro and trade models assume that consumers aggregate goods with CES preferences and have constant elasticities across goods, which implies that markups can differ across firms, but are time-invariant within firms.[44] Given that we identify the within-firm changes in capital allocation, these frameworks would conclude that removing EXIM financing reduced investment because it increased firms input wedges ($\tilde{\tau}$) rather than because firms were able to charge even higher output markup (μ).

6.4 Discussion of EXIM as Industrial Policy

We have shown that EXIM raises average output while reducing capital misallocation within a set of firms that acount for a large share of economic activity. We now provide a discussion of EXIM's interaction with the broader economy. First, we discuss the potential costs of financing the bank through tax revenues, which may require raising distortive taxes elsewhere in the domestic economy. Second, we use our framework to illustrate how EXIM could target classic industrial policy goals.

[44] For instance, in Melitz (2003) the only gain from trade comes from a reallocation of inputs across firms. See Atkeson and Burstein (2008) for the introduction of variable markups within firms.

6.4.1 EXIM Profitability

Unlike private commercial banks, ECAs operate as government-backed agencies that theoretically have access to tax revenues, implying they may not be constrained by a profitability condition. If these institutions can benefit from tax transfers, public financing would then require levying (potentially distortive) taxes, which would impose a cost on the taxed sectors.

Profitability requires that ECAs operate at a price above its own marginal cost by charging a positive mark-up: $r_{i,m}^{ECA} = MC_{i,m}^{ECA} + \mu_{i,m}^{ECA}$. First, we show in Appendix D.4 that ECAs only need to offer financing at a price lower than a firm's shadow price of capital ($r_{i,m}^{ECA} < r_{i,m}^{\tau}$), which is potentially higher than the market price.

Second, relative to private banks, ECAs may have different marginal costs as discussed in section XX. In EXIM's case, its marginal costs may be lower because as a US government agency, it has access to different contract enforcement technologies that raises its recovery rates. In addition, EXIM does not need to pay the high costs of regulatory compliance that govern private commercial banks' domestic and international operations. EXIM's lower marginal cost does *not* come from accessing the US government's cost of capital, as EXIM has historically paid interest to the Treasury on its balance sheet at a higher rate than the 30-year Treasury bond rate (Appendix D.2.4).

Third, by operating with a dual objective of both maximizing profits and boosting exports, ECAs would optimally charge lower mark-ups than a purely profit-maximizing bank. They therefore resemble government-owned banks in other development contexts, such as in Brazil (Fonseca and Matray, 2024) or Thailand (Assuncao, Mityakov and Townsend, 2022).

We systematically collect the balance sheets and income statements from EXIM's annual reports, which allows us to reconstruct EXIM's profitability. Empirically, we find that EXIM generated total profits of over \$480 million during the period of our study with default rates of 0.3%. These results are consistent with the institutional constraints on ECAs that require that they are self-financing.

6.4.2 EXIM as a Tool for Other Industrial Policy Objectives

Industrial policies typically aim to subsidize firms that feature external economies of scale because the privately optimal amount of investment is lower than the social optimum.

More generally, there might exist positive or negative social externalities that vary across sectors j, firms i, markets m, or dynamically over time t, which justify government interventions in the economy. We denote the input wedge that separates the private optimum from the social optimum as τ^s, which can be either negative (in the case of a negative externality) or positive (for a positive externality like external economies of scale).

$$\text{MRPK}_{j,i,m,t} = (1 + \underbrace{\tau_s}_{\text{Social wedge}} - \underbrace{EXIM_{i,j,m,t}}_{\text{Financing friction targeted by EXIM}}) \times r_{j,i,m,t} \qquad (13)$$

The formulation in equation 13 shows that the extent to which EXIM's financing moves the economy closer to or further away from the social optimum depends on the correlation between the trade financing wedges for firms i, j, m at time t, and the broader social wedges carried by these firms. A strong correlation would imply that EXIM is able to target other social wedges while meeting its primary objective of providing trade financing. For example, many advanced economies have tilted their industrial policies towards speeding up the green energy transition. To the extent that firms producing and innovating in that sector face financing constraints in exporting their products, EXIM targets both objectives. Similarly, financing firms that help the US to decouple from China and encouraging trade with certain nations may serve broader geopolitical stability goals. By contrast, a negative correlation would generate a trade-off between EXIM's mission of reducing trade financing wedges, and the social planner's goals.

Ultimately, the interaction between EXIM's objective and other socially desirable motives raises the broader question of complementarities among industrial policies. An advantage of EXIM (and other programs featuring targeted transactions-based interventions) is that it can plausibly target social wedges without introducing other costly distortions. However, the extent to which ECAs in fact target such wedges is an empirical question that is outside the scope of this paper.

7 Conclusion

Can governments boost exports by providing targeted trade financing? The results in this paper, based on the natural experiment of the US EXIM's temporary shutdown, suggests that the answer is yes. When EXIM's sudden closure cut off financing to the exporters it had previously supported, they experience lower growth in revenues and cut back their capital and employment. These effects are particularly pronounced for financially constrained firms and for exports to riskier and less financially developed markets, consistent with EXIM financing alleviating credit constraints. In aggregate, US industries more dependent on EXIM support experience lower growth in exports than those that did not.

Taken together, the effects of the EXIM lapse we document are not consistent with the idea that EXIM is a pure wealth transfer from taxpayers to unconstrained firms. In addition, while the EXIM-dependent firms shrank considerably, this effect was more (not less) pronounced for firms that had higher marginal returns to capital before the shock. We also find no evidence that the profit rates of firms cut off from EXIM financing decreased, which indicates that these firms were not just pocketing artificially high windfall profits prior to the shutdown.

Our findings indicate that EXIM had a positive effect on US exports prior to its shutdown, which speaks to a renewed debate on the circumstances in which industrial policy can be successful in supporting the domestic economy (e.g., Juhász, Lane and Rodrik, 2023). Nonetheless, it is necessary to be cautious in the generalization of our results.

First, our analysis estimates the effect of EXIM within its operational environment. It does not speak to the optimal size of ECA support, nor does it imply that these programs would continue to have the positive effects that we find if they operated at much larger scale. EXIM's ability to generate positive output effects without raising misallocation, while plausibly remaining profitable, arises from firms being financially constrained in the private market. If there are other policy interventions or more ECA intervention, the overall input wedges that firms face would likely shrink, which could reduce the marginal impact of additional support. If these wedges are sufficiently small, ECA support may only have inframarginal impact and in fact may increase capital misallocation.

Second, while we find that EXIM reduces capital misallocation among listed firms, we do not observe the universe of the US economy and we cannot rule out that EXIM increased misallocation once we account for the impact on private firms. Third, our research design cannot, by construction, examine the general equilibrium effects of the EXIM's programs both on the US economy, and more generally on the global economy. Understanding how our micro estimates aggregate to the macro level, and how countries interact in the market for export credit subsidies, represents a fruitful avenue for future work.

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Online Appendix for
"EXIM's Exit: The Real Effects of Trade Financing by Export Credit Agencies"

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A Additional Tables

Table A.1: Impact on US Product Exports: Robustness to Alternative Control Group

Dependent variable	Exports					
Level of aggregation	HS-4	HS-6	HS-6×Destination	HS-6×Destination		
	(1)	(2)	(3)	(4)	(5)	(6)
$\text{EXIM}_{p,o}\times\text{Post}_t$	-3.14	-3.14	-3.14	-2.45	-2.72	
	(1.79)	(1.79)	(1.79)	(1.56)	(1.76)	
	[0.079]	[0.079]	[0.079]	[0.12]	[0.12]	
$\text{EXIM}_{p,o}\geq 0.45\%\times\text{Post}_t$						-0.058
						(0.017)
						[0.00051]
Fixed Effects						
Origin×Year	✓	✓	✓	✓	✓	✓
Product (4-digit)×Year	✓	✓	✓	—	—	—
Product (6-digit)×Year	—	—	—	✓	—	—
Product (6-digit)×Destination×Year	—	—	—	—	✓	✓
Observations	65,862	6,808,567	20,528,380	20,528,380	20,528,380	20,528,380

Notes: This table reports estimates on the effect of EXIM's shutdown on total export at the product-by-destination level taken from BACI. The dependent variable is the exports growth rate of origin country o (exporter) to destination country d (importer) of product p at time t relative to 2014 (the year prior to the shock), and is defined as $\Delta Y_{p,o,d,t} = (Y_{p,o,d,t} - Y_{p,o,d,2014})/[(Y_{p,o,d,t} + Y_{p,o,d,2014}) \times 0.5]$. The sample includes a control group of other exporter countries o with similar export patterns as the US. The control group is defined as the five OECD countries with the highest overlap with the US in their vector of export market shares across products and destinations. EXIM intensity (EXIM_{po}) in columns 1-5 is defined as the total amount of EXIM (in \$) over total exports (in \$) over the period 2007–2010. In column 6, $\text{EXIM}_{po} \geq 0.45\%$ is an indicator variable for a product being in the top quartile of treatment value. In columns 1–3, the coefficients and standard errors are identical by construction of the midpoint growth estimator (Beaumont, Matray and Xu, 2024). Standard errors are clustered at the HS-4 level and are reported in the line below the point estimate in parenthesis, and p-values are reported in brackets below them.

Table A.2: Impact on US Product Exports: Robustness to Alternative Weighting

Dependent variable	Exports			
Weighting	EW	VW: 1%	VW, invariant: 5%	VW, invariant: 1%
	(1)	(2)	(3)	(4)
$\text{EXIM}_{p,o} \times \text{Post}_t$	-3.72	-5.77	-5.36	-5.24
	(1.89)	(2.57)	(2.32)	(2.41)
	[0.049]	[0.025]	[0.021]	[0.030]
Fixed Effects				
Origin×Year	✓	✓	✓	✓
Product (6-digit)×Destination×Year	✓	✓	✓	✓
Observations	24,143,761	24,143,761	24,143,660	24,143,660

Notes: This table reports estimates on the effect of EXIM's shutdown on total export at the product-by-destination level taken from BACI. The dependent variable is the exports growth rate of origin country o (exporter) to destination country d (importer) of product p at time t relative to 2014 (the year prior to the shock), and is defined as $\Delta Y_{p,o,d,t} = (Y_{p,o,d,t} - Y_{p,o,d,2014})/[(Y_{p,o,d,t} + Y_{p,o,d,2014}) \times 0.5]$. The sample includes a control group of other exporter countries o with similar export patterns as the US. EXIM intensity is defined as the total amount of EXIM (in \$) over total exports (in \$) over the period 2007–2010. In column 1, the regression is equally weighted at the product (HS-6)-exporter-year level. In column 2, regression weights are winsorized at 1%. In columns 3 and 4, we use time-invariant weights based on the average exports value at the product (HS-6)-exporter-year level over the pre-shutdown period. Standard errors are clustered at the HS-4 level and are reported in the line below the point estimate in parenthesis, and p-values are reported in brackets below them.

Table A.3: Impact on Firm-level Maritime Exports: Robustness to Different Measures

Dependent variable	Maritime Exports				
			Metric tons		
$\text{EXIM}_i \times \text{Post}_t$	-0.20	-0.19	-0.20	-0.18	-0.26
	(0.022)	(0.021)	(0.022)	(0.020)	(0.051)
	[6.6e-18]	[4.1e-18]	[1.6e-19]	[1.3e-17]	[0.00000026]
			Containers		
$\text{EXIM}_i \times \text{Post}_t$	-0.18	-0.17	-0.19	-0.16	-0.25
	(0.023)	(0.022)	(0.022)	(0.021)	(0.045)
	[1.9e-15]	[3.0e-15]	[5.2e-17]	[6.0e-15]	[0.000000020]
			Value		
$\text{EXIM}_i \times \text{Post}_t$	-0.17	-0.16	-0.17	-0.15	-0.28
	(0.021)	(0.020)	(0.020)	(0.018)	(0.034)
	[7.5e-15]	[2.2e-15]	[7.4e-17]	[1.3e-16]	[7.0e-16]
Fixed Effects					
Post	✓	—	—	—	—
Product×Post	—	✓	—	—	—
Destination×Post	—	—	✓	—	—
Product×Destination×Post	—	—	—	✓	✓
Observations	1,855,542	1,855,542	1,855,542	1,855,542	144,404

Notes: This table reports the estimated effects of EXIM's shutdown on firms' maritime exports from Datamyne. Data are collapsed as an average pre (up to 2014) and post period (2015–2019). Growth rates are based on the Beaumont, Matray and Xu (2024) estimator, and defined as $\Delta Y_{i,t} = (Y_{i,t} - Y_{i,t \leq 2014})/[(Y_{i,t} + Y_{i,t \leq 2014}) \times 0.5]$. $Post_t$ is an indicator variable equal to 1 for the years 2015 to 2019. $EXIM_i$ is an indicator variable that equals 1 if the firm received trade financing from EXIM over the pre-shutdown period. Product fixed effects are at the HS-4 level, and destination fixed effects are at the country level. Regressions are value weighted by firm exports. The number of observations is based on Maritime Exports measured in terms of "Value." Standard errors are clustered at the HS-4 level, and are reported in the line below the point estimate in parenthesis, and p-values are reported in brackets below them.

Table A.4: Impact on Firm-level Maritime Exports: Robustness to Equal Weighting

Dependent variable	Maritime Exports				
			Teus		
$\text{EXIM}_i \times \text{Post}_t$	-0.48	-0.45	-0.46	-0.39	-0.25
	(0.030)	(0.024)	(0.028)	(0.023)	(0.046)
	[4.7e-52]	[7.2e-69]	[3.3e-53]	[9.6e-56]	[0.000000071]
			Metric tons		
$\text{EXIM}_i \times \text{Post}_t$	-0.49	-0.45	-0.47	-0.39	-0.26
	(0.031)	(0.024)	(0.029)	(0.023)	(0.051)
	[5.3e-51]	[4.0e-68]	[8.2e-52]	[5.0e-55]	[0.00000026]
			Containers		
$\text{EXIM}_i \times \text{Post}_t$	-0.49	-0.45	-0.47	-0.39	-0.25
	(0.030)	(0.024)	(0.029)	(0.023)	(0.045)
	[7.5e-53]	[2.5e-70]	[3.7e-54]	[2.6e-57]	[0.000000020]
			Value		
$\text{EXIM}_i \times \text{Post}_t$	-0.43	-0.38	-0.40	-0.33	-0.28
	(0.028)	(0.024)	(0.027)	(0.023)	(0.034)
	[2.4e-47]	[2.1e-53]	[4.0e-46]	[1.8e-42]	[7.0e-16]
Fixed Effects					
Post	✓	—	—	—	—
Product×Post	—	✓	—	—	—
Destination×Post	—	—	✓	—	—
Product×Destination×Post	—	—	—	✓	✓
Observations	1,855,542	1,855,542	1,855,542	1,855,542	144,404

Notes: This table reports the estimated effects of EXIM's shutdown on firms' maritime exports from Datamyne. Data are collapsed as an average pre (up to 2014) and post period (2015–2019). Growth rates are based on the Beaumont, Matray and Xu (2024) estimator, and defined as $\Delta Y_{i,t} = (Y_{i,t} - Y_{i,t\leq 2014})/[(Y_{i,t} + Y_{i,t\leq 2014}) \times 0.5]$. $Post_t$ is an indicator variable equal to 1 for the years 2015 to 2019. $EXIM_i$ is an indicator variable that equals 1 if the firm received trade financing from EXIM over the pre-shutdown period. Product fixed effects are at the HS-4 level, and destination fixed effects are at the country level. Regressions are equally weighted. The number of observations is based on Maritime Exports measured in terms of "Value." Standard errors are clustered at the HS-4 level, and are reported in the line below the point estimate in parenthesis, and p-values are reported in brackets below them.

Table A.5: Impact on Firm Revenues: Robustness to Different Industry Definitions

Dependent variable	Total revenues			
	(1)	(2)	(3)	(4)
$\text{EXIM}_i \times \text{Post}_t$	-0.13	-0.12	-0.10	-0.13
	(0.033)	(0.035)	(0.032)	(0.044)
	[0.000038]	[0.00072]	[0.0017]	[0.0031]
Fixed Effects				
Exporter×Year	✓	✓	✓	✓
Industry (1-digit)×Year	✓	—	—	—
Industry (2-digit)×Year	—	✓	—	—
Industry (3-digit)×Year	—	—	✓	—
Industry (4-digit)×Year	—	—	—	✓
Observations	25,174	25,174	25,174	25,174

Notes: This table reports the estimated effects of EXIM's shutdown on firms' total revenue growth. The dependent variable is the growth rate relative to 2014 (the year prior to the shock) defined as $\Delta Y_{i,t} = (Y_{i,t} - Y_{i,2014})/Y_{i,2014}$. $Post_t$ is an indicator variable equal to 1 for the years 2015 to 2019. $EXIM_i$ is an indicator variable that equals 1 if the firm received trade financing from EXIM over the pre-shutdown period. Exporter fixed effect is an indicator variable that equals 1 if the firm reports positive EXIM financing, foreign sales in Compustat Segment, exports Datamyne, or taxable foreign income before 2014. Standard errors are clustered at the firm level and are reported in the line below the point estimate in parenthesis, and p-values are reported in brackets below them.

Table A.6: Impact on Firm Revenues by Separate EXIM Programs

Dependent variable	Total revenues			
	(1)	(2)	(3)	(4)
$\text{EXIM (working cap)}_i \times \text{Post}_t$	-0.15		-0.12	
	(0.053)		(0.074)	
	[0.0058]		[0.10]	
$\text{EXIM (insurance)}_i \times \text{Post}_t$		-0.13		-0.13
		(0.043)		(0.049)
		[0.0025]		[0.0095]
Fixed Effects				
Exporter×Year	✓	✓	✓	✓
Industry×Year	✓	✓	✓	✓
Size×Year	✓	✓	✓	✓
Observations	24,448	24,775	24,448	24,775

Notes: This table reports the estimated effects of EXIM's shutdown on firms' total revenue growth. The dependent variable is the growth rate relative to 2014 (the year prior to the shock) defined as $\Delta Y_{i,t} = (Y_{i,t} - Y_{i,2014})/Y_{i,2014}$. *EXIM* (working cap)$_i$ is an indicator variable that takes the value one if the firm received EXIM financing under EXIM's lending program. *EXIM* (insurance)$_i$ is an indicator variable that takes the value one if the firm received EXIM financing under EXIM's insurance program. Regressions are unweighted in columns 1 and 2, and they are value weighted by firm exports in columns 3 and 4. $Post_t$ is an indicator variable equal to 1 for the years 2015 to 2019. $EXIM_i$ is an indicator variable that equals 1 if the firm received trade financing from EXIM over the pre-shutdown period. Exporter fixed effect is an indicator variable that equals 1 if the firm reports positive EXIM financing, foreign sales in Compustat Segment, exports Datamyne, or taxable foreign income before 2014. Industries are SIC-4. Standard errors are clustered at the firm level and are reported in the line below the point estimate in parenthesis, and p-values are reported in brackets below them.

Table A.7: Impact on Employment, Capital, and Profit Rates: Robustness to Different Weighting

Dependent variable	Revenues	Tangible capital	Intangible capital	Employment	Profit margin
	(1)	(2)	(3)	(4)	(5)
			Equal weight		
$\text{EXIM}_i \times \text{Post}_t$	-0.15	-0.12	-0.14	-0.077	-0.015
	(0.032)	(0.032)	(0.034)	(0.026)	(0.014)
	[0.0000029]	[0.00017]	[0.000060]	[0.0030]	[0.29]
			Value weight: winsor 1%		
$\text{EXIM}_i \times \text{Post}_t$	-0.098	-0.17	-0.19	-0.088	-0.0027
	(0.036)	(0.058)	(0.066)	(0.035)	(0.0048)
	[0.0065]	[0.0041]	[0.0042]	[0.011]	[0.58]
Fixed Effects					
Exporter×Year	✓	✓	✓	✓	✓
Industry×Year	✓	✓	✓	✓	✓
Observations	25,174	24,635	25,015	22,902	25,174

Notes: This table reports the estimated effects of EXIM's shutdown on various firm outcomes. Intangible capital is measured following Peters and Taylor (2017). Net profit margin is measured as net income over revenues. The dependent variable is the growth rate relative to 2014 (the year prior to the shock) defined as $\Delta Y_{i,t} = (Y_{i,t} - Y_{i,2014})/Y_{i,2014}$. $Post_t$ is an indicator variable equal to 1 for the years 2015 to 2019. $EXIM_i$ is an indicator variable that equals 1 if the firm received trade financing from EXIM over the pre-shutdown period. Exporter fixed effect is an indicator variable that equals 1 if the firm reports positive EXIM financing, foreign sales in Compustat Segment, exports in Datamyne, or taxable foreign income before 2014. Industries are SIC-2. Standard errors are clustered at the firm level and are reported in the line below the point estimate in parenthesis, and p-values are reported in brackets below them.

Table A.8: Impact on Employment, Capital, and Profit Rates: Robustness to LHS Winsorization

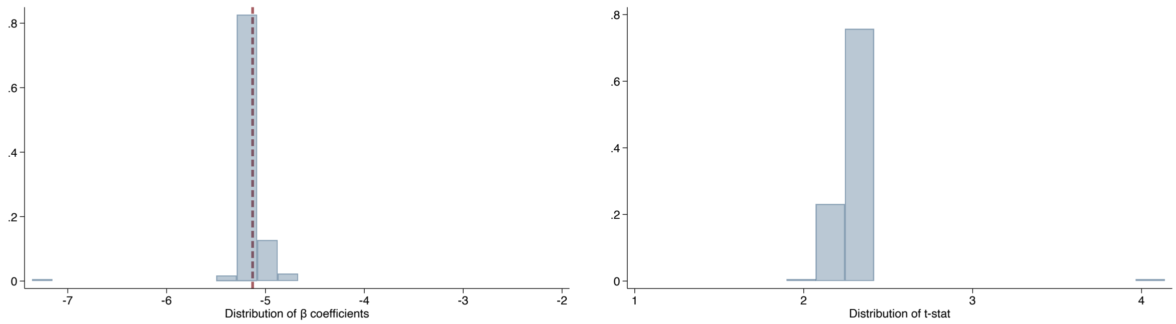
Dependent variable	Revenues	Tangible capital	Intangible capital	Employment	Profit margin
	(1)	(2)	(3)	(4)	(5)
			LHS: winsor 1%		
$\text{EXIM}_i \times \text{Post}_t$	-0.16	-0.20	-0.29	-0.12	0.00033
	(0.044)	(0.059)	(0.068)	(0.040)	(0.0062)
	[0.00028]	[0.00079]	[0.000017]	[0.0023]	[0.96]
			LHS: winsor 3× interquartile		
$\text{EXIM}_i \times \text{Post}_t$	-0.10	-0.11	-0.13	-0.092	0.0010
	(0.033)	(0.039)	(0.038)	(0.033)	(0.0052)
	[0.0019]	[0.0030]	[0.00069]	[0.0057]	[0.84]
			LHS: midpoint growth		
$\text{EXIM}_i \times \text{Post}_t$	-0.075	-0.11	-0.11	-0.056	0.0015
	(0.032)	(0.038)	(0.035)	(0.059)	(0.0059)
	[0.019]	[0.0051]	[0.0013]	[0.35]	[0.80]
Fixed Effects					
Exporter×Year	✓	✓	✓	✓	✓
Industry×Year	✓	✓	✓	✓	✓
Observations	25,174	24,795	25,036	23,605	25,174

Notes: This table reports the estimated effects of EXIM's shutdown on various firm outcomes. Intangible capital is measured following Peters and Taylor (2017). Net profit margin is measured as net income over revenues. The dependent variable is the growth rate relative to 2014 (the year prior to the shock) defined as $\Delta Y_{i,t} = (Y_{i,t} - Y_{i,2014})/Y_{i,2014}$. $Post_t$ is an indicator variable equal to 1 for the years 2015 to 2019. $EXIM_i$ is an indicator variable that equals 1 if the firm received trade financing from EXIM over the pre-shutdown period. Exporter fixed effect is an indicator variable that equals 1 if the firm reports positive EXIM financing, foreign sales in Compustat Segment, exports in Datamyne, or taxable foreign income before 2014. Industries are SIC-2. Standard errors are clustered at the firm level and are reported in the line below the point estimate in parenthesis, and p-values are reported in brackets below them.

B Additional Figures

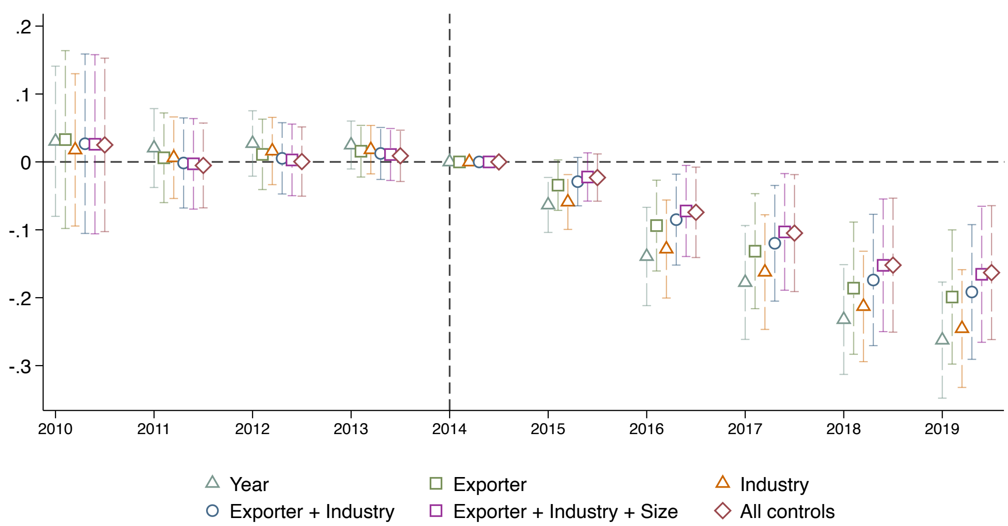
Figure B.1: US Export Effects Excluding Products Individually: Distribution of β and t-stats

(a) β (b) t-stat



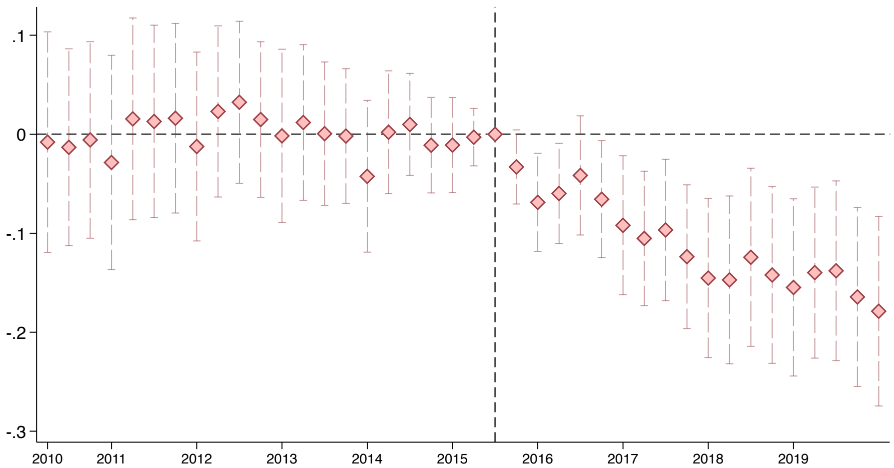
Notes: This figure reports the distribution of β and t-stats for the average effect of EXIM's shutdown on aggregate export at the product-by-destination level taken from BACI, as estimated in Table 2, when we exclude products (HS-4) one-by-one. Panel (a) plots the $\hat{\beta}$ reported in Table 2 column 5 in the vertical red dotted line. The dependent variable is the exports growth rate of origin country o (exporter) to destination country d (importer) of product p at time t relative to 2014 (the year prior to the shock), and is defined as $\Delta Y_{p,o,d,t} = (Y_{p,o,d,t} - Y_{p,o,d,2014})/[(Y_{p,o,d,t} + Y_{p,o,d,2014}) \times 0.5]$. The sample includes a control group of other exporter countries o with similar export patterns as the US. Standard errors are clustered at the HS-4 level.

Figure B.2: Impact of EXIM's Shutdown on Total Revenues: Robustness to Multiple Specifications



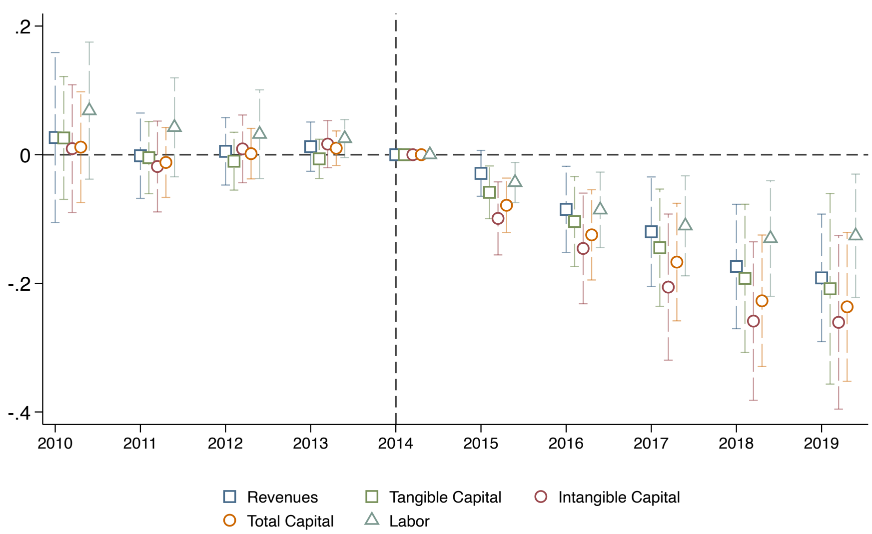
Notes: This figure shows the point estimates and 95% confidence intervals when estimating equation (5) and progressively including more stringent sets of fixed effects. The dependent variable is the growth rate relative to 2014 (the year prior to the shock) defined as $\Delta Y_{i,t} = (Y_{i,t} - Y_{i,2014})/Y_{i,2014}$. Standard errors are clustered by firm.

Figure B.3: EXIM's Shutdown and Quarterly Firm Revenues



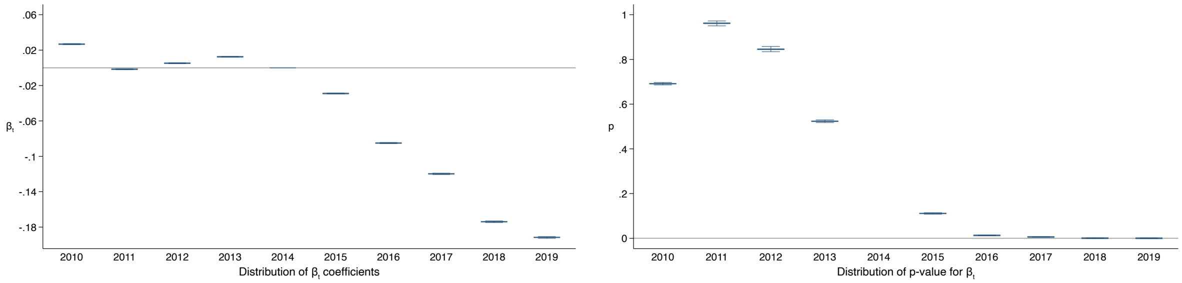
Notes: This figure plots the point estimate and 95% confidence intervals when estimating equation (5) with quarterly firm total revenues including industry-by-year and exporter-by-year fixed effects. The omitted time period is the second quarter of 2015, corresponding exactly to the quarter of EXIM's shutdown (July, 2015). The dependent variable is the growth rate relative to 2014 (the year prior to the shock) defined as $\Delta Y_{i,t} = (Y_{i,t} - Y_{i,2014})/Y_{i,2014}$. Standard errors are clustered by firm.

Figure B.4: Impact of EXIM's Shutdown on Other Firm Outcomes



Notes: This figure plots the point estimate and 95% confidence intervals when estimating equation (5) for the following outcomes: total revenues, tangible capital (PP&E), intangible capital (Peters and Taylor, 2017), total capital (tangible + intangible), and employment. The dependent variable is the growth rate relative to 2014 (the year prior to the shock) defined as $\Delta Y_{i,t} = (Y_{i,t} - Y_{i,2014})/Y_{i,2014}$. Standard errors are clustered by firm.

Figure B.5: Firm-level Effects Excluding Industries Individually: Distribution of β and p-values

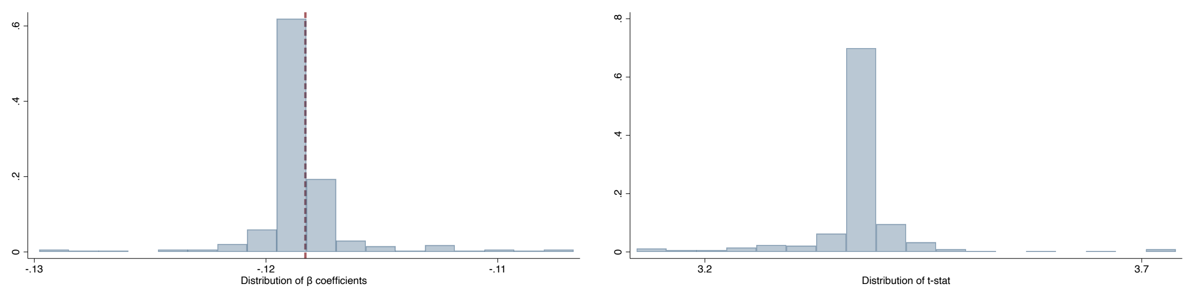


Notes: This figure reports the distribution of β and p-values for the firm-level event study in Figure 5 when we exclude industries (SIC-4) one-by-one. The dependent variable is the growth rate relative to 2014 (the year prior to the shock) defined as $\Delta Y_{i,t} = (Y_{i,t} - Y_{i,2014})/Y_{i,2014}$. Standard errors are clustered by firm.

Figure B.6: Firm-level Effects Excluding Industries Individually: Distribution of β and t-stats

(a) β

(b) t-stat



Notes: This figure reports the distribution of β and t-stat for the average effect of EXIM's shutdown on firm revenue, as estimated in Table 5, when we exclude industries (SIC-4) one-by-one. Panel (a) plots the $\hat{\beta}$ reported in Table 5 column 5 in the vertical red dotted line. The dependent variable is the growth rate relative to 2014 (the year prior to the shock) defined as $\Delta Y_{i,t} = (Y_{i,t} - Y_{i,2014})/Y_{i,2014}$. Standard errors are clustered by firm.

C Additional Details on Data Construction

C.1 Matching between EXIM and Compustat & Datamyne

Algorithmic match. All datasets are collapsed at the unique level of name (firm name), city and state. EXIM and Datamyne contains geographical information about the state and the city. Compustat does not contain city names but, it does contain the zipcode of the firm's headquarters, which allows us to recover the name of the city in which the firm is located. We harmonize the name of cities across datasets when needed. We harmonize the different company names in the usual way by removing punctuation signs, removing trailing incorporation status ("inc," "LLC," etc.) and harmonizing obvious typos errors in name (e.g., "internatoinal" becomes "international"). The details of the harmonization code can be directly obtained from the new STATA command **strclean** created for this purpose (Matray and Xu, 2024).

We match the loans in EXIM to Compustat and to Datamyne separately. For each match, we follow three steps.

In steps one and two, we impose exact matching on state and cities, and we use a fuzzy name merge using the reclink2 STATA package (Wasi and Flaaen, 2015) where we impose a threshold of word similarity of 99% and then 95%. We do so in an iterative process so that we remove matched firms with a score of 99% before starting the new procedure with a threshold of 95%.

In step 3, we merge only based only on firm names to allow for errors or noise in the reporting of the city or state variables. For example, a firm may be registered in a different city between two datasets. At this final stage, given the higher risk of false positives, we impose a 99% fuzzy score threshold.

Manual verification. We manually inspect all the potential matches that were generated algorithmically in steps one to three. The companies we did not consider a match usually fit into one of the following three categories. The first category are companies with equivalent names but different company endings where it is unclear whether or not a potential match refers to the same company. For example, "Barnett Corp" and "Barnett Inc" could easily be mistaken to refer to the same company, and both are based in the United States. However, the former produces paper products and the latter distributes plumbing and electrical equipment, so we do not treat them as a match. The second category are companies with relatively generic or common names, such as "General Technologies," of which there are many different firms worldwide. In many of these cases, we cannot know exactly whether a firm is a match or not, so we keep them unmatched. The third category are cases of holding or group companies that may refer to several firms. For example, "Magna Group" could refer to the Canadian car parts manufacturer or to Magna International, the Korean subsidiary of lubricant producer ITW PP & F headquartered in Shanghai, or several other chemical companies called Magna. In these cases, we also do not treat them as matches.

C.2 Data cleaning

Compustat. We start with the universe of Compustat. We remove financials (sic = 6) and utilities (sic= 49) as well as "foreign government entities" (sic= 8888) and "international affairs and non operating establishments" (sic= 9). We also drop observations for which the fiscal year is missing and observations where the number of fiscal periods is less than 12 months (variable $pddur \neq 12$).

Given our focus on US firms, we remove foreign firms ($fic \neq$ "USA") and firms with headquarters outside the US ($loc \neq$ "USA").

We drop observations with negative or missing revenues ($sale$) and assets (at). In the remaining rare cases of duplicates within a gvkey-year, we sort firms by gvkey and date and keep the first observation.

We restrict the observations to years 2010 and 2019, and we remove firms that enter after the year of the shock, 2014. We also require being able to observe the firm in 2014.

In the baseline analysis, all firm-level variables that are calculated as ratios or growth rates are winsorized at the 5% level.

BACI. BACI corresponds to the raw Comtrade data that have already been cleaned and harmonized, so the data requires limited cleaning. We impose two filters.

1. Remove importers that are not defined (ISO code "NA")

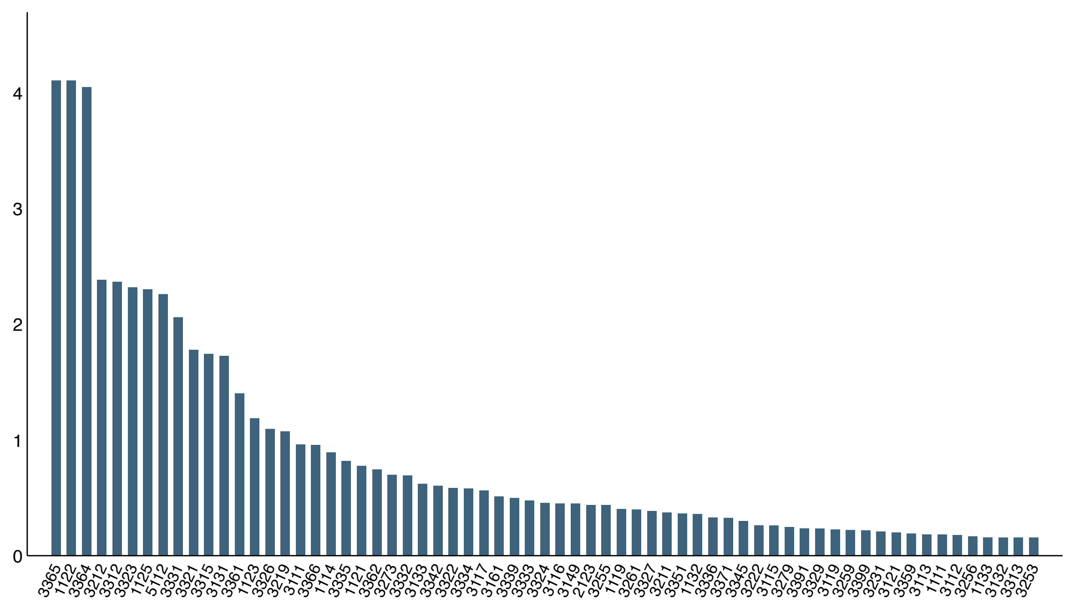
2. Remove from the data the cells where the US never exports. We do this because our preferred specification when studying the effect of EXIM on aggregate export includes destination-by-product (HS6) fixed effects interacted with year fixed effects ($\gamma_{p,d,t}$). As a result, this set of fixed effects restricts the identifying variation to destination-product-year cells in which the US exports. Including all the data yields quantitatively similar results.

EXIM loan database. This loan database provides information on the specific type of financing instrument (loan, guarantee, etc), the name of the US exporting firm, the NAICS code for the US product being exported, and the value of financial support. We include all financial instruments and for ease of explication, we call them all "loans." Not all loans specify the export product, so these observations are not included in the product-level measure of EXIM exposure ($EXIM_{p,o}$); this pertains to 3% of observations and 13% of the overall value of loans in the pre-shutdown period. Not all loans specify a specific firm (because multiple firms are funded), and these observations are not included in the firm-level measure of EXIM exposure ($EXIM_i$); this pertains to 4% of observations and 16% of the overall value of loans. There are 1.6% of observations and 12% of the overall value of funding that appears in neither measure (because a single loan is authorized to fund multiple firms and the export product is not specified).

Figure C.1 shows the distribution across NAICS4, conditional for the industry of having at least 0.15% of its exports financed by EXIM. The top 10 industries are: "Hog and Pig Farming" (1122), "Railroad Rolling Stock Manufacturing" (3365), "Aerospace Product and Parts Manufacturing" (3364),"Veneer, Plywood and Engineered Wood Product Manufacturing" (3212), "Steel Product

Manufacturing from Purchased Steel" (3312), "Architectural and Structural Metals Manufacturing" (3323), "Aquaculture" (1125), "Software Publishers" (5112), "Agricultural, Construction and Mining Machinery Manufacturing" (3331), "Forging and Stamping" (3321).

Figure C.1: EXIM Financing Intensity By Industries (%)



Notes: This figure plots the intensity of EXIM support (EXIM financing in dollars scaled by exports in dollar) at the NAICS-4 level for all industries that received at least one dollar from EXIM over the period 2007–2010.

C.3 Variable Definitions

Variable	Definition
Exporter	Firm reports positive value of: foreign taxable income ($txfo$ and $pifo$), or maritime export in Datamyne, or EXIM financing, or appears in the Hoberg-Moon dataset
Asset	at
Capital	$ppent$
Employment	emp
Total sales	$sale$
ROA	$(oibdp - dp)/at$
Leverage	$(dltt + dlc)/ppent_{t-1}$
Lobbying	$sum\_lobby\_exp/sale$
Financing friction in 10K	$delaycon$ in Hoberg-Maskimovic dataset
Profit margin	$(ib + dp)/sale$
MRPK	$sale/ppent$
Dividend intensity	$dvc/ebitda_{t-1}$
Coverage ratio (industry)	Median at SIC-4 of $dlc/ebitda$

C.4 Additional datasets

Datamyne. Datamyne provides detailed information on individual shipments—including product codes, destination countries, and the weight of the shipped products. However, the data has some limitations. First, it only covers seaborn trade, which accounts for around 35% of the total value of U.S. exports (International Trade Administration, 2022). Second, it only includes information on shipment volumes. While Datamyne provides an imputation of export values based on average values for Harmonized System (HS) codes, these estimates are missing for 18% of the shipments. Third, the data are incomplete and less reliable before 2013; we thus rely on a shorter sample from 2013 to 2019 for the analysis where we use Datamyne.

Rule of Law. The rule of law information comes from Worldwide Governance Indicators (WDI) Database. The WGI project sources its data from household and firm surveys (e.g., Afrobarometer, Gallup World Poll), commercial business information providers (e.g., Economist Intelligence Unit), non-governmental organizations (e.g., Freedom House), and public sector organizations (e.g., World Bank CPIA assessments). It measures perceptions of trust and adherence to societal rules, including contract enforcement, property rights, police, courts, and the likelihood of crime and violence. This process involves assigning individual data points to the relevant indicators, rescaling these data points from 0 to 1, and using an Unobserved Components Model (UCM) to create a weighted average that corrects for data non-comparability with final scores ranging from approximately -2.5 to 2.5 on a standard normal distribution with higher values corresponding to better governance.

A summary of the methodology of the WGI project and discusses related analytical issues and the inherent challenges in governance measurement can be found in (Kaufmann, Kraay and Mastruzzi, 2010).

D Additional Institutional Detail on ECAs and EXIM

D.1 ECAs around the world

We hand-collect new data on export credit agencies around the world. We begin with the list of ECAs maintained by the OECD, and we supplement that with the list from EXIM's 2022 competitiveness report.[1] We then systematically go through every exporting country and search additional sources like Trade Finance Global's website for additional ECAs.

We find that most exporting countries around the world have an official export credit agency. 90 countries have ECAs, and these countries account for 92% of the total value of world exports. In the OECD, 36 out of 38 countries have ECAs; the only exceptions are Costa Rica and Iceland. In the EU, 24 out of 27 countries have ECAs; the only exceptions are Cyprus, Ireland, and Malta.

Figure D.1 plots the share of world exports (including both goods and services) by each country in 2022 where countries colored in dark blue have an official ECA. Figure D.1a includes the countries that each contributes at least 0.5% of the value of world exports. In total, they account for

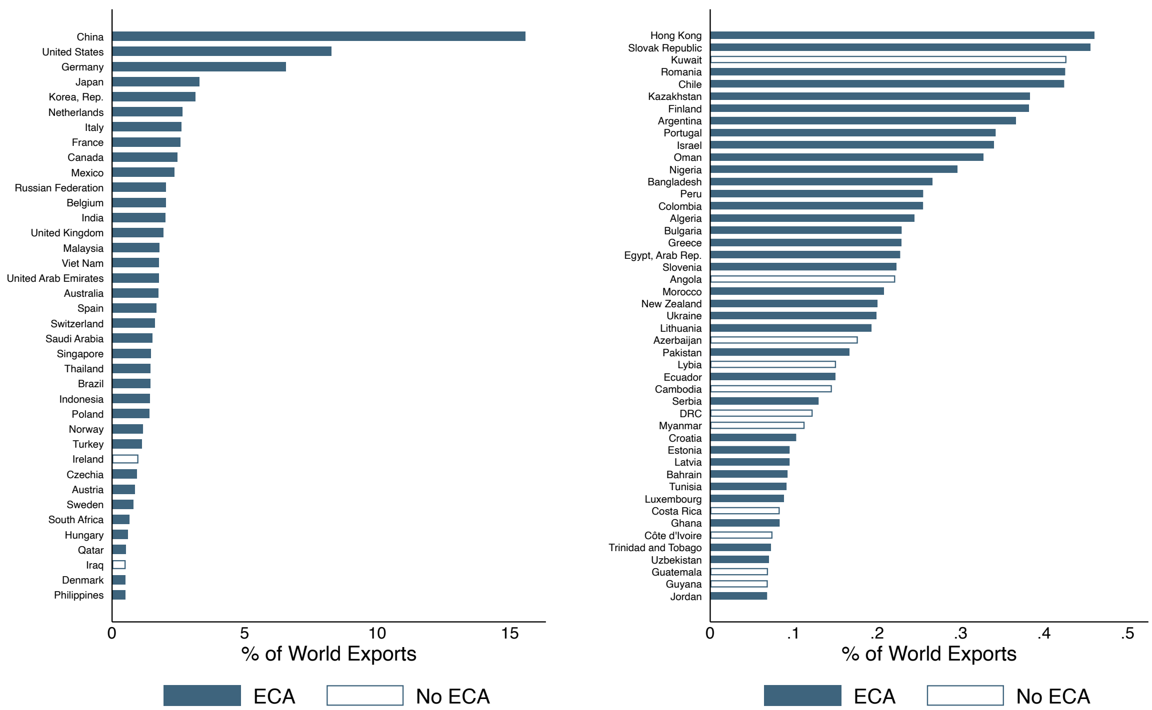
[1] OECD: https://www.oecd.org/trade/topics/export-credits/documents/links-of-official-export-credit-agencies.pdf. EXIM's competitiveness reports: https://www.exim.gov/news/reports/competitiveness-reports.

approximately 89% of the total value of world exports. Figure D.1b includes approximately fifty additional countries that account for an additional 9% of the total value of world exports. Together, all the countries represented account for 98% of the total value of world exports.

Table D.1 lists each country that has an ECA along with the country's OECD membership, the ECA's name, and the year that it was founded. While most countries have one official ECA, several countries (for example, China, Japan, and Sweden) have more than one. In addition, several countries in Africa have their own ECA (for example, Morocco, Tunisia, and South Africa) while all of the independent states of Africa are all supported by the African Export Import Bank.

Figure D.1: Export Credit Agencies Around the World

(a) Countries with $\geq 0.5\%$ of World Exports (b) Countries with $< 0.5\%$ of World Exports



Notes: These figures plot the share of world exports (measured as both goods and services in 2022) for all countries that cumulatively account for 98% of the value of world exports. Countries with an ECA are in dark blue while those without are in white. Panel (a) includes the contries that each contributes at least 0.5% of the overall value of world exports and overall account for 89% of the value of world exports. Panel (b) includes approximately fifty additional countries that each contributes less than 0.5% of the overall value of world exports and overall account for 9% of the value of world exports.

Table D.1: Export Credit Agencies by Country

Country	**OECD**	**Name**	**Year Founded**
Albania	0	Albania Investment Development Agency (AIDA)	2010
Algeria	0	Compagnie Algérienne d'Assurance et de Garantie des Exportations	1996
Armenia	0	Export Insurance Agency of Armenia	2013

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Table D.1 – *Continued from previous page*

Country	OECD	Name	Year Founded
Argentina	0	Banco de Inversion y Comercio Exterior	1992
Australia	1	Export Finance Australia	1957
Austria	1	Oesterreichische Kontrollbank AG	1946
Austria	1	Austria Wirtschaftsservice	2002
Bahrain	0	Export Bahrain	2018
Bangladesh	0	Sadharan Bima Corporation	1973
Barbados	0	Central Bank of Barbados: Export Credit Insurance Scheme	1978
Belarus	0	EXIMGARANT of Belarus	2001
Belgium	1	Credendo Group	1921
Belgium	1	The Brussels Guarantee Fund (Fonds Bruxellois de Garantie)	1999
Bosnia and Herzegovina	0	Export Credit Agency of Bosnia and Herzegovina	1996
Botswana	0	Export Credit Insurance & Guarantee Company	1996
Brazil	0	Brazilian Development Bank	1952
Brazil	0	The Brazilian Guarantees and Fund Management Agency	1999
Bulgaria	0	Bulgarian Export Insurance Agency	1998
Cameroon	0	Fonds d'Aide et de Garantie des Crédits aux Petites et Moyennes Enterprises	2022
Canada	1	Export Development Canada	1944
Chile	1	La Corporación de Fomento de la Producción	1939
China	0	Export-Import Bank of China	1994
China	0	China Export and Credit Insurance Corporation	2001
Hong Kong	0	Hong Kong Export Credit Corporation	1966
Colombia	1	Fondo Nacional de Garantias S.A	1982
Colombia	1	Banco de Comercio Exterior de Colombia	1991
Colombia	1	Colombia's Business Development Bank (BANCOLDEX)	1992
Croatia	0	Croatian Bank for Reconstruction and Development	1992
Czechia	1	Export Guarantee and Insurance Corporation	1992
Czechia	1	Czech Export Bank	1995
Denmark	1	Export Credit Fund	1922
Dominican Republic	0	National Bank for Exports (BANDEX)	2015
Ecuador	0	National Financial Corporation Export Promotion Fund	1972
Egypt, Arab Rep.	0	Export Development Bank of Egypt	1983
Egypt, Arab Rep.	0	Export Credit Guarantee Company of Egypt	1992
Estonia	1	Kredex Credit Insurance	2000
Ethiopia	0	Development Bank of Ethiopia, Export Credit Guarantee and Special Fund Administration Bureau	2008
Finland	1	Finnvera	1999
Finland	1	Finnish Export Credit Ltd.	2000
France	1	Bpifrance Assurance Export	2017

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Table D.1 – *Continued from previous page*

Country	**OECD**	**Name**	**Year Founded**
Germany	1	Euler Hermes Aktiengesellschaft	2002
Germany	1	KfW IPEX Bank	2008
Ghana	0	Ghana Export-Import Bank	2016
Greece	1	Export Credit Insurance Organisation	1988
Hungary	1	Hungarian Export Credit Insurance Ltd.	1994
Hungary	1	Hungarian Export-Import Bank Plc.	1994
India	0	Export Credit Guarantee Corporation of India	1957
India	0	Export-Import Bank of India	1982
Indonesia	0	PT. Asuransi Ekspor Indonesia	1985
Indonesia	0	Indonesian Eximbank	2009
Iran, Islamic Rep.	0	Export Development Bank of Iran	1991
Iran, Islamic Rep.	0	Export Guarantee Fund of Iran	1994
Israel	1	Israel Export Insurance Corp. Ltd.	1957
Italy	1	Cassa Depositi e Prestiti	1850
Italy	1	Servizi Assicurativi del Commercio Estero (SACE)	1977
Jamaica	0	EXIM Bank Jamaica	1986
Japan	1	Japan Bank for International Cooperation	1999
Japan	1	Nippon Export and Investment Insurance	2017
Jordan	0	Jordan Loan Guarantee Corporation	1994
Kazakhstan	0	Eximbank Kazakhstan	1994
Kazakhstan	0	KazExportGarant	2003
Latvia	1	SIA Latvijas Garantiju aģentūra (Latvian Guarantee Agency Ltd.)	1998
Lebanon	0	The Lebanese Credit Insurer (LCI)	2001
Lithuania	1	Investiciju ir Verslo Garantijos (INVEGA)	2001
Luxembourg	1	Office du Ducrorie	1961
Macedonia	0	Macedonian Bank for Development Promotion AD Skopje	1998
Malaysia	0	Export-Import Bank of Malaysia Berhad	1995
Mexico	1	Banco Nacional de Comercio Exterior, SNC	1937
Morocco	0	Caisse Centrale de Garantie	1949
Morocco	0	Société Marocaine d'Assurance à l'Exportation (SMAEX)	1974
Namibia	0	Development Bank of Namibia	2004
Netherlands	1	Atradius Dutch State Business	2001
Netherlands	1	Netherlands Enterprise Agency	2014
New Zealand	1	New Zealand Export Credit Office	2001
Nigeria	0	Nigerian Export-Import Bank	1991
Norway	1	Export Credit Norway	2012
Norway	1	Garanti-instituttet for eksportkreditt, GIEK	1929
Norway	1	Export Finance Norway	2021
Oman	0	Export Credit Guarantee Agency of Oman (S.A.O.C)	1991
Pakistan	0	Export Import Bank of Pakistan	2015
Peru	0	Corporacion Financiera de Desarrollo	1971

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Table D.1 – *Continued from previous page*

Country	**OECD**	**Name**	**Year Founded**
Philippines	0	Philippine Guarantee Corporation	1977
Poland	1	Export Credit Insurance Corporation	1991
Portugal	1	Companhia de Seguro de Créditos	1969
Qatar	0	TASDEER (managed by the Qatar Development Bank)	2011
Korea, Rep.	1	Export-Import Bank of Korea	1976
Korea, Rep.	0	Korea Trade Insurance Corporation	1992
Romania	0	Eximbank of Romania	1992
Russian Federation	0	Export Import Bank of Russia	1994
Russian Federation	0	Bank for Development and Foreign Economic Affairs (Vnesheconombank)	2007
Russian Federation	0	Export Insurance Agency of Russia	2011
Saudi Arabia	0	Saudi Arabia Export Program	1999
Saudi Arabia	0	Saudi Export Development Authority	2013
Senegal	0	Société Nationale d'Assurances du Crédit et du Cautionnement	1998
Serbia	0	Serbian Export Credit and Insurance Agency	2005
Singapore	0	Entireprise Singapore	2018
Slovak Republic	1	Export-Import Bank of the Slovak Republic	1997
Slovenia	1	Slovenska izvozna in razvojna banka	1992
South Africa	0	Export-Import Credit Insurance Corporation of South Africa	1957
Spain	1	Compañía Española de Seguros de Crédito a la Exportación (CESCE)	1970
Spain	1	Fondo para la Internationalización de la Empresa	2010
Sri Lanka	0	Sri Lanka Export Credit Insurance Corporation	1978
Sri Lanka	0	Sri Lanka Export Development Board (SLEDB)	1979
Sudan	0	National Agency for Insurance and Finance of Export	2005
Swaziland	0	Central Bank of Swaziland: Export Credit Guarantee Scheme	1990
Sweden	1	Exportkreditnämnden	1933
Sweden	1	Svensk Exportkredit	1962
Switzerland	1	Swiss Export Risk Insurance	2007
Taiwan	0	Export-Import Bank of the Republic of China	1979
Tanzania	0	Export Credit Guarantee Scheme	2002
Thailand	0	Export-Import Bank of Thailand	1993
Trinidad and Tobago	0	Export-Import Bank of Trinidad & Tobago	1997
Tunisia	0	Compagnie Tunisienne pour l'Assurance du Commerce Extérieur	1985
Turkey	1	Export Credit Bank of Turkey	1980
Ukraine	0	The State Export-Import Bank of Ukraine	1992
United Arab Emirates	0	Etihad Credit Insurance	2017

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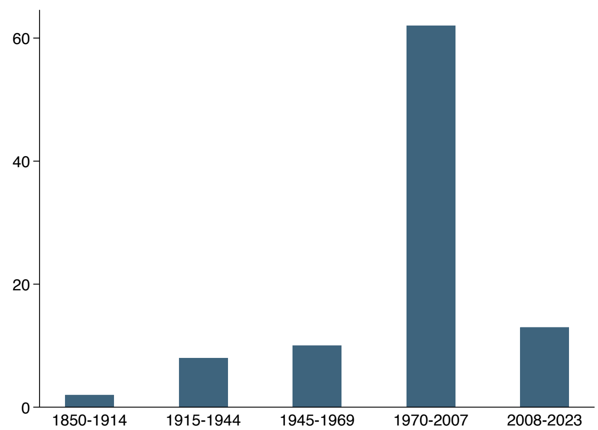
Table D.1 – *Continued from previous page*

Country	**OECD**	**Name**	**Year Founded**
United Kingdom	1	Export Credits Guarantee Department (ECGD)/UK Export Finance	1919
United States	1	The Export Import Bank of the United States	1934
Uruguay	0	Banco de Seguros del Estado	1911
Uzbekistan	0	Uzbekinvest National Export-Import Insurance Company	1997
Viet Nam	0	Export Import Commercial Joint Stock Bank	1989
Viet Nam	0	The Vietnam Development Bank	2006
Zambia	0	Development Bank of Zambia	1972
Zimbabwe	0	Export Credit Guarantee Company of Zimbabwe	1999
Region		**Regional ECA**	
Africa	N/A	African Export-Import Bank	1993
Africa	N/A	African Trade and Investment Development Insurance (ATIDI)	2001

In Figure D.2, we plot the number of ECAs that were established in each period of history. We include the following periods: 1850–1914 (the first age of globalization), 1914–1944 (the world wars and interwar years), 1945–1970 (Bretton Woods), 1971–2007 (post-Bretton Woods), and 2008–2023 (post-global financial crisis). The figure shows that while many countries began establishing ECAs in the Bretton Woods period, the widespread adoption and usage of ECAs is primarily a post-Bretton Woods phenomenon.

While there is limited comprehensive data on the value of ECA support from other countries, the US EXIM along with the OECD collected information for a subset of countries for their 2013 competitiveness report. Figure D.3 panel (a) plots the value of official medium to long-term credit under the OECD arrangement. The figure shows that countries differ widely in how much export credit support they provide. In absolute terms, China, Germany, Korea, and the United States spend the most on these programs. In Figure D.3 panel (b), we plot credit relative to export volumes in 2013, based on data from the World Bank. The Scandinavian countries, China, and Korea, are among the heaviest users of export credit agency support relative to their exports.

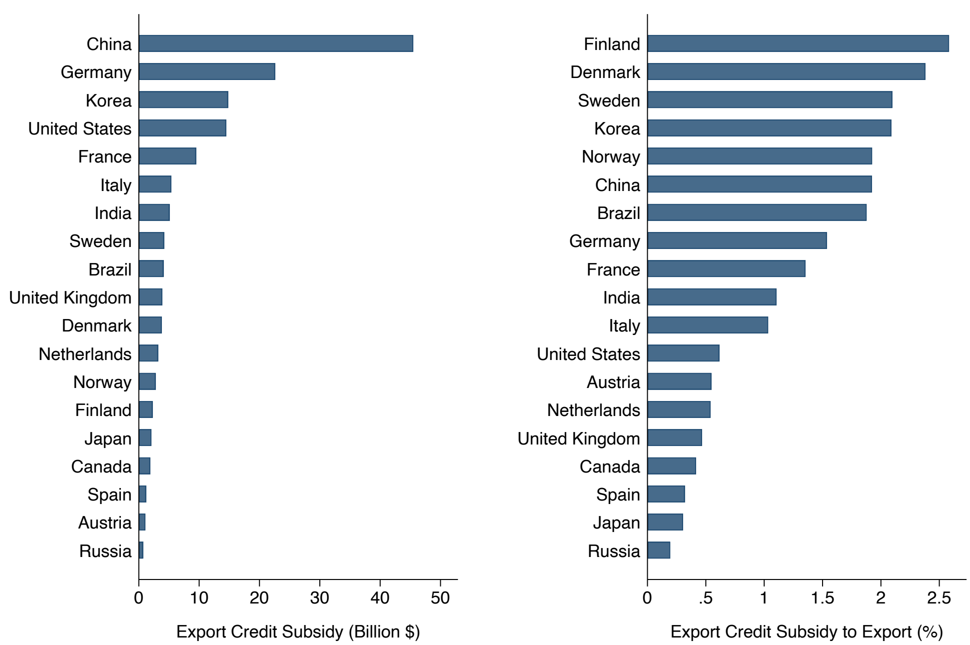
Figure D.2: Export Credit Agencies: Number Founded by Time Period



Notes: This figure documents the number of ECAs founded in different periods of history based on information in Table D.1. Regional ECAs are not included in this figure.

Figure D.3: Export Credit Agency Support by Country

(a) Total Value of Export Credit Support (b) Value Relative to Exports



Notes: These figures document the extent to which different countries use export credit subsidies. Panel (a) plots the official medium to long-term credit amount under the OECD arrangement, collected from EXIM's competitiveness report in 2013. Panel (b) plots credit subsidies relative to export volumes in 2013, where export data is taken from the World Bank's World Development Indicators.

D.1.1 ECA mandates

We collect the official mandates of the ECAs for the top six exporters in the world as of 2022: China, the US, Germany, France, UK, and Japan. Together, these countries account for 37% of the value of total world exports.

- China - China Export & Credit Insurance Corporation (Sinosure): Sinosure's mission is to promote Chinese exports and investments, especially in high-tech and high-value-added sectors, by offering insurance solutions to protect against overseas risks.
- United States - Export-Import Bank of the United States (EXIM): EXIM's mission is to support American jobs by facilitating the export of U.S. goods and services. The agency aims to assume credit and country risks that the private sector is unable or unwilling to accept and to help level the playing field for U.S. exporters by matching the financing that other governments provide to their exporters.
- Germany - Euler Hermes Aktiengesellschaft (Euler Hermes): Managed by Euler Hermes on behalf of the German government, its mission is to support German exports through export credit guarantees. These guarantees protect German companies from payment defaults in export business, covering commercial and political risks.
- France - Bpifrance (BPI): BPI's mission is to bolster the growth of the French economy by supporting entrepreneurs through every stage of their business development, offering solutions such as financing, guarantees, and equity investment. As the French agency for innovation, BPI delivers extensive programs to innovative entrepreneurs, focusing on micro-businesses, SMEs, mid-caps, and significant large caps crucial to the national economy, while embodying values of determination, optimism, proximity, simplicity, and performance.
- United Kingdom - UK Export Finance (UKEF): UKEF's mission is to ensure that no viable UK export fails for lack of finance or insurance from the private sector. They provide finance and insurance to help exporters win, fulfill, and get paid for export contracts.
- Japan - Nippon Export and Investment Insurance (NEXI): NEXI's mission is to contribute to the sound development of Japan and the international economy and society by insuring the risks associated with overseas investments and the export of goods and services.

D.1.2 International operational constraints

Most ECAs work within a regulated environment in which they are obliged to comply with a set of OECD guidelines, called the "Arrangement on Officially Supported Export Credits" (henceforth, the "Arrangement"). The Arrangement is a gentlemen's agreement amongst its Participants: Australia, Canada, the European Union, Japan, Korea, New Zealand, Norway, Switzerland, Türkiye, the United Kingdom and the United States.

The Participants do not comprise a formal OECD body but they operate according to its rules and procedures. The Arrangement first came into existence in 1978, building on the export credit "Consensus" agreement among a smaller number of OECD countries in 1976. Since then, it has been regularly developed and updated to reflect Participants' needs and market developments. The resulting export credits disciplines apply first and foremost to OECD Members; however, several key non-Members regularly observe meetings of the Participants.

The Arrangement is aimed at avoiding unfair competition as a result of certain ECAs offering particularly generous financing conditions and sets out the following set of rules:

- Minimum interest rates for fixed rate loans defined as the commercial interest reference rate (CIRR). The CIRR depends on the currency of the transaction, and is adjusted by the OECD on a monthly basis.
- The maximum repayment tenor for both standard exports, as well as for specified industries through special sector understandings.
- An allowance for the financing of a percentage of local costs associated with the exported items.
- Compliance obligations associated with the Equator Principles' social and environmental standards.

The Arrangement applies to all official export credits with a repayment term of 2 years or more. It does not apply to military equipment or agricultural commodities.

The WTO's anti-subsidy legislation has been linked to the OECD's Arrangement since 1979, and the terms of the Arrangement has been recognized in various WTO dispute cases: Brazil/Canada on civil aircraft, Korea/EU on ships, US/Brazil on upland cotton. The interaction between the Arrangement and WTO rules works as follows. WTO member states are not allowed to subsidize exports, which is defined as providing financing at interest rates lower than the country's own cost of borrowing. However, if a WTO member complies with the Arrangement interest rate provisions, then loans extended by an ECA are not considered an export subsidy.

D.1.3 ECA tools

ECAs broadly fall under three categories: direct financing, indirect financing, and insurance.

Direct financing. Financing is direct when ECA lends money directly pursuant to a facility agreement. Direct financing comes in two forms:

- Tied financing: financing that is tied to a particular contract for goods or services supplied by a firm from that ECA's home country.
- Untied financing: financing that is not conditional on the procurement of goods or services from the ECA's home country. Untied financing is instead offered on the basis that the transaction is strategically in the national interest of the ECA's home country, securing broader benefits for the country. Note that untied financing falls outside the scope of the OECD Arrangement.

Indirect financing. Financing is indirect when the ECA lends first to a financial intermediary, which then lends to a firm from that ECA's home country at a low interest rate. Indirect financing can also occur through interest rate support. The ECA may also pay for the difference between the relevant CIRR and the rate at which the banks fund themselves, plus a margin. This allows the firm to take advantage of an interest rate equal to the CIRR and ensures that the bank sees a commercial return on their loan.

A last type of indirect financing is ECA guarantees. ECA guarantees can take a number of forms. Credit guarantee facilities are commonly used, whereby ECAs provide guarantees to lenders in their home country for loans to foreign banks which are then on-lent to foreign purchasers of the home country goods or services.

Insurance. Finally, some ECAs also provide insurance products that cover commercial risk, political risk (such as imposition of foreign exchange controls, war, expropriation, rescission of licences etc), or a combination of both.

D.2 EXIM

Established during the New Deal, EXIM is the official export credit agency of the United States. EXIM's objective is to fill financing gaps of US exporters or their customers when the private sector is unable or unwilling to do so. Note that the "Import" component in the name refers to the fact that EXIM finances other countries' imports of US goods and services. It does not finance US imports of foreign goods and services.

D.2.1 US Federal government operational constraints

There are three main federal operation constraints EXIM faces.

First, as outlined in the World Trade Organization (WTO) Agreement on Subsidies and Countervailing measures, the institution must remain self-financing. Annex I, clause (j), writes "*The provision by governments (or special institutions controlled by governments) of export credit guarantee or insurance programmes, of insurance or guarantee programmes against increases in the cost of exported products or of exchange risk programmes, at premium rates which are inadequate to cover the long-term operating costs and losses of the programmes.*" Therefore, EXIM must charge rates that realistically reflect the cost and risk of the programs in order to cover its long-term operating costs and potential losses.

As part of the Federal Credit Reform Act of 1990, each EXIM transaction must be "subsidy neutral" or generate "negative subsidy." In particular, Section 9 ("Budgetary Treatment") stipulates that "subsidies must be properly accounted for in the budgetary process," and these costs should be minimized or justified if they exceed the revenues or savings.

Finally, EXIM is also subject to congressional oversight are subject to independent annual audits and maximum default rates. For this purpose, the Office of Congressional and Intergovernmental Affairs (OCIA) serves as the point of contact for Congress and state and local governments at EXIM. Two main legislative texts justify its existence – Legislative Reorganization Act of 1946 and Government Corporation Control Act (GCCA) of 1945. The former is designed to enhance legislative oversight of federal agencies, attempt to regain its diminished role shaping national policy. The latter, specifically, "Congressional action on budgets of wholly owned Government corporations," was designed to establish financial and administrative control over government corporations.

Budget procurement process. EXIM has a structured budget procurement process that begins annually with the submission of the Congressional Budget Justification. This document outlines anticipated costs for the fiscal year, categorized into key areas such as administration, program support, and provisions for defaults and losses. Additionally, it addresses funding for other time-variant needs like cybersecurity, support for Subject Matter Experts (SMEs), and assistance programs targeting Minority and Women-Owned Businesses (MWOBs).

EXIM's primary revenues are fees on Guarantees and Insurance and interest on Loans. There are also additional revenues coming from charges associated with the administration of its credit and insurance products, such as application fees, exposure fees, and other related service charges.

D.2.2 EXIM tools

EXIM supports US exporters through four main products: loan guarantees, insurance against customer credit losses, direct loans, and working capital loans. EXIM can therefore affect firm exports not only by financing the necessary working capital, the costs of which can be particularly high for exports, but also by reducing the risks for exporters who might not be able to find a bank capable of issuing letters of credit in the private market, as exemplified by one of the main products that EXIM offers: payment guarantees, which insures the US exporter up to 85% of the value of the contract for payment defaults by the importer.

There are distinct differences between these products offered by EXIM. First, coverage varies: loan guarantees often cover up to 100% of the principal and interest, while loan insurance typically covers less than 100%. Second, export credit insurance is used to encourage US exporters to provide short-term trade credit to overseas customers, whereas EXIM insures exporters against non-payment. This insurance, in turn, allows exporters to include these foreign accounts receivable as collateral in their borrowing base, which is often used to back short-term financing from lenders. Loan guarantees, in contrast, can be applied to various types of loans, including long-term financing. Third, direct loans are generally long-term in nature and come with fixed interest rates, making them suitable for capital-intensive projects. In contrast, working capital loans are short-term loans with interest rates that can either be fixed or floating, designed to meet the operational needs of US exporters.

EXIM's financing tools extend across various terms. Medium-term financing supports capital goods and services with repayment options of up to 7 years for amounts not exceeding $10 million. Long-term financing is available for larger projects over $10 million with typical repayment terms up to 10 years, extendable up to 12 years for specific large-scale projects like civil aircraft and non-nuclear power plants, and up to 18 years for nuclear power plants and selected renewable energy and water projects. Short-term financing options such as the Financial Institution Buyer Credit (FIBC) and Single Buyer Export Credit and Exporter Support (ELC & ESS) policies provide flexible, short-duration credit terms up to 360 days.

Process for obtaining EXIM funding. The underwriting for direct loans and long-term loan guarantees, as well as some medium-term and working capital loans, is performed by EXIM loan officers. For some of its programs, especially medium-term and working capital loan guarantees, EXIM delegates credit decisions and underwriting to a selected group of "delegated authority lenders." To limit the risks and potential conflicts of interest inherent when working with third-party lenders, EXIM imposes underwriting requirements and independently reviews these transactions.

After EXIM receives an application, usually from a lender or, at times, foreign buyer of US products, it is screened for completeness and minimum eligibility requirements. To qualify for these programs, the goods and services must be U.S.-origin and shipped from the United States to a foreign buyer. In addition, businesses that submit applications must have operated for at least three years, employ at least one full-time individual, and maintain a positive net worth. Next, applications are evaluated in terms of their compliance with EXIM's policies on credit risk, and financing terms and collateral requirements are determined. Finally, the loan officer makes a decision to approve or deny an application. Long-term transactions above $10 million have to be approved by EXIM's Board of Directors.

D.2.3 The 2015 Lapse in EXIM's Authorization

The lapse in EXIM's charter was primarily caused by a political dispute in the highly polarized environment following the 2012 Presidential elections. EXIM's critics gained considerable traction in Congress in the Tea Party movement. While the arguments for and against EXIM were not new, the political gridlock resulted in a lack of common ground for re-authorizing EXIM's charter.

When Trump became president in 2016, EXIM had lost all its board members. Trump nominated five people for the board. His nominee for EXIM president, Scott Garrett, was a vocal EXIM opponent, and his bid was promptly rejected by the Senate Banking Committee.[2] It was only in May 2019 that Trump's next nominee, Kimberley Reed, was approved by the Senate.

D.2.4 EXIM Expense

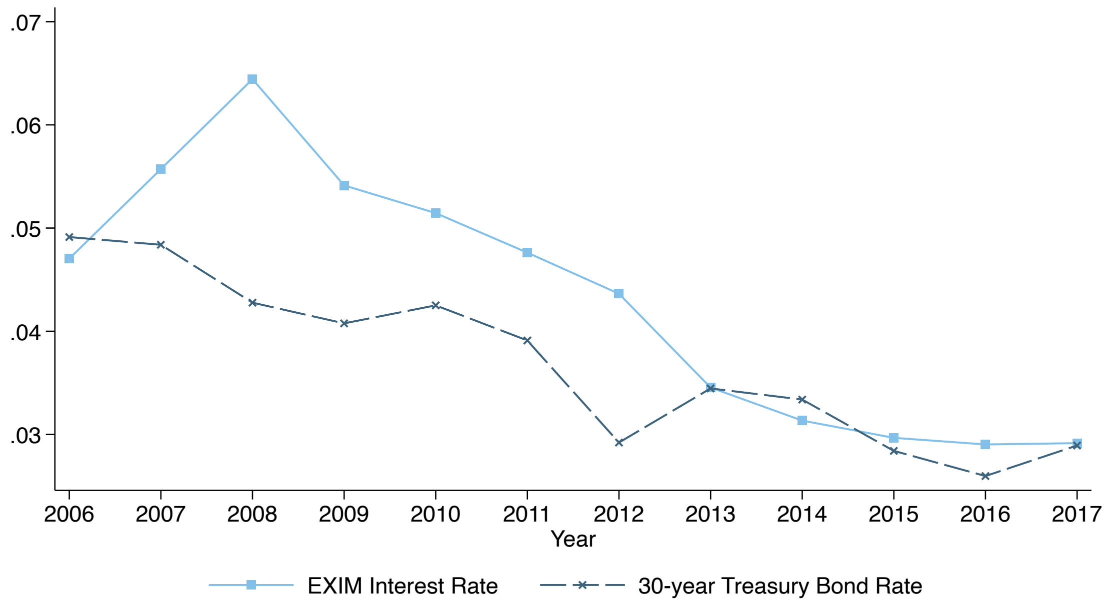
We collect all of the Annual Reports published by EXIM from 2006 to 2023 where we focus on the bank's "Balance sheet" and its "Statement of net costs" in each publication.

Interest expense paid to the US Treasury. We calculate EXIM's annual interest expense by combining information from the balance sheets and statement of net costs. The balance sheets provide the budget allocation from the US Treasury (named "intergovernmental debt"), which is the amount on which EXIM pays interest expense each year. The statement of net costs provides a line item for the interest expense on the loan program. We calculate the interest rate by dividing the interest expense by the stock of intergovernmental debt.

Figure D.4 plots EXIM's interest expense rate along with the 30-year US Treasury bond. We include all of the years for which these data exist in full. On average, EXIM's interest rate expense is 60 basis points higher than the 30 year rate (4.3% versus 3.7%). In the pre-shutdown period (2006 to 2014 inclusive), EXIM's rate is 80 basis points higher (4.8% versus 4.0%).

[2] An article in Reuters quoted a Republican Senator voting against him as saying: "I believe he's a principled man who simply believes in the abolishment of the Bank."

Figure D.4: EXIM's Annual Interest Expense



Notes: This figure plots the time series of EXIM's interest expense from the authors' calculations. The data stop in 2017 because EXIM's annual statement of net costs were no longer sufficiently disaggregated to conduct this calculation.

D.3 EXIM and Country Risks

In addition to being potentially expensive due to high markups, banks and insurance companies might not be able to insure against country-wide risks, which due to their specialization would be considered as "aggregate" instead of idiosyncratic risks. This explains why trade insurance provided by private banks is non-comprehensive and typically makes explicit exceptions for country-wide risks such as regime changes, the introduction of capital controls, military events, or natural disasters.

In contrast, EXIM appears well-suited to fill this gap due to its broad coverage of countries and investment in the fixed costs necessary to acquire the expertise to provide trade financing. Several pieces of evidence suggest that political risks are indeed one of the frictions that EXIM is able to alleviate.

D.3.1 Data and estimation

Perception of country risk. Our main independent variable, country risk, comes from Hassan, Schreger, Schwedeler and Tahoun (2023), where it is defined as aggregated risk associated with a given country perceived by publicly traded firms around the world that hold earnings calls in the English language. We also distinguish between four measures of country risk based on the subset of firms it is assessed on: any, financial, domestic, and foreign.

The main dependent variable is the total financial exposure that EXIM has to a country in its entire portfolio. We obtained this data by digitizing the EXIM's overall financial exposure by country from the Annual Reports. These exposures reflect the total outstanding value of loans, guarantees, and insurance authorized by EXIM.

Estimation. We estimate the following model using data from 2006 to 2022:

$$log(EXIM)_{it} = \beta_1 log(Risk)_{it} + \alpha_i + \gamma_t + \epsilon_{it} \tag{D.1}$$

$EXIM_{it}$ is the total amount of EXIM exposure to country i in year t. α_i and γ_t are country and year fixed effects. Standard errors are clustered at the country level.

Table D.2 reports the results. Column 1 shows the results when we use any country risk, and columns 2 to 5 decompose the risks among its sub-measures by different types of firms (financial, foreign, and domestic). The decomposition provides further support for the interpretation that EXIM helps to fill a gap in the private market. First, the relationship between EXIM support and risk is highest when focused on risks perceived by financial firms, which are precisely the segment of the private sector that are the closest substitute to EXIM. Second, the relationship is large and statistically significant for the perception by foreign firms, which are the ones that would trade internationally with a country. Given this interpretation, the perception of risk by domestic firms acts as a placebo, and indeed there is no statistically significant relationship. Finally, there is a "local crisis" measure, which takes the value of the number of quarters in a year that a country has risk perception measures two standard deviations above its own mean. Countries experiencing a local crisis also have higher levels of EXIM support, consistent with the rest of the evidence that EXIM provides a missing market when private firms may be particularly unwilling to engage.

D.4 Theory: The Impact of ECA Financing on Firm Outcomes

This subsection develops a framework that generates predictions for how firm investment and profit rates react in response to changes in the supply of trade financing that firms receive from export credit agencies. We set up a one period model where firms maximize profits by choosing their capital investment, which they finance with private market and/or ECA debt.

The main intuition from the model is that even if ECAs supply financing at a cost lower than the market, financially unconstrained firms will not change their optimal size and will instead receive the subsidized financing as a "windfall profit" that raises their profit rates. If by contrast firms are constrained, they will use ECAs' financing to expand operations up to the point where they become unconstrained.

D.4.1 Setup

We begin by describing the environment without ECAs and with the two types of firms: constrained and unconstrained.

Firm production. We assume for simplicity that capital K is the only input, and that firm i has standard revenue production function $f_{i,m}(K)$ for product m. We also assume that $f(K)$ is increasing but bounded in K, that $f(K)$ is twice differentiable and that $f'(K) > 0$, $f''(K) < 0$, so that the firm's revenue function is increasing but concave.

Table D.2: EXIM Support and Country Risk

	(1)	(2)	(3)	(4)	(5)
Risk (by all)	2.23				
	(0.76)				
	[0.0048]				
Risk (by financial)		1.59			
		(0.64)			
		[0.016]			
Risk (by foreign)			1.61		
			(0.93)		
			[0.087]		
Risk (by domestic)				-0.018	
				(0.069)	
				[0.79]	
Local crisis					0.093
					(0.044)
					[0.038]
Fixed Effects					
Country	✓	✓	✓	✓	✓
Year	✓	✓	✓	✓	✓
Observations	812	812	812	660	812

Notes: This table reports estimates of equation D.1, where the amount of EXIM support a country receives and political risk are both measured in logs. The measure of perceived country risks comes from Hassan, Schreger, Schwedeler and Tahoun (2023). These risks include perceptions by all firms (column 1), and are also decomposed into risks perceived by financial firms (column 2), firms foreign to a country (column 3), and domestic firms within a country (column 4). "Local crisis" measures the number of quarters in a year that a country is perceived to have risk that is two standard deviations above its mean. Standard errors are clustered at the country level and are reported in the line below the point estimate in parentheses, and p-values are reported in brackets below them.

This revenue function encompasses standard cases of constant prices and decreasing returns to scale in quantities produced (e.g., because of span of control as in Lucas, 1978) and monopolistic competition with firms having constant return to scale but facing downward sloping demand curves (e.g., Dixit and Stiglitz, 1977; Melitz, 2003).

Entrepreneurs have no initial wealth endowment and must raise outside financing D in order to invest in K. They face a (risk-adjusted) market price of capital $r_{i,m}$. We assume that the fixed costs of creating the firm have already been paid.

Unconstrained firm profit maximization. Firms choose the amount of capital that maximizes their profits, subject to their funding constraint. By definition of being unconstrained, firms face a flat debt supply curve for $D_{i,m}$, and their problem is the following:

$$\begin{aligned} \max_{K_{i,m}} \quad & \Pi_{i,m} = f(K_{i,m}) - r_{i,m} \times K_{i,m} \\ \text{s.t.} \quad & K_{i,m} \leq D_{i,m} \end{aligned} \tag{D.2}$$

The FOC implies that unconstrained firms optimally choose size $K^*_{i,m}$ such that $f'(K^*_{i,m}) = r_{i,m}$, which is funded by a level of debt equal to $D^*_{i,m}$.

Constrained firm profit maximization. We define a firm as being constrained if it is only able to raise funding D to some level $D^{\tau}_{i,m} < D^{*}_{i,m}$, implying that there is residual unmet demand at the market rate $r_{i,m}$. Firms invest up to their financing constraint such that $K_{i,m} = D^{\tau}_{i,m}$. We denote this level of capital as $K^{\tau}_{i,m}$, with $K^{\tau}_{i,m} < K^{*}_{i,m}$.

At this lower level of capital, constrained firms have a higher marginal revenue product than their market rate $r_{i,m}$: $f'_{i,m}(K^{\tau}) > r_{i,m}$ and therefore behave as if they face a higher cost of capital than unconstrained firms. This difference in behavior implies that there exists a positive $\tau_{i,m}$ such that $f'(K^{\tau}_{i,m}) = (1 + \tau_{i,m})r_{i,m}$. $\tau_{i,m}$ acts as a wedge on the market price of capital.[3]

We represent the firms' *shadow* cost of capital as $r^{\tau}_{i,m} = (1 + \tau_{i,m})r_{i,m}$, where unconstrained firms have $\tau_{i,m} = 0$. The firm's marginal investment decision is governed by this shadow price, and a firm will only increase investment above $K^{\tau}_{i,m}$ if it is able to do so at a price below $r^{\tau}_{i,m}$.

As discussed in Section 2.1, the $\tau_{i,m}$ wedge can arise from an exporting firm-specific financing friction and/or an import-market specific friction. Note that the wedges that generate quantity constraints endogeneously arise out of banks' expected profit maximization. As such, even though firms find it profitable to borrow at $r_{i,m}$, banks do not find it profitable to lend at that rate.

D.4.2 Theoretical Predictions for the Role of ECAs

We model ECA financing as allowing firms to raise some amount of capital $D^{ECA}_{i,m}$ at rate $r^{ECA}_{i,m}$. In order to more accurately capture the institutional context, we assume that ECAs face balance sheet constraints and that they will not finance firms up to their efficient scale ($D^{ECA}_{i,m} < K^{*}_{i,m}$). We do not impose that firms must raise a fraction of their debt from the private market.

Positive takeup of ECA financing implies that the price of ECA financing is lower than the shadow price firms face: $r^{ECA}_{i,m} \leq r^{\tau}_{i,m}$. Note that firms may have positive takeup of ECA financing even if $r^{ECA}_{i,m} > r_{i,m}$, indicating that the use of ECA financing does *not* imply that it must be offered at below-market rates.

With ECA financing, the firm profit maximization problem becomes:

$$\begin{aligned} \max_{K_{i,m},\ K^{ECA}_{i,m}} \quad & \Pi_{i,m} = f(K_{i,m} + K^{ECA}_{i,m}) - r_{i,m} \times K_{i,m} \ - \ r^{ECA}_{i,m} \times K^{ECA}_{i,m} \\ \text{s.t.} \quad & K_{i,m} \leq D_{i,m} \\ & K^{ECA}_{i,m} \leq D^{ECA}_{i,m} \end{aligned} \tag{D.3}$$

The optimal behavior of a firm facing multiple sources of lending with different costs is to first fully use the external liquidity from the cheapest source of borrowing, and then to turn to more expensive sources (Banerjee and Duflo, 2014). The impact of ECAs' financing on firm outcomes therefore falls under three cases.

Case 1: Unconstrained firm optimization. When firms are unconstrained, ECA financing has no effect on the level of investment, but it increases firm profit rates. The impact of ECA financing is *purely inframarginal.*

[3] τ is an explicit tax if the rate constrained firms pay is higher, or it can be an implicit shadow cost of capital that arises from a quantity constraint, as we have modeled it here. These wedges implement a given (potentially inefficient) allocation in the decentralized Arrow-Debreu-McKenzie economy. This formulation is standard in the misallocation literature (e.g., Hsieh and Klenow, 2009; Baqaee and Farhi, 2020).

We illustrate this case in Figure D.1a and Figure D.1b. The firm's profits without ECA financing are in light blue in Figure D.1a while the additional firm profits after receiving ECA financing are in dark blue in Figure D.1b. We define the firm's profit rate as total profits divided by capital stock.

Unconstrained firms will only use ECA financing if $r_{i,m}^{ECA} < r_{i,m}$. In Figure D.1b the optimal behavior of unconstrained firms is to first borrow from the ECA at a price $r_{i,m}^{ECA}$ to the fullest extent possible, which we denote $D_{i,m}^{ECA}$. The firm invests in $K_{i,m}^{ECA} = D_{i,m}^{ECA}$ levels of capital. At that size, the marginal return to capital is $f'(K_{i,m}^{ECA}) > r_{i,m}$, implying that it is optimal for the firm to expand until returns are equalized at $K_{i,m}^{*}$. The firm therefore raises the remaining capital $(K_{i,m}^{*} - K_{i,m}^{ECA})$ from the market.

Investment remains at $K_{i,m}^{*}$ as before. The substitution to cheaper ECA financing generates a windfall profit for the firm equal to $K^{ECA} \times (r_{i,m} - r_{i,m}^{ECA})$. Firm profit rates are now higher.

Case 2: Constrained firm optimization when $r_{i,m}^{ECA} < r_{i,m}$. Receiving ECA support relaxes the firm's financing constraint, and firms increase investment. The impact on firm profit margins is ambiguous when ECA financing is provided at a lower rate than the market rate.

Figure D.1c shows a constrained firm's choices of capital and its profits. Figure D.1d shows the impact of accessing ECA financing when $r_{i,m}^{ECA} \leq r_{i,m}$. We draw the figure such that firms remain constrained: $D_{i,m}^{ECA} + D_{i,m}^{\tau} < D_{i,m}^{*}$. In Appendix **??**, we provide an extension in which we relax this condition.

Firms first utilize all of the available ECA financing and invest at the level of capital $K_{im}^{ECA} = D_{i,m}^{ECA}$. At that point, $f'(K_{im}^{ECA}) > r_{i,m}$, so the firm continues to invest at the market rate until it reaches its optimal size $K_{i,m}^{*}$ or until its private financing constraint binds. Investment unambiguously increases.

Firm profits increase, but the change in firm profit rate is ambiguous and depends on the value of the subsidized financing $(K^{ECA} \times (r_{i,m} - r_{i,m}^{ECA}))$ relative to the decreasing returns to scale in the firm's production function.

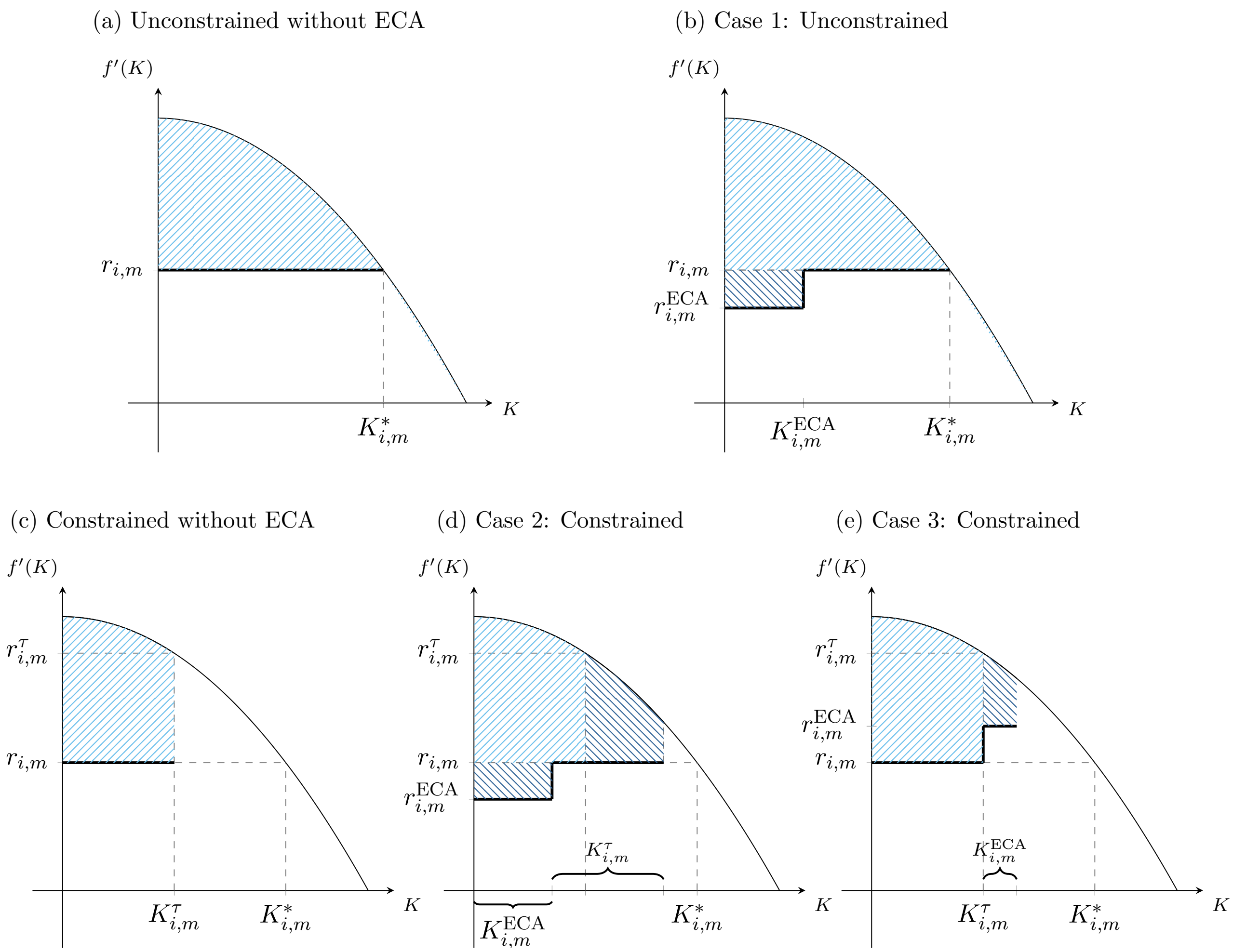
Case 3: Constrained firm optimization when $r_{i,m} < r_{i,m}^{ECA} < r_{i,m}^{\tau}$. Receiving ECA support relaxes the firm's financing constraint, and firms increase investment. The impact on firm profit rates is negative.

Figure D.1e illustrates this case when $r_{i,m}^{ECA} < r_{i,m}^{\tau}$. Recall that constrained firms will use ECA financing as long as it is offered at a price below the firm's shadow price of capital so ECA financing does not need to be provided at below market rates. Despite ECA financing being offered at a *higher* price, firms still find it optimal to use ECA financing because it is below their shadow price of capital.

Firms first use private market financing before using the more expensive ECA financing. They invest up to a level where they face their ECA financing constraint $(K_{i,m}^{ECA} = D_{i,m}^{ECA})$ or until they reach a level of capital $K_{i,m}^{**}$ such that $f'(K_{i,m}^{**}) = r_{i,m}^{ECA}$. The new firm size is unambiguously larger, and it is between the constrained and the optimal size: $K_{i,m}^{\tau} < K_{i,m}^{**} < K_{i,m}^{*}$. Firm profit rates unambiguously decline when $r_{i,m}^{ECA} > r_{i,m}$.

Case 4: Extension to becoming unconstrained

Figure D.1: Unconstrained and Constrained Firm Optimization



Notes: This figure plots the firm's marginal revenue production function. The bold black line traces out the capital that the firm invests and the rate at which it invests. The light blue shading is the firm's original profits without ECA financing. The dark blue shading is the additional new profits that come from ECA financing.

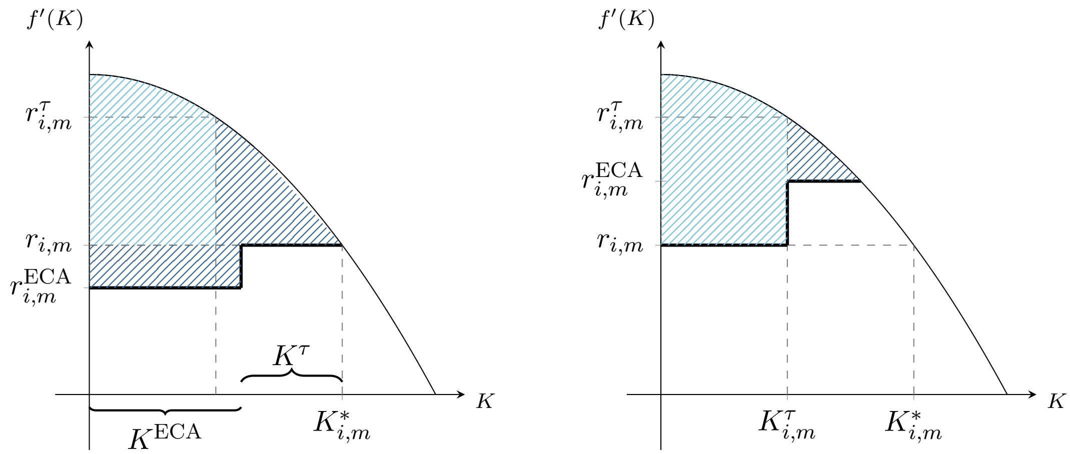
Figure D.2 illustrates the effect of access to ECA financing when firms that are initially constrained become unconstrained. As before, we assume that firms cannot access as much ECA financing as before, but relative to the baseline case in the main paper, we now allow for $D^{ECA}_{i,m} + D^{\tau}_{i,m} \geq D^*_{i,m}$.

In Panel (a), the cost of ECA financing is lower than market financing, and therefore the firm uses all of its available ECA financing ($K^{ECA}_{i,m} = D^{ECA}_{i,m}$) before turning to the market source. The firm expands to the point where $f'(K^{\tau}_{i,m} + K^{ECA}_{i,m}) = r_{i,m}$ which occurs at $K^{\tau}_{i,m} + K^{ECA}_{i,m} = K^*_{i,m}$. The impact on the firm's profit rate is ambiguous.

In Panel (b), the cost of ECA financing is below market financing, and therefore the firm uses all of its available market financing before turning to ECA financing. In this case, the firm expands to the point where $f'(K^{\tau}_{i,m} + K^{ECA}_{i,m}) = r^{ECA}_{i,m}$, which occurs at some point $K^{\tau}_{i,m} + K^{ECA}_{i,m} < K^*_{i,m}$. In this last case, the firm expands, but it ultimately is smaller than in the unconstrained case. The impact on the firm's profit rate is unambiguously negative.

Figure D.2: Constrained Firm Optimization: Extension

(a) Case 2: Constrained (b) Case 3: Constrained



Notes: This figure plots the firm's marginal revenue production function. The bold black line traces out the capital that the firm invests and the rate at which it invests. The light blue shading is the firm's original profits without ECA financing. The dark blue shading is the additional new profits that come from ECA financing.

D.5 Industry Misallocation and Industry Average Wedge

In this section, we discuss the link between the change in the *average* wedge for firms in an industry that can explain the results in the DID (section 4), and the effect on misallocation (section 6).

The overall amount of capital invested in the industry depends on the average value of wedges among firms that belong to the industry, which we denote $\overline{\tau_J} = \mathbb{E}_J[\tau_{i \in J}]$. Around this average, firms can be heterogeneous in the value of their τ_i, as represented in Figure D.3a.

As discussed in section 4, a way to model how EXIM financing affects firms' real outcomes is by reducing the *average* τ for firms in a given industry, as depicted in Figure D.3b.

A policy shock like EXIM's shutdown can have an impact on average investment and misallocation that fall under four distinct cases:

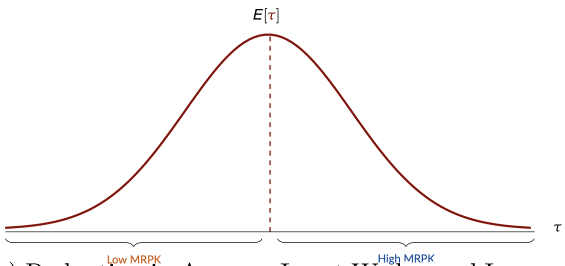
- A change in misallocation but no change on average investment: This would happen if the change in the spread of τ_i preserves the mean value $\mathbb{E}[\tau_i]$. In this case, misallocation can increase (high MRPK firms shrink, while low MRPK expand), or decrease (high MRPK expand and low MRPK shrink), but change in investment among high MRPK firms perfectly counterbalance the ones among low MRPK firms.

- No change in misallocation but a change on average investment: This would be the case if the mean changes, but the distribution of τ_i is preserved. This occurs if the entire distribution shifts to the left.

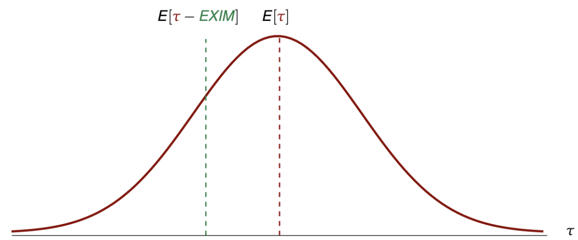
- An increase in misallocation **and** a change in average investment: This case corresponds to Figure D.3c in which the change in the average wedge in the industry is driven by a larger expansion of the low MRPK firms (Figure D.3c), which implies that misallocation increases.

Figure D.3: Effect of EXIM on Average Investment and Misallocation

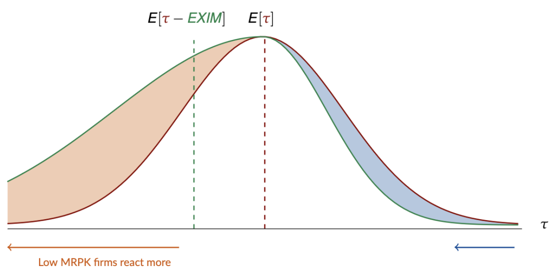
(a) Distribution of input wedge for firms i around the average in industry J



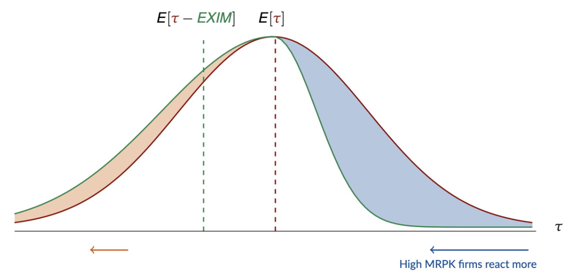
(b) Effect of EXIM's Trade Financing on Average Input Wedge



(c) Reduction in Average Input Wedge and Increase in Misallocation



(d) Reduction in Average Input Wedge and Decrease in Misallocation



- A decrease in misallocation **and** a change in average investment: This case corresponds to Figure D.3d in which the change in the average wedge in the industry is driven by a larger expansion of the high MRPK firms (Figure D.3d), which implies that misallocation decreases.

Notice in both cases 3 and 4, EXIM's supply of trade financing has exactly the same effect on the average investment in the industry ($\mathbb{E}_J[\tau_{i\in J} - EXIM_i]$), but completely opposite consequences for the industry TFP. These different cases clarify that it is never possible to infer how misallocation changes by simply looking at the *average* effect of a policy shock.

D.6 Industry Misallocation: Alternative Measures of Capital Cost Wedge

This section discusses alternative ways of measuring the dispersion in firm capital input cost wedge and reports the results in Table D.3. In columns 1–2, we estimate directly firms' production function using the control approach of Olley-Pakes (1996), and compute firm MRPK. In columns 3–4, we follow Baqaee and Farhi (2019*a*) and adopts the user cost approach that is also used in Gutierrez and Philippon (2016), as well as Foster, Haltiwanger and Syverson (2008). This technics relies on computing the user-cost of capital in the spirit of Hall and Jorgenson(1967), where the rental price takes into account not just the risklessrate and industry-specific depreciation but also industry-level risk premia. The Appendix of Baqaee and Farhi (2019*a*) provides a detail explanation of the computation. In columns 5–6, we use the dispersion in TFPR, estimating using the technic of Olley-Pakes (1996). This dispersion reflects the dispersion in cost wedges for all inputs that the firm uses, as shown by Hsieh and Klenow (2009).

If firms have a more general CES production function (the Cobb-Douglas being the CES production function when the elasticity of substitution across inputs is equal to one), it is no longer possible to estimate specifically the capital input cost wedge, but it is still possible to estimate the capital cost wedge relative to another input used by the firm, as highlighted for instance in Whited and Zhao (2021).

To see this, assume that firms have a standard CES production function where a firm i is section s generates total revenue Y by using capital and labor:

$$Y_{si} = A_{si}\left(\alpha_s K_{si}^{\frac{\gamma-1}{\gamma}} + (1-\alpha_s)L_{si}^{\frac{\gamma-1}{\gamma}}\right)^{\frac{\gamma}{\gamma-1}}. \tag{D.4}$$

α_s is the relative weight of capital in production and γ is the elasticity of substitution between capital and labor, while A_{si} is the firm technological efficiency parameter. In the non-distorted economy, firms pay their capital r and labor w, but as is standard in the misallocation literature, each input can have an extra wedge τ_s^X is the additional wedge on input X (in this case either capital or labor) that governs the marginal return necessary to invest in this input. It follows that the firm nominal profit π_{si} is given by:

$$\pi_{si} = Y_{si} - \left[(1+\tau_{si}^K)rK_{si} + (1+\tau_{si}^L)wL_{si}\right]. \tag{D.5}$$

To maximize (D.5), the firm first minimizes its cost by choosing K and L subject to setting (D.4) equal to a fixed level $\bar{Y_{si}}$. This implies that the solution for the optimal ratio of capital to labor is given by:

$$\frac{K_{si}}{L_{si}} = \left(\frac{\alpha_s}{1-\alpha_s} \times \frac{(1+\tau_{si}^L)w}{(1+\tau_{si}^K)r}\right)^{\gamma}. \tag{D.6}$$

As long as α_s and γ do not vary within firms in a sector or sector-by-size bin, firms in the same cell should have the ratio of inputs, and dispersion within a cell will reflect differences in the value of the ratio of input cost wedges. This is why in this case, we can no longer measure directly the capital cost wedge directly (as it is possible when the production function is Cobb-Douglas), but we can still measure it relative to the value of the wedge on the other input. In this case, labor to capital ratio gives the relative capital cost wedge. We operationalize this logic in columns 7–10, where we rank firms based on their ratio of COGS over capital (columns 7–8) and their ratio of labor over capital (columns 9–10).

In all the different ways of estimating the ex-ante wedge distortions that firms face, we find that EXIM's shutdown leads to larger contractions for firms that are ex-ante more constrained, confirming that EXIM's shutdown increased capital misallocation.

Table D.3: Impact on Capital Misallocation: Alternative Measures of MRPK

Dependent variable	Investment									
Measure of wedge distorsion	MRPK Olley-Pakes		MRPK User Cost		TFPR: Olley Pakes		CES: Capital / COGS markup		CES: Capital / L markup	
Sample	Low	High	Low	High	Low	High	Low	High	Low	High
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
$\text{EXIM}_i \times \text{Post}_t$	-0.064	-0.14	-0.088	-0.15	-0.057	-0.18	-0.056	-0.23	-0.075	-0.18
	(0.036)	(0.078)	(0.043)	(0.058)	(0.039)	(0.073)	(0.037)	(0.079)	(0.040)	(0.065)
	[0.077]	[0.072]	[0.042]	[0.0092]	[0.14]	[0.015]	[0.13]	[0.0046]	[0.062]	[0.0059]
Fixed Effects										
Exporter×Year	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Industry×Size quartile×Year	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Observations	13,420	7,764	14,983	9,010	13,446	7,738	14,420	8,570	14,960	9,050

Notes: This table reports the estimated effects of EXIM's shutdown on firms' capital investment. Depending on whether a firm is high or low MRPK. We measure MRPK by estimating the firm production function following Olley-Pakes (1996) in columns 1–2. In columns 3–4, we follow Baqaee and Farhi (2019*a*) and adopt the user cost approach. In columns 5–6, we report compute firm total TFPR. Finally in columns 7–10, we use the ratio of COGS over capital (columns 7–8) and total employment over capital (columns 9–10), which when the firm has a CES production function, will reflect the capital input cost wedge relative to the other input cost wedge. In all columns, we compute the value in the pre-shock period, average at the firm level, and sort firms along the median of their SIC-4 × quartile of asset distribution. The dependent variable is the growth rate relative to 2014 (the year prior to the shock) defined as $\Delta Y_{i,t} = (Y_{i,t} - Y_{i,2014})/Y_{i,2014}$. $Post_t$ is an indicator variable equal to 1 for the years 2015 to 2019. $EXIM_i$ is an indicator variable that equals 1 if the firm received trade financing from EXIM over the pre-shutdown period. Exporter fixed effect is an indicator variable that equals 1 if the firm reports positive EXIM financing, foreign sales in Compustat Segment, exports in Datamyne, or taxable foreign income before 2014. Industries are SIC-2. Standard errors are clustered at the firm level and are reported in the line below the point estimate in parenthesis, and p-values are reported in brackets below them.