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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 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. These negative effects for the average firm are amplified by increased capital misallocation across firms as those with higher ex-ante marginal revenue product of capital contract more. We model the effect of EXIM trade financing as lowering two types of input cost wedges: an exporting firm's financing friction, and an importer market friction. We show that both frictions are empirically relevant, indicating that even in well-developed financial markets, the supply of trade financing is plausibly constrained. 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 whose goal is to promote exports and ultimately boost domestic output, investment and employment by providing exporters with an additional source of trade financing. These institutions are ubiquitous, operating in 95 developing and developed countries that account for more than 92% of world trade, and they have become the predominant tool of industrial policy (Juhász, Lane, Oehlsen and Pérez, 2022).

Despite their widespread adoption, however, there is limited evidence on whether ECAs create trade and real economic activity, and how they affect the domestic allocation of capital.

In this paper, we study the causal effect of an export credit agency using a natural experiment: the temporary shutdown of the Export-Import Bank of the United States (EXIM) between 2015 and 2019. During the shutdown, EXIM's supply of trade financing collapsed by 84% relative to the years prior. Because firms and industries differed in their 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 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. As a result, even in the presence of profitable demand from foreign customers, firms may have to forgo exporting. ECAs help to overcome those financing frictions, thereby boosting exports and potentially spurring economic growth.

On the other hand, even if ECA funding benefits some firms, this may come at the expense of non-recipient firms, resulting in the reallocation of market share while leaving total exports unchanged. Moreover, exporting firms are larger and more productive, and hence unlikely to be financially constrained in the first place. In that case, ECAs' supply of trade financing would constitute a windfall that artificially boosts recipient firms' profit rates while not affecting their export decisions. Therefore, 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.

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 allocated capital to firms with a lower marginal revenue product of capital, misallocation would increase, which would lower the economy's total factor productivity and potentially lower output (e.g., Hsieh and Klenow, 2009; Moll, 2014; Baqaee and Farhi, 2020;

Bau and Matray, 2023).

To guide our empirical analysis, we model an economy in which firms are potentially constrained in their access to capital. These constraints imply that firms' marginal return to capital is governed by a shadow price of capital above the risk-adjusted price at which they borrow. In the model, EXIM expands a firm's access to credit such that it optimally increases exports and investment if it is constrained in the private market. However, if the firm was initially unconstrained, the lower price of financing from EXIM only raises its profit rates without changing real variables (investment, employment).

In the first part of the paper, we directly assesses 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 for each country 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 US exports, with significant variation across products.

Our empirical strategy compares changes in US exports of a given product to a given destination with those of other developed countries. Importantly, we do *not* require a random allocation of EXIM financing across products nor randomness in the timing of the shutdown itself. This specification allows us to control for any potentially unobserved product-destination demand shocks, so we also do not require that products faced no shocks correlated with EXIM exposure (for example, a change in import tariffs on EXIM-financed goods). 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 EXIM's 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 President Obama's policies and nominations in Congress. Third, the distribution of our point estimates are

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 second set of results using firm-level variation allows us to directly control for US-specific industry 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 4 to 5%. 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) after the EXIM 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 incur once to enter a market, which drives the extensive margin changes in entry but not exit (see e.g., Das, Roberts and Tybout, 2007; Xu, 2022).

Although our results show that the supply of EXIM trade financing creates trade at the product level, 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 raises the misallocation of capital across firms in the economy such that there is a reduction in aggregate productivity, then these additional costs could outweigh any average benefit.

To better understand the impact of EXIM on the domestic economy, we examine publicly listed firms that generate the majority of exporting activity, for which we observe all balance sheet and income statement items. We hand-match each EXIM financing contract to firms, and we define a firm as treated if it had received any EXIM financing prior to the 2014 shutdown. Econometrically, the firm-level analysis allows us to use within-industry variation and to control for multiple proxies of firm productivity and political connections. Absorbing firm-type specific shocks in this way relaxes the identifying assumption that EXIM's shutdown is not correlated with unobserved industry shocks.[1]

We find that EXIM's shutdown reduced the total sales (foreign and domestic) of EXIM-backed firms by an average of 12.5% 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, or size. As additional robustness checks, we show that the results are unchanged if we exclude the top recipients of EXIM financing or individual industries. Given the elasticity of the effects of EXIM's shutdown on total sales and firm exports,

[1] We exclude Boeing in our baseline analysis; our results are quantitatively identical when we include it. Benmelech and Monteiro (2023) specifically analyze the effect of EXIM's shutdown on Boeing.

we calculate that the shock to firms' exports has a pass-through to domestic sales of approximately 5% to 30%. 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, which can emerge in particular from financing frictions and the presence of internal capital markets (e.g., Stein, 1997; Lamont, 1997).

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

In the second part of the paper, we examine whether the financing provided by EXIM imposes an indirect cost on the economy by increasing the misallocation of capital. Our theoretical framework clarifies that if firms are heterogeneous in the input wedges they face, and hence in their marginal revenue returns to capital (henceforth "MRPK"), changes in investment could be driven by either an allocation of capital to firms with low MRPK (i.e., an increase in misallocation) or high MRPK (i.e., a decrease in misallocation). We use the Bau and Matray (2023) methodology that directly estimates within-firm changes in investment for high versus low MRPK firms. Unlike other work in the literature, this methodology does not rely on attributing the observed cross-sectional dispersion in MRPK to misallocation, which relaxes the assumptions necessary to identify changes in misallocation.

We 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. While our findings speak only to changes in misallocation among publicly listed firms, these 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 the third part of the paper, we provide more direct empirical evidence for our proposed mechanism that EXIM is able to target endogenous wedges in the private market for trade financing. We model the distortions in the economy that generate misallocation as having two components: an exporting *firm*-specific component and an importing *market*-specific component. We apply the Bau and Matray (2023) methodology to test for EXIM's ability to target those wedges. First, we find that firms that are ex-ante more financially constrained are also more impacted by EXIM's shutdown, implying that EXIM was able to relax their credit constraints. Second, we show that EXIM financing is allocated more to countries that plausibly face larger trade financing frictions, and that trade to those destinations grows significantly less after the shutdown.

In the final part of the paper, we discuss how EXIM and ECAs more generally interact with the domestic economy beyond just the exporting sector. Our analysis shows that EXIM can increase output by reducing capital input wedges for the firms with the highest marginal return to capital. However, it leaves open the question of whether EXIM is only able to do so because it does not have a profitability constraint, thereby requiring it to be funded by distortive taxes. Empirically, that does not appear to be the case: EXIM's balance sheets show that it profitably returned approximately $50 million annually to the US Treasury on average during our sample period, which can be explained in part by the fact that EXIM operates with very low default rates (0.3%).

Three factors could contribute to EXIM's ability to generate profits while at the same time relaxing exporters' trade financing frictions. First, a positive takeup of EXIM's programs does not imply that they are supplying trade finance at a price below the private market. If firms face a constraint in their access to credit, they will demand EXIM financing as long as it is priced below their marginal revenue return to capital, which can be above the market price of capital. Second, even though below-market prices of trade financing by EXIM is not necessary for generating demand for its programs, EXIM can also plausibly operate at lower costs than the private market. It may be able to recover losses more effectively (for instance due to US geopolitical power), it may pool a wider set of risks, and it is not subject to the same regulatory burden as private commercial banks. Third, if EXIM's objective function is not only to maximize profits but also to foster broader social outcomes such as export growth or domestic employment, it would optimally choose to charge a lower (but still non-negative) markup than purely profit-maximizing banks. All of these factors would also suggest that private banks may not find it profit-maximizing to step in to provide more trade financing after the shutdown.

We conclude by discussing how ECAs may operate as a tool for broader industrial policy motives. Our framework clarifies that ECAs can target trade financing 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 specifically targeting firms facing such frictions is a question for future research.

Related literature. Our paper is connected to several strands of the literature. Because export credit agencies are one of the most important tools of industrial policy, 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; Gregg, 2020; Choi and Levchenko, 2021; Garin and Rothbaum, 2022; Juhász, Lane, Oehlsen and Pérez, 2022;

Lane, 2023). In contrast to these papers, we focus on the supply of trade financing from an export credit agency in a developed economy, and we show that even in such a context policies alleviating financing frictions can raise economic activity in the tradable sector.

The second literature our paper relates to is 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 (e.g., Khandelwal, Schott and Wei, 2013; 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 also contribute to the literature on the effects of financial frictions and misallocation, which has theoretically shown how financing frictions might give rise to capital misallocation (e.g., Buera, Kaboski and Shin, 2011; Midrigan and Xu, 2014; Moll, 2014), and empirically shown how government intervention might be able to reduce it (e.g., Bau and Matray, 2023).

The third literature we contribute to is 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, Michalski and Ors, 2017; Xu, 2022; Beaumont and Lenoir, 2023; Bruno and Shin, 2023; Monteiro and Moreira, 2023);[2] how trade affects firm demand for working capital and external finance (e.g., Demir and Javorcik, 2018; Federico, Hassan and Rappoport, 2024; Demir, Javorcik, Michalski and Ors, 2024); 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, our paper examines 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 government-backed export credit and shows that such interventions can foster exports and firm growth through access to trade financing without necessarily increasing misallocation in the economy.

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,

[2] An initial set of papers studied how external finance dependence affects exports, in particular by relying on the Rajan and Zingales (1998) measure of "external finance dependence." See, for instance, Do and Levchenko (2007), Bricongne, Fontagné, Gaulier, Taglioni and Vicard (2012), Behrens, Coreos and Mion (2013), Chor and Manova (2012), and Manova (2013).

[3] For surveys of this literature, see Foley and Manova (2015) and Leibovici, Szkup and Kohn (2022). Models of how financing frictions and financial development should affect international trade include Manova (2013), Caggese and Cuñat (2013), Chaney (2016), and Leibovici (2021).

2013), Pakistan (Zia, 2008; Defever, Riaño and Varela, 2020), and Korea (Hur and Yoon, 2022). One exception is Zia (2008), which finds that an export credit program in Pakistan mostly led to capital misallocationl due to "political capture," as evidenced by publicly-listed firms being the main recipient of government support, and the fact the program affected these firms' profit rates but not their investment.[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 firm revenue, investment, and employment over and above the effect on exports, particularly when these firms were plausibly financially constrained.

The most related paper to our study is Benmelech and Monteiro (2023), which also analyzes the shutdown of EXIM with a difference-in-differences estimation strategy. It focuses entirely on the impact on Boeing relative to other aircraft manufacturers. The main finding is that the effect of EXIM's shutdown was only sizable for Boeing's sales to airlines in countries with underdeveloped financial systems.[5] These results are consistent with our finding that the EXIM shutdown affected markets with larger trade (financing) frictions more broadly. In addition, we show a significant effect of EXIM support on US exporters beyond the airline sector, independent of specific markets or a single firm, and show that these effects also translate into an important contraction of capital and labor. By looking at the universe of (listed) firms rather than any specific firm, we are also able to study how EXIM affects the (mis)allocation of capital, which is an important additional source of gains. Our baseline effects are estimated without Boeing and are qualitatively and quantitatively unchanged when we include it. Studying the universe of listed firms also allows us to understand the distributive effects of export credit subsidies and to unpack the channels through which these agencies have may affect the real economy.

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 provide a theoretical framework for how ECA financing impacts firm investment decisions.

[4] Another exception is Agarwal et al. (2023), which uses a regression discontinuity design on a marketing campaign of the Swedish ECA and finds a positive effect on exports (but limited effects on other firm outcomes).

[5] Also related are Desai and Hines (2008) and Kurban (2022). Desai and Hines (2008) study the stock market reactions to the 1997 E.U. complaint at the WTO about illegal U.S. export subsidies. However, they do not look at the real effects of a change in subsidies, and the shock is not specific to preferential access to credit. Kurban (2022) shows that EXIM support fosters US exports using industry-level data.

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.[6]

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 the high trade financing needs is costly for most firms. The lack of cash reserves for self-financing generates a role for financial intermediaries, reinforced by the fact that financial intermediaries (such as banks) may be able to provide this 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 preventing 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

[6]See Schmidt-Eisenlohr (2013) and Antras and Foley (2015) for a discussion of cross-border contractual frictions and how they impact international trade financing arrangements.

different contractual environments; and (ii) higher markups charged by banks with market power.[7] 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 worldwide, which operate in countries that account for 92% of the value of world exports. ECA financing is one of the primary tool of industrial policy (Juhász, Lane, Oehlsen and Pérez, 2022). 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 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 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, the specific party receiving the financing should not matter. Whether the exporter or the importer formally receives ECA's trade financing, a specific transaction between the two parties backs the financing. When financing is extended to the exporter, the ECA directly relaxes the firm's financing constraint. When the importer receives the financing, the buyer is implicitly extending financing to the exporter, which indirectly relaxes the exporter's constraint. In both cases, the trade financing frictions that prevented the profitable international transaction from occurring is alleviated, and the exporter can export more, invest, hire, and grow.

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.

[7] Bank market power might be possible (and 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 (Niepmann and Schmidt-Eisenlohr, 2017*a*; Paravisini, Rappoport and Schnabl, 2023).

2.1.2 The Export-Import Bank of the United States (EXIM)

EXIM is the official export credit agency of the United States. 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.

EXIM's operations. Established during the New Deal, EXIM's official mandate is to support jobs in the US by providing financing to US exporters or their customers when the private sector is unable or unwilling to do so.[8]

Operational constraints. EXIM operates to fulfill its mandate under several constraints.

- Underwriting loans and insurance contracts: Applications must comply with EXIM's policies on credit risk and meet minimum eligibility requirements. These eligibility requirements include demonstrating that the exporting activity requires employees in the US and that the firm has not secured trade financing on the private market. The latter aims to ensure that EXIM is not directly competing with private banks.

- Financing terms: 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 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.

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

- Strict balance sheet cap: 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" in which the annual budget reflects the budgeting process rather than investment opportunities.

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

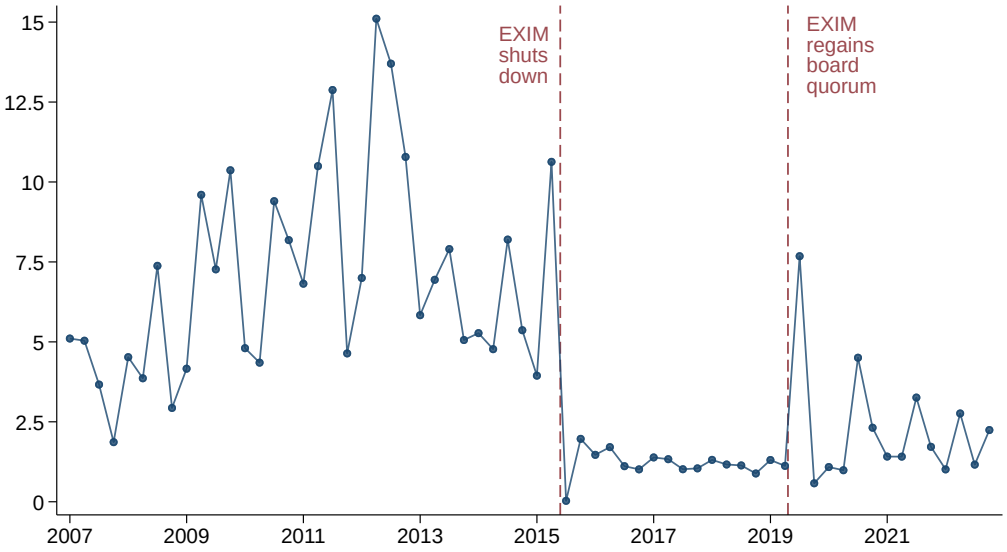
[8]The "Import" component in the name refers to the fact that EXIM finances other countries' imports of US goods and services. It does not finance US imports of foreign goods and services.

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.[9]

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.[10] 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.

Figure 1: EXIM's Supply of Trade Financing



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

2.2 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.

[9]EXIM board members serve until a pre-determined date or until a successor is appointed. Potential board members are nominated by the President, assessed by the Senate Banking Committee, and brought to the full Senate for a vote.

[10]An article in the New York Times on February 2016 described Mr. Shelby the following way: "He now has the distinction of running the only committee in the Senate that has not acted on a single nominee in this Congress."

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.

2.2.1 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.

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:

$$\begin{aligned} \max_{K_{i,m}} \quad & \Pi_{i,m} = f(K_{i,m}) - r_{i,m} \times K_{i,m} \\ \text{s.t.} \quad & K_{i,m} \leq D_{i,m} \end{aligned} \tag{1}$$

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.[11]

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.

2.2.2 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:

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

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*.

[11] 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 2a and Figure 2b. The firm's profits without ECA financing are in light blue in Figure 2a while the additional firm profits after receiving ECA financing are in dark blue in Figure 2b. 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 2b 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 and firm profit rates are now higher.

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 2c and Figure 2d illustrate the case when $r_{i,m}^{ECA} \leq r_{i,m}$. Figure 2c shows a constrained firm's choices of capital and its profits.

Figure 2d shows the impact of accessing ECA financing. 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.[12] 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.

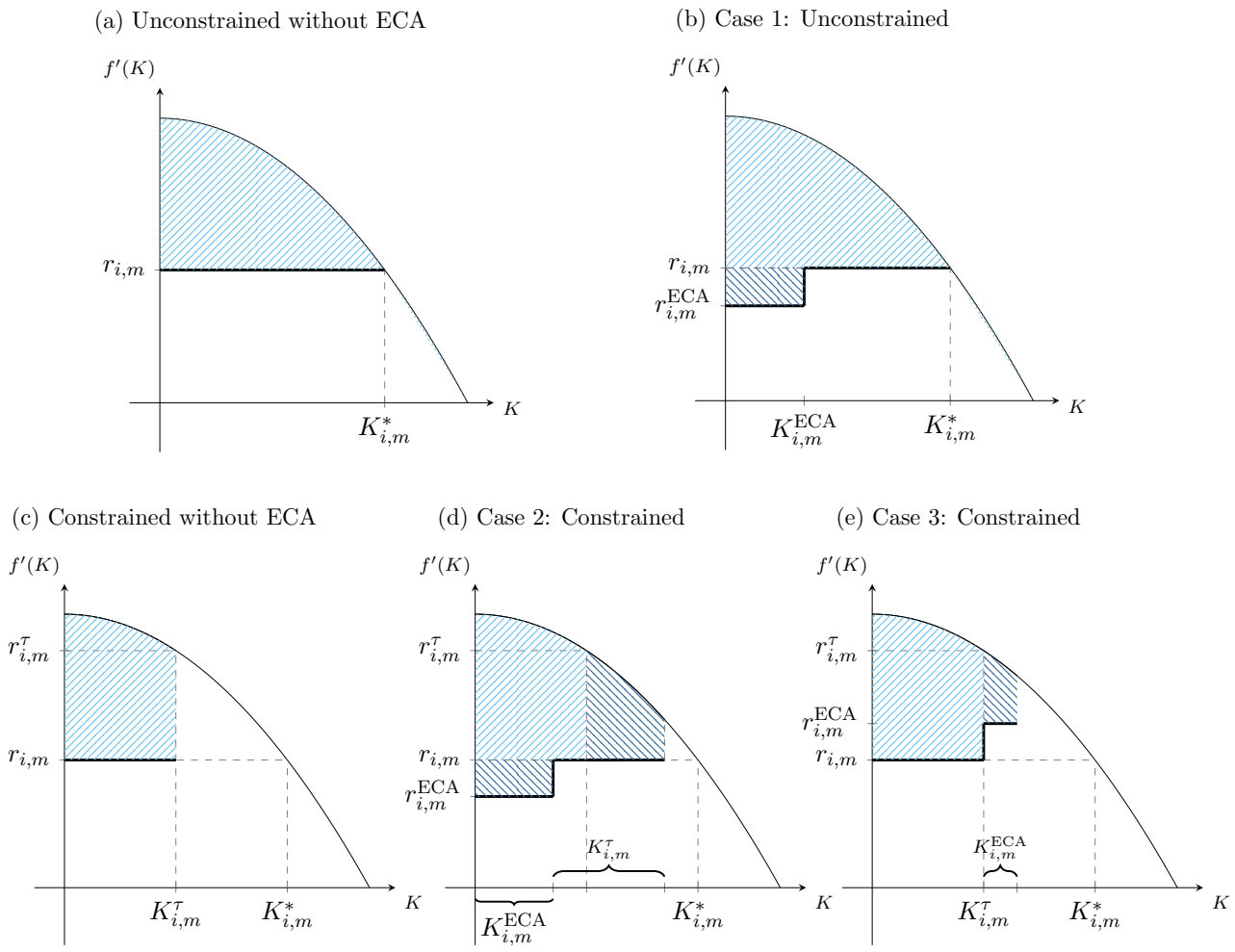
Figure 2e illustrates this case when $r_{i,m}^{ECA} < r_{i,m}$. Recall that constrained firms will use ECA financing as long as it is offered at a price below the firm's shadow price of capital $r_{i,m}^{ECA} < r_{i,m}^{\tau}$ and so ECA financing does not need to be provided at below market rates. Despite 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

[12] We draw the figure such that firms remain constrained: $D_{i,m}^{ECA} + D_{i,m}^{\tau} < D_{i,m}^{*}$. In Appendix E.1, we provide an extension in which we relax this condition.

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 $r_{i,m}^{ECA} > r_{i,m}$.

Figure 2: 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.

Summary of predictions. Our model provides several empirical predictions. First, access to ECA financing will only cause firms to increase their size if they are financially constrained. Unconstrained firms already invest the optimal amount, and so there is no causal impact on firm size. Second, when firms are not financially constrained and ECA financing is inframarginal, firm profit rates will increase. Third, firm profit rates will decrease if firms are financially constrained and ECA financing is more expensive than private financing.

3 Data and Empirical Strategy

3.1 Data

We use five main data sources: (1) loan authorizations by EXIM; (2) an annual panel of origin country-by-product-by-destination country-level exports; (3) firm balance sheets and outcomes from Compustat; (4) firm-level transaction-level export data from Datamyne, and (5) additional firm-level variables from various sources.

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.

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 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 asset 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 Appendix C.1, C.2 and C.3.

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 and a discussion of data limitations.

In order to identify whether a firm is an exporter, we use three additional proxies. First, in Compustat historical segment data, we flag firms that report non-domestic sales in the geographic

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

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.

Additional firm data. We measure lobbying activity for EXIM support 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. 4.3% 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.

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	3,917.40	17,074.45	49.58	429.52	2,084.00
Employees No.	12.23	56.88	0.16	1.36	7.06
Tangible Capital	2,711.78	15,027.31	17.91	172.54	1,038.05
Intangible Capital	2,473.23	11,326.72	43.24	242.83	1,119.56
Total assets	4,722.69	19,349.99	68.15	488.99	2,358.10
Share foreign sales	0.26	0.28	0.00	0.17	0.45
MRPK	4.28	5.02	1.14	2.51	4.91
Net profit margin	-2.31	13.09	-0.05	0.06	0.13
Leverage	0.33	0.57	0.03	0.21	0.41
Tangibility	0.24	0.24	0.06	0.15	0.35
Observations	28,458				

Notes: This table presents summary statistics for the main firm sample. The EXIM dummy variable takes the value of 1 if a firm was supported by an EXIM loan before the lapse in its authorization (1st July 2015). Total revenues, Employees, Tangible Capital, Intangible Capital, and Total assets are reported in thousands. MRPK is sales over tangible capital. Net profit margin is net income over total revenues. Leverage is defined as long-term debt plus debt in current liabilities divided by the total assets. Tangibility is net property, plant, and equipment divided by total assets.

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:

$$Y_{p,o,d,t} = \beta \; EXIM_{p,o} \times Post_t + \theta_{p,o,d} + \gamma_{p,d,t} + \delta_{o,t} + \varepsilon_{p,o,d,t} \tag{3}$$

where $Y_{p,o,d,t}$ is the value of exports of product p, originating from a country o, to a destination country d, at time t. To account for the fact that exporters, destinations, and products might systematically differ 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_t 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.

The treatment intensity $EXIM_{p,o}$ is defined as the average amount of EXIM trade financing a product received over 2007–2010, scaled by US export flows in that product.[14]

Since EXIM financing collapses during the shutdown, the ex-ante cross-sectional variation in EXIM dependency ($EXIM_{p,o}$), captures the drop in the supply of EXIM financing to each product. One attractive feature of this construction is that it is plausibly exogeneous to export dynamics after 2015 that are not directly related to EXIM dependency.[15]

We plot the distribution of treatment intensity across 3-digit industries in Figure 3. This figure shows that we not only have substantial variation across multiple sectors, but also that while the aerospace and transportation equipment sector is an important recipient of EXIM financing, it is only one of many industries impacted by the shutdown.

We estimate equation (3) using a specification in first differences:

$$\Delta Y_{p,o,d,t} = \beta EXIM_{p,o} \times Post_t + \gamma_{p,d,t} + \delta_{o,t} + \varepsilon_{p,o,d,t} \tag{4}$$

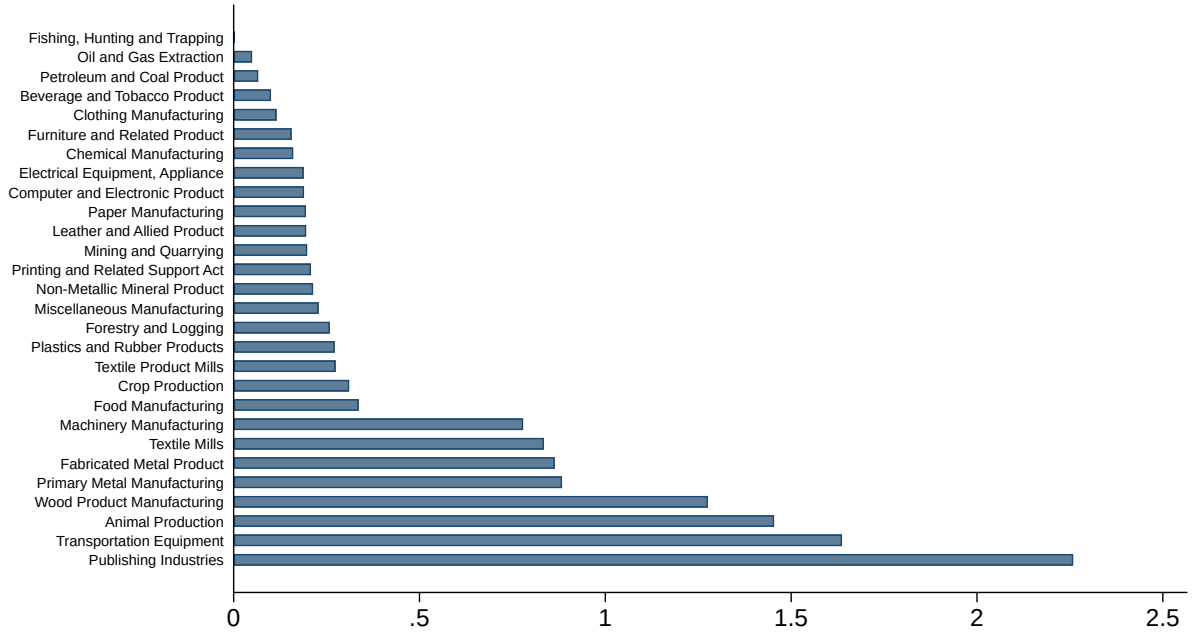
where $\Delta Y_{p,o,d,t}$ is now the *change* of exports of product p, originating from a country o to a destination country d at time t relative to a moment prior to EXIM's shutdown. In our baseline, we choose 2014, the year prior to the shutdown, as the reference year. The only difference between equations (3) and (4) is that since we are using the first difference operator, the time invariant exporter-product-destination fixed effects ($\theta_{p,o,d}$) from equation (3) 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 (4) with an event study specification

[14] $EXIM_{p,o} = \sum_{t=2007}^{2010} \sum_{i \in p} EXIM_{i,US,t} \Big/ \sum_{t=2007}^{2010} Export_{p,US,t}$ where i denotes an individual EXIM loan and p denotes an HS-4 product. EXIM loans are linked to products reported at the NAICS-4 level so we convert everything into HS-4 (Pierce and Schott, 2012).

[15] As explained in Section 2.1.1, EXIM provides two broad types of financial products: loans and 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.7, 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.

Figure 3: 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-3 level for all industries that received at least one dollar from EXIM over the period 2007–2010. In Appendix Figure C.7, we plot the distribution at the NAICS 4-digit level, which we convert into HS-4, that we use for the estimation.

that estimates the effect of $EXIM_{p,o}$ every year relative to the omitted year (2014):

$$\Delta Y_{p,o,d,t} = \beta_t EXIM_{p,o} + \gamma_{p,d,t} + \delta_{o,t} + \varepsilon_{p,o,d,t} \tag{5}$$

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 an 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

[16]While transformations of the log-function have been used previously to handle zeros (e.g., log(x+1) or the arcsin-log function), such transformations 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).

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-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 compare to estimated coefficients at higher levels.

Constructing the control group. 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).[19] 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 various risk shocks by including origin-year fixed effects ($\delta_{o,t}$).

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.

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

[18] This 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. This estimation strategy is somewhat similar to the one developed in Amiti and Weinstein (2018) but allows for a simpler way to handle entry and exit, and because it relies on a linear estimator, allows for exact decomposition of the main effect into multiple margins and for varying the level of aggregation of the data.

[19] 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 pattern prior to 2014 by using the cosin similarity of the vector of their export market share across products-destinations.

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. We are able to partially offset such concerns in the firm-level analysis that we outline in the next section.

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.

3.2.2 Firm-level Effects

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

$$\Delta Y_{i,j,t} = \beta \; EXIM_i \times Post_t + \gamma_{j,t} + Exporter_{i,t_0} \times \delta_t + X_{i,t_0} \times \delta_t + \varepsilon_{i,j,t} \tag{6}$$

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.[20] $EXIM_i$ 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 at various horizons 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:

$$\Delta Y_{i,j,t} = \beta_t \; EXIM_i + \gamma_{j,t} + Exporter_{i,t_0} \times \delta_t + X_{i,t_0} \times \delta_t + \varepsilon_{i,j,t} \tag{7}$$

As in equation (4), we do not include time invariant unit fixed effects (firms in this case) because

[20] Since we work at the firm level and study the effect of EXIM on within-firm changes, we do not need to accomodate for entry and exit, as in the context of disaggregated trade data, and we therefore use a standard growth rate defined as $(Y_{i,t}\text{-}Y_{i,2014})/Y_{i,2014}$. We show the results are very similar when if we use the midpoint growth rate in Appendix Table A.9.

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 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.

Figure 4 shows that treated and control firms are very similar along most observable dimensions. We plot the average (normalized) differences and confidence intervals for various observable ex-ante characteristics. These differences are estimated unconditionally, conditional on exporter fixed effects, or 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).

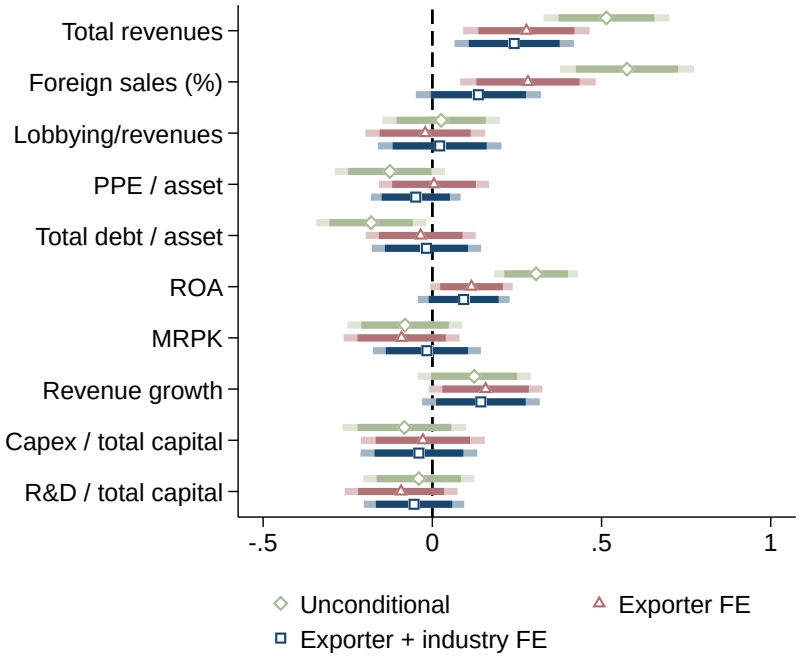
Along the remaining significantly different dimension of firm size, treated and control firms still share a large overlap in size, which ensures that effects can be identified across firms of similar size. In addition, treated and control firms are similar in terms of the share of foreign sales, financing frictions proxied by their leverage, and tangibility (defined as property, plants and equipment over total assets). 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 and marginal return to capital (MRPK, defined as sales over tangible capital).

Identifying assumptions and threats to identification. Our identifying assumptions are very similar to the ones we need to estimate the causal impact of EXIM on total exports in the custom data. We do not need random assignment for EXIM support nor similarity in levels between EXIM backed and non-backed firms. We only require that there is no unobserved shock to EXIM-

supported shocks that would impact their outcomes.

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, etc.), 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 4: Firm Covariate Balance



Notes: This figure shows coefficient estimates and 90% (lighter bars) and 95% (darker 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. "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. EXIM may have no effect either because it is inframarginal, and hence finances an exports sale that would have happened no matter what, or because the business stealing effect between EXIM-backed and non-backed firms fully compensates for any positive effect EXIM

might have on beneficiary firms. In our second set of results, we analyze the impact on firms, including their sales, investment, and hiring decisions.

At the aggregate product exports level, we find that EXIM's exit leads to a sizable decline in exports for products that received more financing prior to the shutdown. At the firm level, we find that the shutdown had sizable negative impact on firm real outcomes including total revenues, employment and capital 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 (4) 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.[21]

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, as long as we include the same set of fixed effects, weight the regressions appropriately, and cluster standard errors correctly.[22]

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. 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 an elasticity. The value of -5.02 means that a 1% change in EXIM trade financing generates a change of -5.02% in total exports at the product level.

The point estimate is stable and if anything slightly larger and more significant when we control for market (destination-product) specific shocks (-4.40 in column 1 vs -5.02 in column 4). This result implies that the exposure to EXIM is uncorrelated with demand shocks or with market specific risk shifters.

[21] 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.

[22] 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$\times$HS-6$\times$destination$\times$year, each cell is weighted by: $A_{o,hs6,t} \Big/ (\sum_{hs6 \in [o,hs4,t]} A_{o,hs6,t})$. This guarantees that the equation provides an equal weighting at the origin$\times$HS-4$\times$year. We then multiply this weight by $A_{o,p=HS-4,t}$ 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.

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 as a threshold 0.45%, which approximately 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 -0.062 implies that EXIM's shutdown reduces exports of products highly exposed to EXIM funding relative to less exposed products by 6.2%. The average EXIM support for the group of products with an exposure above 0.45% is 1%, which implies an elasticity of -6.2 (-6.2%/1%). Econometrically, the similarity in magnitude 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.

Our specification tightly controls for product×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 certain US-specific products 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 5). 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.

In Figure 5, 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.

The impact of EXIM's shutdown on US exports has two implications. First, EXIM supplies marginal trade financing that shifts the exporting decision for the average firm. Second, EXIM is able to create trade net of potential business stealing between recipient and non-recipient firms, meaning that even if EXIM induces some market share reallocation among US firms, this amount is smaller than the additional exports that EXIM financing generates.

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.

Table 2: Impact on US Products Exports

Dependent variable	Exports					
Level of aggregation	HS-4	HS-6	HS-6×Destination	HS-6×Destination		
	(1)	(2)	(3)	(4)	(5)	(6)
$\text{EXIM}_{p,o}\times\text{Post}_t$	-4.40	-4.40	-4.40	-4.16	-5.02	
	(1.57)	(1.57)	(1.57)	(1.64)	(2.40)	
	[0.0052]	[0.0052]	[0.0052]	[0.011]	[0.037]	
$\text{EXIM}_{p,o}\geq 0.45\%\times\text{Post}_t$						-0.062
						(0.020)
						[0.0017]
Fixed Effects						
Origin×Year	✓	✓	✓	✓	✓	✓
Product (4-digit)×Year	✓	✓	✓	—	—	—
Product (6-digit)×Year	—	—	—	✓	—	—
Product (6-digit)×Destination×Year	—	—	—	—	✓	✓
Observations	109,199	8,419,512	23,775,713	23,775,713	23,775,713	23,775,713

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.

Motivated by trade models where firms face both fixed and variable exports 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).

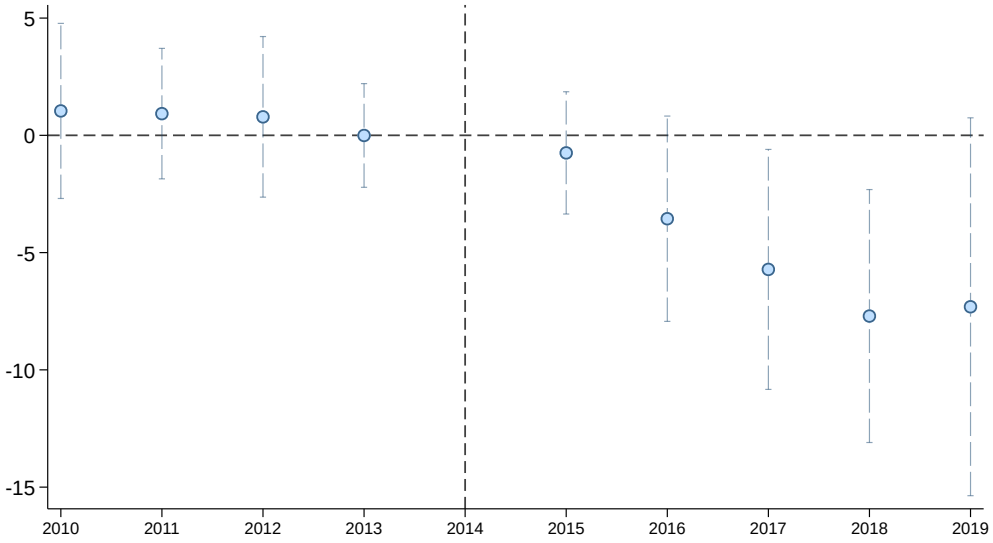
Formally, we define $I_t = d : Y_{p,t} > 0$ as the set of destinations to which a product is exported in year t. The set of destinations served in year t and in year 2014 is given by $I_{t\cap 2014} = \{d : d \in I_t, d \in I_{2014}\}$; the set of destinations that appears in t but were not served in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

$$g^{2014}[Y_{p,t}] = \sum_{d\in p} g^{2014}[Y_{p,d,t}] = \underbrace{g[Y_{d\in I_{\cap}2014}]}_{\text{intensive margin}} + \underbrace{g[Y_{d\in I_{t\setminus 2014}}]}_{\text{entry margin}} + \underbrace{g[Y_{d\in I_{2014\setminus t}}]}_{\text{exit margin}} \tag{8}$$

We show the results of this decomposition in Table 3. We find that the decrease in exports is mostly driven by the intensive margin, which explains between 90% (3.97/4.40) to 80% (0.042/0.052), depending on whether EXIM exposure is measured continuously (odd columns) dichotomously

Figure 5: Impact on Aggregate Product Level 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 (5) with product-destination and destination-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 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.

(even columns). 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 large intensive margin response are consistent with trade financing models in which finance enters directly in the cost function of exporters in the form of additional iceberg trade costs that scale with the exported quantities.[23]

Trade financing also appears to have a sunk cost component that needs to be paid upfront (hence the decline in entry margin), but does not need to be repaid once the firm has entered the new market (hence the absence of decline on the exit margin). Such costs could take the concrete form of the initial costs to set up a distribution network in a new market, or a one time marketing campaign to create brand awareness among new customers.

The asymmetry in reaction between entry and exit is also consistent with the supply of trade financing having an effect on entry, and then allowing firms to learn about the specificities of the foreign market (e.g., Koenig, 2009; Berman, Rebeyrol and Vicard, 2018; Atkin, Khandelwal and Osman, 2017). EXIM might also have a direct effect entry via "knowledge promotion," where part of its effects come from helping firms to navigate exporting to a destination for the first time, which

[23]They are also consistent with models in which firms need to provide trade credit (in this setting trade financing) to maintain their customer relationships or acquire new customers (e.g., Arkolakis, 2010; Beaumont and Lenoir, 2023)

triggers "learning-by-exporting," in line with the role of "export promotion policies" (e.g., Volpe Martincus and Carballo, 2008; Broocks and Van Biesebroeck, 2017).

Our results on the lack of extensive margin exit are also informative about how fixed costs should be modeled, and in particular suggest that on the extensive margin, firms do not appear to face a recurring, period-by-period (fixed) continuation cost once they have pay an up-front sunk cost to enter a foreign market, consistent with prior work (e.g., Das, Roberts and Tybout, 2007; Xu, 2022).

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)
$\text{EXIM}_{p,o} \times \text{Post}_t$	-4.40		-3.97		0.50		-0.93	
	(1.57)		(1.46)		(0.43)		(0.47)	
	[0.0052]		[0.0068]		[0.25]		[0.048]	
$\text{EXIM}_{p,o} \geq 0.45\% \times \text{Post}_t$		-0.052		-0.042		-0.00039		-0.0099
		(0.018)		(0.017)		(0.0037)		(0.0055)
		[0.0038]		[0.012]		[0.91]		[0.072]
Fixed Effects								
Origin×Year	✓	✓	✓	✓	✓	✓	✓	✓
Product (4-digit)×Year	✓	✓	✓	✓	✓	✓	✓	✓
Observations	109,199	109,199	109,199	109,199	109,199	109,199	109,199	109,199

Notes: This regression is 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 period. *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 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.

Interpretation of magnitudes. The elasticity estimated in Table 2 is between 4 and 5. Two points are important to stress. First, this is the elasticity relative to a dollar of extra *revenue* (the value of export) and not relative to an extra dollar of *profit* for the firm or the bank.

Second, this elasticity is in line with expected working capital elasticities. If for instance a firm's working capital accounts for 20% to 25% of its revenues, an additional $1 change in working capital will be able to sustain an extra $4 to $5 of extra revenues.

We can also use estimates of the trade elasticity to back out the impact of EXIM's shutdown on firms' financing costs. Assuming that financing costs pass through fully to export prices and using standard estimates of the trade elasticity of -2 to -5 (Boehm, Levchenko and Pandalai-Nayar, 2023; Imbs and Mejean, 2017), EXIM's shutdown raised (financing-inclusive) prices by 1% to 2%. If trade financing acts as an iceberg trade cost, these magnitudes imply that its costs increased by

1–2% during the shutdown.

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

To examine this question, we now turn to the sample of publicly listed exporters for which we can study various firm outcomes. 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, and so we believe that we capture the majority of the relevant economic activity.[24]

4.2.1 Effect on Firm Exports

We start by confirming that EXIM's shutdown lowered firm exports using the universe of firms that we observe in the Datamyne data, and we show that results are similar when we restrict to the subset that can also be matched with Compustat. An advantage of our firm-level analysis relative to the aggregate product exports estimation is that we are now able to measure the treatment at the firm level and compare US exporters shipping the same product to the same destination at the same time.

We define $EXIM_i$ as a dummy that takes the value one if the firm received EXIM trade financing prior to the shutdown. 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 (2010–2014) and an average post period (2015–2019). Because of the large number of entry and exit decisions at this level, we use the same Beaumont, Matray and Xu (2024) method as in Table 2, and we weight the data in the same way as in the aggregate product exports data. 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.

Table 4 reports the results. Columns 1 and 2 show the aggregation property of the estimator in which the point estimates and standard errors are the same whether we aggregate exports at

[24]The US Census Bureau does not report firms' equity status, and therefore 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%.

the firm level (column 1) or disaggregate at the firm-product-destination level. In columns 3 to 5, we progressively include more fixed effects to control for unobserved demand shocks that might correlate with the treatment. In column 6, we restrict the data to the sample of Compustat firms that we match with Datamyne. Columns 5 and 6 show that the effect of EXIM's shutdown remains the same when we tightly control for product×destination×time fixed effects. Relative to the results in the aggregate customs data, this analysis with just US exporters allows us to control for even finer types of demand shocks such as country-specific tariff shocks (e.g., China tariff shocks on certain American products).

In terms of economic magnitudes, EXIM financing accounts for approximately 6.3% of maritime exports for treated firms. The point estimate of -0.33 implies an average elasticity of -5.2, which is similar to the elasticity estimated in the aggregate product exports data.

Table 4: Impact on Firm Maritime Exports

Dependent variable	Maritime Exports					
Sample	Listed + private firms					Listed firms
	(1)	(2)	(3)	(4)	(5)	(6)
$\text{EXIM}_i \times \text{Post}_t$	-0.33	-0.33	-0.32	-0.32	-0.28	-0.27
	(0.050)	(0.050)	(0.049)	(0.049)	(0.046)	(0.13)
	[7.9e-11]	[7.9e-11]	[7.7e-11]	[6.0e-11]	[1.2e-09]	[0.044]
Fixed Effects						
Post	✓	✓	—	—	—	—
Product×Post	—	—	✓	—	—	—
Destination×Post	—	—	—	✓	—	—
Product×Destination×Post	—	—	—	—	✓	✓
Observations	79,980	1,789,006	1,789,006	1,789,006	1,789,006	142,087

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 effect is a vector of indicator variables at the HS-4 level, destination fixed effects are fixed effects for each country where the product is exported. 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.

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 (6) that captures the average change in total revenues that EXIM-backed relative to non-backed firms over the post period (2015–2019) relative to the pre-period. Table 5 reports our results. Column 1 is estimated with the sparsest set of controls: only year fixed effects. Column 2 includes an exporter-by-year

fixed effect to account for the mechanical correlation between the treatment exposure to export shocks. Column 3 includes industry-by-year fixed effects, and column 4 is our preferred specification that includes both industry and exporter-by-year fixed effects. 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 drop of 17% in column 1 to a difference of 10% in column 4 when we restrict our identifying variation to firms exporting to similar destinations that are also in the same industry.

In columns 5 to 7, we include some robustness exercises. Column 5 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. In column 6, we exclude the ten firms with the highest reliance on EXIM support in the pre-period. Finally, in column 7, we include Boeing. The coefficients and standard errors are identical to the baseline effects that we estimate in column 4. 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.[25]

Figure 6 plots the yearly coefficients of β_t and 95% confidence intervals of the growth of firm total revenues relative to 2014 for the dynamic event study in equation (7) controlling for the full set of firm characteristics (industry, exporter status, size, leverage, profitability).[26]

There is visual evidence of the absence of differential pre-trends before the shock. After EXIM's shutdown, 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 compensate the loss of their foreign sales by an increase in domestic sales, and (ii) that treated firms are not able to compensate the loss of their EXIM financing with an increase in trade financing at commercial, profit-maximizing banks during the entire duration of the shutdown.

Interpretation of magnitudes. Given that in our sample, the average treated firm received financing from EXIM amounting to approximately 5% of its total revenues, a back of the envelope computation implies that in the firm data, \$1 of EXIM financing translates into a \$0.0 of additional

[25] 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. Results are, if anything, larger with other weighting schemes or no weights: see Appendix Table A.8.

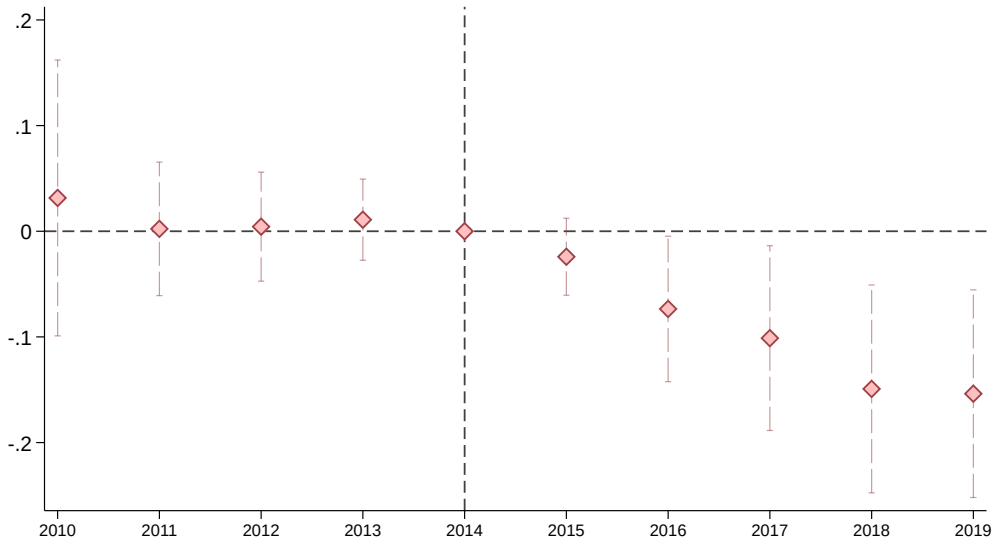
[26] Appendix Figure B.2 reports robustness for the firm event study when we progressively include the different fixed effects and firm controls and transparently shows that the point estimates are barely affected as we control for more unobserved heterogeneity. Appendix Figure B.3 shows the event study in the quarterly data, which allows us to define more finely the quarter of the shock *within* 2015. As in our baseline specification, the figure shows that the sales of EXIM-supported firms trended similarly to 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.

Table 5: Impact on Firm Total Revenues

Dependent variable	Total Revenues						
Sample	All					Excl. top 10 recipients	Inc. Boeing
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
$EXIM_i \times Post_t$	-0.17	-0.16	-0.13	-0.12	-0.095	-0.12	-0.12
	(0.033)	(0.033)	(0.035)	(0.035)	(0.035)	(0.035)	(0.035)
	[0.00000016]	[0.0000015]	[0.00032]	[0.00081]	[0.0072]	[0.00079]	[0.00072]
Fixed Effects							
Year	✓	—	—	—	—	—	—
Exporter×Year	—	✓	—	✓	✓	✓	✓
Industry×Year	—	—	✓	✓	✓	✓	✓
Fiscal month×Year	—	—	—	—	✓	—	—
Size×Year	—	—	—	—	✓	—	—
Balance sheet controls×Year	—	—	—	—	✓	—	—
Lobbying×Year	—	—	—	—	✓	—	—
Observations	25,165	25,165	25,165	25,165	25,165	25,109	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. Industries are SIC-2. Column 6 removes the top ten firms with the highest reliance on EXIM support in the pre-period from the sample. Column 7 removes Boeing. 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.

Figure 6: 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 (7) 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.

revenues (0.0= 12.5%/5%). We calculate the elasticity of the effect of EXIM on domestic sales using the following accounting identity where we denote the elasticity of sales in market m with respect to EXIM as ϵ^m:

$$\epsilon^{total} = \omega_f \times \epsilon^{foreign} + (1 - \omega_f)\epsilon^{domestic} \tag{9}$$

ω_f is the share of total revenues generated by foreign sales, $\epsilon^{foreign}$ is the elasticity of exports, and ϵ^{total} is the elasticity of firm total revenues to EXIM financing.[27]

Rearranging the terms in (9) yields: $\epsilon^{domestic} = \frac{\epsilon^{total} - \omega_f \times \epsilon^{foreign}}{(1-\omega_f)}$. According to Bernard, Jensen, Redding and Schott (2018), $\omega_f \approx 20\%$ when looking at 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. For instance, the share of foreign revenues in Compustat segment is around 40%.

We approximate $\epsilon^{foreign}$ with the impact on US exports $\hat{\beta}^{US\ exports} = 5.02$ (Table 2) and ϵ^{total} with $\hat{\beta}^{Compustat} = 0.0$ (Table 5). This implies that $\epsilon^{domestic} = \frac{0.0 - 0.2 \times 5.02}{0.80} = -1.2$. The elasticity between a foreign shock and domestic sales is therefore: $\frac{-1.2}{5.02} = -0.25$, which is around the elasticity estimated by Berman, Berthou and Héricourt (2015) in the case of France, close the elasticity estimated by Ding (2024) for the US, and lower than the one for Denmark estimated by Jakel (2022). If instead foreign sales account for 40% of firm total revenue, the domestic elasticity is equal to $\frac{0.0 - 0.4 \times 5.02}{0.60} = -3.3$, which implies a pass-through of foreign to domestic sales of $\frac{-3.3}{5.02} = -0.66$.

While the spillover between between foreign markets and the domestic market is at odds with the canonical Melitz (2003) model of firm-level trade, it is consistent with models of intra-firm spillovers (i.e., existence of firm level economies of scale and scope) that can emerge from the existence of financing frictions and internal capital markets, shared inputs like knowledge transfer or vertical supply linkages.[28]

Given that EXIM designs its program to service financially constrained firms (Table 8 and Appendix Section D.2), the positive spillovers we find between EXIM-backed firms' foreign sales and their domestic sales are consistent with internal capital markets, where the reduction in exports is akin to a negative cash-flow shock for treated firms that increases their financing constraints and affects production across the board.

Additional robustness. We provide several additional sets of robustness. First, we show that

[27] We cannot directly compute the effect of EXIM on domestic sales due to the limited quality of the segment data in Compustat.

[28] In Melitz (2003), marginal costs are assumed to be constant, which implies that demand shocks in one market do not affect a firm's sales in another market. For models of internal capital markets, see Stein (1997). For empirical evidence, see Lamont (1997) or Giroud and Mueller (2019). For reduced form evidence and a 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, and links such positive spillovers to shared non-rival knowledge within the firm. Vertical supply linkages are studied for instance in Desai, Foley and Hines (2009) or Boehm, Flaaen and Pandalai-Nayar (2019).

the results are not driven by specific firms or industries. In the last column of Table 5, we exclude the ten firms with the highest reliance on EXIM support in the pre-period. 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 industries one-by-one. The point estimates and t-stats are tightly distributed around the average reported in Table 5 and Figure 6, showing that the results are not driven by any industry in particular. In Appendix Table A.6 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 the one defined in equation (6) and replace firm revenue growth with firms' change in capital, labor and operating profit margin (EBIT over revenues).

Table 6: Impact on Employment, Capital Accumulation, and Profit Rates

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	-0.095	-0.0062
	(0.035)	(0.044)	(0.047)	(0.033)	(0.0087)
	[0.00081]	[0.0017]	[0.000059]	[0.0036]	[0.47]
Fixed Effects					
Exporter×Year	✓	✓	✓	✓	✓
Industry×Year	✓	✓	✓	✓	✓
Observations	25,165	24,626	25,006	22,893	25,165

Notes: This table reports the estimated effects of EXIM's shutdown on several 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 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.

Taking stock. Through the lens of the model that we lay out in Section 2.2, the decrease in firm revenues via lowers inputs usage (capital and labor) indicates that the average firm benefiting from EXIM's financing is financially constrained. In that case, the firm finds it optimal to use the extra source of financing to expand its size up to the point where the marginal returns to capital equalize the cost of additional financing.

The change in firm size also indicates that private banks do not find it profitable to supply financing to these firms despite the positive profits that firm investment would generate, and so they are not leaving money on the table. As discussed in Section 2.2, fundamental frictions such as asymmetric information or constrained balance sheets can make an investment profitable for a firm but unprofitable for its lender. By increasing credit supply, EXIM relaxes firms' financing constraints for profitable projects without necessarily crowding out private banking. The coexistence of these two sources of financing imply that de facto, they operate in segmented markets, which is consistent with the conditions under which firms can apply to EXIM trade financing.

5 Implications for the Allocation of Capital

In this section, we study the *distributive* effects of EXIM financing. The evidence so far rejects the hypothesis that EXIM financing was inframarginal, and it instead shows that EXIM is able to create additional net exports, leading to more firm revenues, hiring, and investment. However, the *average* effects on firm investment cannot distinguish between whether EXIM improves or reduces the misallocation of capital, i.e., whether this average increase in investment is driven by high or low MRPK firms. Since capital misallocation is a key driver of an economy's TFP, understanding how EXIM affects misallocation is therefore a key component of evaluating its overall impact.

5.1 Framework

We model misallocation as heterogeneous wedges on the prices of inputs (e.g., Hsieh and Klenow, 2009; Baqaee and Farhi, 2020). Following Section 2.2.2 and consistent with the results in Section 4.2.2, we include the effect of EXIM financing as a linear 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 additional input wedge that governs the marginal return necessary to invest in an input that introduces a gap between the firm's TFPQ and the firm's TFPR.[29] 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.[30]

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:

$$\underbrace{p_i \frac{\partial q_i(K_i)}{\partial K_i}}_{\text{MRPK = marginal revenue returns to capital}} = \underbrace{(1 + \tau_i - EXIM_i) \times \ r_i}_{\text{Marginal cost of capital}} \tag{10}$$

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; Bau and Matray, 2023). In this case, the TFP change in discrete time of the set of treated firms in industry J is given by:

$$\Delta TFP_{J,t} \approx \underbrace{\sum_{i \in J} \lambda_i \ \Delta \log A_i}_{\text{Technological efficiency}} + \underbrace{\sum_{i \in J} \lambda_i \ \alpha_i^x \ \frac{\tau_i^x}{1 + \tau_i x} \ \Delta \log x_i}_{\text{Allocative efficiency}} \tag{11}$$

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.[31]

[29] We use the denomination "risk-adjusted cost of capital," rather than the generic "price of input," 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%.

[30] 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.

[31] A derivation of this expression can be found in the appendix of Bau and Matray (2023).

We rewrite the "allocative efficiency" part of equation (11) and focus on capital, below:

$$\sum_{i \in J} \lambda_i \, \alpha_J^k \, \frac{\tau_i}{1+\tau_i} \, \Delta \log K_i \tag{12}$$

where $\Delta \log K_i$ is the growth rate in capital produced by the shock. λ_i is the share of a firm's sales in its industry and is a scalar that does not affect the estimation of the reallocation of capital. α_J^k is the 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 industry×size bin).

Equation (12) illustrates how an increase in the total amount of capital used by industry J 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 will be 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.

Therefore, the change in average investment by firms (K_i) as documented in the empirical results so far can occur both when misallocation goes down *and* when it goes up. Appendiz E.2 illustrates this point graphically.

5.2 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 dispersion in MRPK can only arise from firms' heterogeneous wedges, it is possible to use equation (10) to recover the values of τ_i.

However, a well-documented challenge of using cross-sectional dispersion in MRPK_i to infer τ_i is that dispersion in MRPK can be generated by 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.[32] In short: any unobserved heterogeneity across firms limits the researcher's ability to infer the firm wedge from 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

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

changes in input usage to a policy. By restricting the estimation to using within-firm variation over time, this methodology does not rely on unobserved (potentially confounding) heterogeneity across firms to infer firms' wedges.

This methodology also does not require that production has constant returns, that aggregate output is produced by a CES aggregator, and that TFPR and TFPQ are jointly log normal. The last assumption of joint log normality is particularly important, as it implies that misallocation can only be inferred if high and low MRPK firms react symmetrially (Bau and Matray, 2022). In contrast, our methodology allows for high and low MRPK firms to react differently to a shock, which is often the case empirically.[33]

Measuring MRPK. While we cannot directly measure τ_i, there is a direct relationship between τ_i and MRPK (equation 10), which implies that the ranking of firms by their MRPK is informative about the ranking along their τ_i. We use the standard assumption in the production function estimation literature that firms have Cobb-Douglas revenue production functions:[34]

$$Revenue_{ijt} = TFPR_{ijt} K_{ijt}^{\alpha_j^k} \tag{13}$$

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.

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:

$$\begin{aligned}\Delta^{2014}[K_{i,j,t}] = {} & \beta_1 \; EXIM_i \times Post_{t\geq 2015} \times I_i^{High\ MRPK_{i\in j}} \\ & + \beta_2 \; EXIM_i \times Post_{t\geq 2015} \\ & + I_i^{High\ MRPK_{i\in j}} \otimes \left[\gamma_{j,t} + Exporter_{i,t_0} \times \delta_t + X_{i,t_0} \times \delta_t + \varepsilon_{i,j,t}\right]\end{aligned} \tag{14}$$

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 2010–2014, 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

[33] Bau and Matray (2022) provides a detailed explanation of why, once the joint normality cannot be assumed, using the change in the log variance of TFPR is likely to produce biased estimates.

[34] This assumption is for simplicity and the methodology accomodates any production function.

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 (14) is the empirical counterpart to equation (12) (up to the two positive scalars). $\beta_1 < 0$ implies that capital differentially shrinks for firms with high ex-ante wedges, and capital misallocation falls. 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 (12) for high versus low τ_i firms.

Identifying assumptions. Equation (14) 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 7 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 $\times$ 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 (5%, not statistically significant), high MRPK firms reduce their invesment by 18%, such that the difference between the two groups of firms increases by 12%.

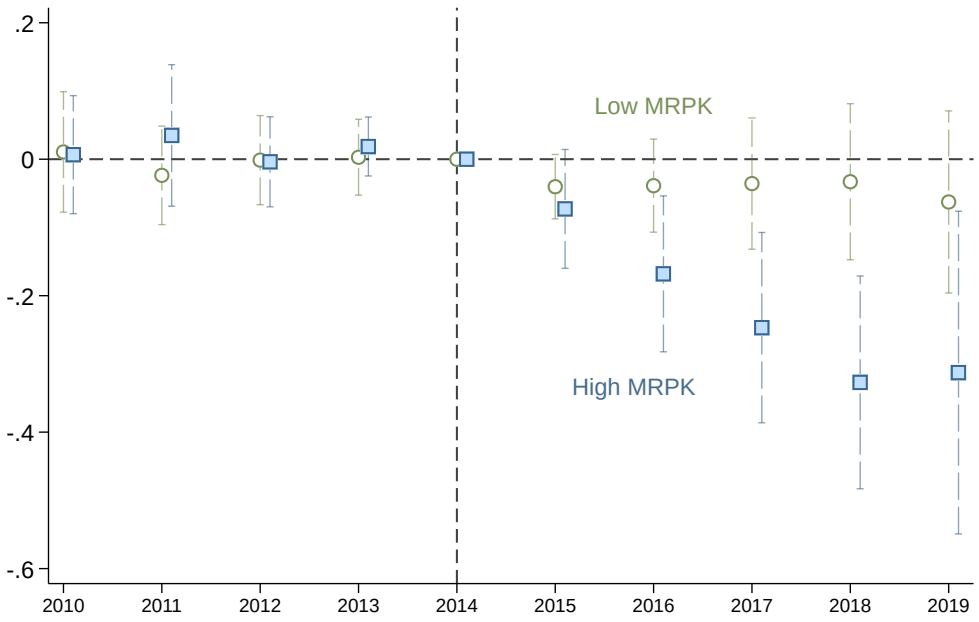
These results indicate that capital contracts relatively more for high MRPK firm and that misallocation increases following EXIM's shutdown. We provide graphical evidence of this pattern in Figure 7. The figure shows a lack of pre-trends for both high and low MRPK firms, consistent with our identifying 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.[35]

[35]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 for

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 in the specification an interaction 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 estimates and if anything of larger magnitudes (18% vs. 12%).

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 estimating equation 14 with industry-by-size quartile-by-year and exporter-by-year fixed effects separately. 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.

instance to (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.

Table 7: 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)
$\text{EXIM}_i \times \text{Post}_t$	-0.055	-0.18		-0.040	-0.22	
	(0.038)	(0.055)		(0.042)	(0.061)	
	[0.15]	[0.0015]		[0.34]	[0.00044]	
$\text{EXIM}_i \times \text{Post}_t \times \text{I}_i^{\text{High MRPK}}$			-0.12			-0.18
			(0.067)			(0.074)
			[0.067]			[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	10,775	24,001	14,986	9,015	24,001

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 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.

5.3 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 down? Our interpretation of results in Table 7 is 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 more their input wedges or their risks

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×destination×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 controlling for the risk of exporting projects, 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 affects misallocationthrough a higher input price wedge $\tilde{\tau}$ or higher 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 a output wedge 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.[36] Given that we identify the within-firm changes in capital allocation, these frameworks would conclude that we identify the effect of removing EXIM financing solely on firms with high input wedge ($\tilde{\tau}$) rather than firms with high output markup (μ).

6 Channels for EXIM's Impact

So far, we have discussed the impact of EXIM financing on firms in the presence of financing frictions. While the firm-level wedge is a sufficient parameter to study the implications of EXIM for capital misallocation, we now impose more structure on the wedge in order to better understand the channels through which EXIM may affect output and capital allocation.

6.1 Firm Financing Frictions and Market Access Frictions

To guide our analysis, we decompose the exporting wedge $\tau_{i,m}$ into two components: a *firm financing friction* (λ_i) and an *export market friction* (η_m). Equation (10) then becomes:

$$\text{MRPK}_{i,m} = (1 + \underbrace{\lambda_i}_{\text{Firm friction}} + \underbrace{\eta_m}_{\text{Export market friction}} - EXIM_{i,m}) \times r_{i,m} \tag{15}$$

Firm financing frictions 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), and have been shown to create a role for industrial policy (e.g., Itskhoki and Moll, 2019).

We introduce an *export market friction*, which similarly endogenously emerges out of information asymmetries that makes it more difficult for exporters to screen solvent customers and to provide trade credit (e.g., Biais and Gollier, 1997; Cuñat, 2007), or from heightened hold-up risks and difficulties in enforcing (possibly incomplete) contracts that require relationship-specific investments (e.g., Williamson, 1979; Grossman and Hart, 1986; Hart and Moore, 1990), in particular in international settings (e.g., Nunn, 2007; Alfaro, Antras, Chor and Conconi, 2019).

As discussed in Section 2.1.1, cross-border frictions can impose high (and potentially heterogeneous) fixed costs of entry for financial institutions such that the private market for financing and insuring trade is heavily concentrated and specialized by country. For example, the regulatory burden of operating across legal jurisdictions imposes high costs to bank entry, and profitable operations require in-depth knowledge of the local market. This structure implies that η_m are unlikely

[36] This is why for instance in the standard Melitz (2003) model, 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.

to be zero and would be particularly high for risky or financially underdeveloped markets.

6.2 Empirical Evidence

We empirically analyze the role of each type of friction by estimating the heterogeneous effects of EXIM's shutdown. We implement the triple differences methodology from Bau and Matray (2023) where we interact the EXIM DID term ($EXIM \times Post$) with proxies of each type of friction.

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 8 reports the results. We use firm leverage (e.g., Giroud and Mueller, 2017) as a proxy in column 2 and dividend payments intensity (e.g., Fazzari, Hubbard and Petersen, 1988) in column 3.[37] In column 4, we use the measure developed by Hoberg and Maksimovic (2015) based on the textual analysis of firms' 10-K filings to identify the frequency firms mention they are constrained. Finally, in column 5, we use the industry current ratio (i.e., current liabilities over EBITDA), motivated by the fact that EXIM's trade financing is largely for short-term working capital. We interact each proxy with the full set of fixed effects. This allows us to tighten our control group by including EXIM-by-year fixed effects, which absorbs the changes to all EXIM-dependent firms and accounts for systematic differences between treated and control firms.

We find that within the group of EXIM-dependent firms, those that are most constrained (higher λ_i) experience a larger cut in their investment. These heterogeneous effects are consistent with the main theoretical prediction: financial constraints that prevent firms from borrowing privately also generate the largest effects from EXIM.

Institutionally, EXIM's policies are also consistent with this channel of targeting financially constrained firms. In particular, the loan application process for EXIM financing requires that firms prove that they have first attempted and were unsuccessful at obtaining a trade financing loan on the private market. Given that EXIM's mandate is to have real impact while operating with limited balance sheet capacity, and that the primary concern is that its support is inframarginal, EXIM's requirement that firms are only eligible if they first tried and failed to obtain private sector financing filters out the most unconstrained firms. The resulting market segmentation between EXIM and private banks also implies that EXIM cannot, by construction, "cream skim" the market for trade financing.

Importer market frictions. We next empirically estimate the role of importer market frictions (η_m) for aggregate US product exports. We use three proxies for different dimension of market

[37] 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 8: 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)				
	[0.00019]				
$\text{EXIM}_i \times \text{Post}_t \times \text{I}_i^{\text{Constrained}}$		-0.16	-0.11	-0.12	-0.075
		(0.044)	(0.039)	(0.047)	(0.039)
		[0.00038]	[0.0035]	[0.014]	[0.053]
Fixed Effects					
Exporter×Year	✓	—	—	—	—
Industry×Year	✓	—	—	—	—
EXIM×Year	—	✓	✓	✓	✓
Fixed Effects (interacted)					
Exporter×Year	—	✓	✓	✓	✓
Industry×Year	—	✓	✓	✓	✓
Observations	24,626	23,985	23,942	22,285	24,626

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 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.

frictions at the importer level: the amount of other firms' (perceived) risk of a country, the quality of rule of law in the importing country, and the financing frictions that importers in a country face.

The first proxy, the perceived risk to transact with a country, comes from Hassan, Schreger, Schwedeler and Tahoun (2021) and is constructed from textual analysis of all publicly listed firms' quarterly earnings calls in English. We use three country risk measures: risks perceived by all firms, risks perceived specifically by financial institutions, and risks perceived specifically by firms foreign to a country.

The second measure, the likelihood of recovery, is proxied by the degree to which the importer country abides by rule of law, motivated by the work of (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, the third measure is the potential financing frictions faced by the importer and hence would require trade financing from the exporter, is proxied by the financial development of the country, measured by outstanding private credit relative to GDP and is obtained from the World

Bank. We provide more details in Appendix D.3.1.

We show in Appendix D.3 that EXIM financing to importers in a particular country varies with the perception of risks and frictions, consistent with the theoretical channel that EXIM actively targets countries with higher market frictions. 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 dummy $I_d^{\text{Constrained}}$ 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 dummy 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, 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$\times$product level.

Table 9 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.[38]

Together, the heterogeneous effects of firm-level (λ_i) and importer market level (η_m) frictions provide empirical evidence for the channels that we model in equation (15). They are consistent with both the theory and baseline empirical evidence that EXIM's effects arise from its ability to lower constraints in the private market for trade financing.

7 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 broader discussion of EXIM's interaction with the rest of the economy. We first 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 other classic industrial policy goals.

[38] 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 9: Role of Importer Market Frictions

Dependent variable	Export				
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	-3.14	-2.28	-2.44	-2.38
	(0.98)	(1.22)	(1.08)	(0.99)	(0.99)
	[0.034]	[0.010]	[0.034]	[0.014]	[0.016]
$\text{EXIM}_{p,o}\times\text{Post}_t$	-1.71	-1.02	-1.71	-2.64	-2.75
	(1.36)	(1.41)	(1.36)	(1.14)	(1.10)
	[0.21]	[0.47]	[0.21]	[0.021]	[0.012]
Fixed Effects					
Product (6-digit)×Destination×Year	✓	✓	✓	✓	✓
$\text{Origin}\times\text{Year}\times\text{I}_d^{\text{Constrained}}$	✓	✓	✓	✓	✓
Observations	1,661,218	1,661,218	1,661,218	3,341,610	3,255,834

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 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 (2021), 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 d, p. 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.

7.1 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, recall from section 2.2 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. In EXIM's case, its marginal costs may be lower because as a US government agency, it likely 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 financial operations. It is worth noting that EXIM's lower marginal cost does not come from access to 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, 2020).

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.

7.2 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 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).

We can then adapt the model developed in Section 6, and in particular equation (15) to include τ^s. This reformulation then 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 EXIM's objective to reduce trade financing wedges for firms i, j, m at time t, and the broader social wedges carried by these firms.

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.

8 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 experienced lower growth in revenues and cut back their capital and employment. These effects are particularly pronounced for financially constrained firms and for exports to less financially developed markets, consistent with EXIM financing alleviating credit constraints. In aggregate, US industries more dependent on EXIM support experienced 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 also indicates that these firms were not just pocketing artificially high windfall profits beforehand.

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, we think 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 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"

Adrien Matray Karsten Mueller Chenzi Xu Poorya Kabir

June 2024

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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)
$\text{EXIM}_{p,o}\times\text{Post}_t$	-4.24	-4.24	-4.24	-3.89	-4.31	
	(1.52)	(1.52)	(1.52)	(1.41)	(1.56)	
	[0.0055]	[0.0055]	[0.0055]	[0.0060]	[0.0057]	
$\text{EXIM}_{p,o}\geq 0.45\%\times\text{Post}_t$						-0.058
						(0.016)
						[0.00039]
Fixed Effects						
Origin×Year	✓	✓	✓	✓	✓	✓
Product (4-digit)×Year	✓	✓	✓	—	—	—
Product (6-digit)×Year	—	—	—	✓	—	—
Product (6-digit)×Destination×Year	—	—	—	—	✓	✓
Observations	65,897	6,924,701	20,878,627	20,878,627	20,878,627	20,878,627

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)
$\text{EXIM}_{p,o} \times \text{Post}_t$	-3.49	-5.78	-5.30	-5.17
	(1.86)	(2.73)	(2.44)	(2.52)
	[0.061]	[0.034]	[0.030]	[0.040]
Fixed Effects				
Origin×Year	✓	✓	✓	✓
Product (6-digit)×Destination×Year	✓	✓	✓	✓
Observations	23,775,713	23,775,713	23,775,613	23,775,613

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			
$\text{EXIM}_i \times \text{Post}_t$	-0.34	-0.34	-0.33	-0.33	-0.29	-0.33
	(0.052)	(0.052)	(0.051)	(0.050)	(0.047)	(0.14)
	[1.0e-10]	[1.0e-10]	[6.8e-11]	[8.7e-11]	[8.4e-10]	[0.016]
			Containers			
$\text{EXIM}_i \times \text{Post}_t$	-0.33	-0.33	-0.32	-0.32	-0.28	-0.28
	(0.050)	(0.050)	(0.049)	(0.049)	(0.046)	(0.13)
	[4.7e-11]	[4.7e-11]	[6.3e-11]	[3.4e-11]	[8.3e-10]	[0.038]
			Value			
$\text{EXIM}_i \times \text{Post}_t$	-0.30	-0.30	-0.31	-0.28	-0.24	-0.17
	(0.058)	(0.058)	(0.056)	(0.057)	(0.049)	(0.12)
	[0.00000020]	[0.00000020]	[0.000000031]	[0.00000058]	[0.00000091]	[0.15]
Fixed Effects						
Post	✓	✓	—	—	—	—
Product×Post	—	—	✓	—	—	—
Destination×Post	—	—	—	✓	—	—
Product×Destination×Post	—	—	—	—	✓	✓
Observations	78,993	1,680,385	1,680,385	1,680,385	1,680,385	133,464

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 effect is a vector of indicator variables at the HS-4 level, destination fixed effects are fixed effects for each country where the product is exported. Regressions are value weighted by firm exports. 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.4: Impact on Firm-level Maritime Exports: Robustness to Equal Weighting

Dependent variable	Maritime Exports					
			Teus			
$EXIM_i \times Post_t$	-0.53	-0.53	-0.51	-0.50	-0.44	-0.31
	(0.030)	(0.030)	(0.030)	(0.030)	(0.030)	(0.17)
	[8.8e-68]	[8.8e-68]	[1.0e-63]	[3.2e-62]	[1.4e-50]	[0.074]
			Metric tons			
$EXIM_i \times Post_t$	-0.55	-0.55	-0.52	-0.52	-0.45	-0.30
	(0.031)	(0.031)	(0.031)	(0.031)	(0.030)	(0.17)
	[9.7e-68]	[9.6e-68]	[2.7e-63]	[5.0e-62]	[2.5e-49]	[0.076]
			Containers			
$EXIM_i \times Post_t$	-0.54	-0.54	-0.51	-0.51	-0.45	-0.30
	(0.030)	(0.030)	(0.030)	(0.030)	(0.030)	(0.17)
	[2.7e-69]	[2.7e-69]	[7.3e-65]	[1.4e-63]	[9.3e-52]	[0.077]
			Value			
$EXIM_i \times Post_t$	-0.49	-0.49	-0.45	-0.45	-0.38	-0.29
	(0.031)	(0.031)	(0.031)	(0.031)	(0.030)	(0.16)
	[4.3e-54]	[4.3e-54]	[4.0e-48]	[1.6e-48]	[2.3e-37]	[0.067]
Fixed Effects						
Post	✓	✓	—	—	—	—
Product×Post	—	—	✓	—	—	—
Destination×Post	—	—	—	✓	—	—
Product×Destination×Post	—	—	—	—	✓	✓
Observations	78,993	1,680,385	1,680,385	1,680,385	1,680,385	133,464

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 effect is a vector of indicator variables at the HS-4 level, destination fixed effects are fixed effects for each country where the product is exported. Regressions are equally weighted. 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.5: Impact on Firm Revenues: Robustness to Additional Controls

Dependent variable	Total Revenues						
Sample	All					Excl. 10 largest recipients	Inc. Boeing
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
$\text{EXIM}_i \times \text{Post}_t$	-0.12	-0.10	-0.099	-0.12	-0.11	-0.12	-0.11
	(0.034)	(0.035)	(0.036)	(0.036)	(0.036)	(0.035)	(0.036)
	[0.00080]	[0.0042]	[0.0055]	[0.00054]	[0.0028]	[0.00079]	[0.0015]
Fixed Effects							
Exporter×Year	✓	✓	✓	✓	✓	✓	✓
Industry×Year	✓	✓	✓	✓	✓	✓	✓
Fiscal month×Year	✓	—	—	—	✓	—	—
Size×Year	—	✓	✓	—	✓	—	—
Balance sheet controls×Year	—	—	✓	—	✓	—	—
Lobbying×Year	—	—	—	✓	✓	—	—
Observations	25,165	25,165	25,165	25,165	25,165	25,109	25,165

Notes: This table reports the estimated effects of EXIM's shutdown on firms' total revenue. 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. 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.6: Impact on Firm Revenues: Robustness to Different Industry Definitions

Dependent variable	Total revenues			
	(1)	(2)	(3)	(4)
$\text{EXIM}_i \times \text{Post}_t$	-0.14	-0.12	-0.10	-0.13
	(0.033)	(0.035)	(0.033)	(0.045)
	[0.000044]	[0.00081]	[0.0018]	[0.0032]
Fixed Effects				
Exporter×Year	✓	✓	✓	✓
Industry (1-digit)×Year	✓	—	—	—
Industry (2-digit)×Year	—	✓	—	—
Industry (3-digit)×Year	—	—	✓	—
Industry (4-digit)×Year	—	—	—	✓
Observations	25,165	25,165	25,165	25,165

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.7: Impact on Firm Revenues by Separate EXIM Programs

Dependent variable	Total revenues					
	(1)	(2)	(3)	(4)	(5)	(6)
$\text{EXIM}_i \times \text{Post}_t$	-0.16			-0.14		
	(0.030)			(0.034)		
	[0.000000037]			[0.000024]		
$\text{EXIM (working cap)}_i \times \text{Post}_t$		-0.15			-0.16	
		(0.064)			(0.077)	
		[0.015]			[0.041]	
$\text{EXIM (insurance)}_i \times \text{Post}_t$			-0.17			-0.15
			(0.030)			(0.034)
			[0.000000029]			[0.000021]
Fixed Effects						
Exporter×Year	✓	✓	✓	✓	✓	✓
Size×Year	✓	✓	✓	✓	✓	✓
Balance sheet controls×Year	✓	✓	✓	✓	✓	✓
Observations	25,165	24,229	24,905	25,165	24,229	24,905

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 "loan" program. *EXIM* (insurance)$_i$ is an indicator variable that takes the value one if the firm received EXIM financing under EXIM's "insurance and guarantee" program. $Post_t$ 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-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 Different Weighting

Dependent variable	Revenues	Tangible capital	Intangible capital	Employment	Net profit margin
	(1)	(2)	(3)	(4)	(5)
			Equal weight		
$\text{EXIM}_i \times \text{Post}_t$	-0.15	-0.12	-0.14	-0.075	-0.017
	(0.032)	(0.032)	(0.035)	(0.026)	(0.012)
	[0.0000034]	[0.00019]	[0.000074]	[0.0036]	[0.18]
			Value weight: winsor 1%		
$\text{EXIM}_i \times \text{Post}_t$	-0.098	-0.16	-0.19	-0.083	-0.0092
	(0.036)	(0.056)	(0.067)	(0.035)	(0.0059)
	[0.0074]	[0.0044]	[0.0057]	[0.018]	[0.12]
Fixed Effects					
Exporter×Year	✓	✓	✓	✓	✓
Industry×Year	✓	✓	✓	✓	✓
Observations	25147	24608	24988	22873	25147

Notes: This table reports the estimated effects of EXIM's shutdown on several 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 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.

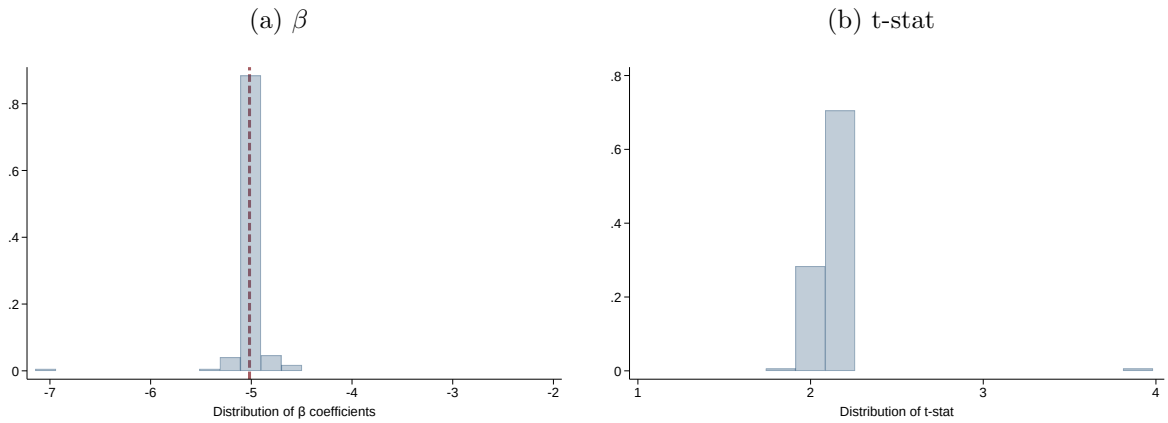
Table A.9: Impact on Employment, Capital, and Profit Rates: Robustness to LHS Winsorization

Dependent variable	Revenues	Tangible capital	Intangible capital	Employment	Net profit margin
	(1)	(2)	(3)	(4)	(5)
			LHS: winsor 1%		
$\text{EXIM}_i \times \text{Post}_t$	-0.16	-0.19	-0.29	-0.12	-0.0033
	(0.043)	(0.058)	(0.068)	(0.040)	(0.0045)
	[0.00025]	[0.00078]	[0.000022]	[0.0030]	[0.46]
			LHS: winsor 3× interquartile		
$\text{EXIM}_i \times \text{Post}_t$	-0.10	-0.11	-0.13	-0.088	-0.0064
	(0.033)	(0.039)	(0.038)	(0.033)	(0.0083)
	[0.0022]	[0.0037]	[0.00093]	[0.0080]	[0.44]
			LHS: midpoint growth		
$\text{EXIM}_i \times \text{Post}_t$	-0.075	-0.10	-0.11	-0.053	-0.0066
	(0.032)	(0.038)	(0.036)	(0.060)	(0.0068)
	[0.020]	[0.0059]	[0.0017]	[0.38]	[0.33]
Fixed Effects					
Exporter×Year	✓	✓	✓	✓	✓
Industry×Year	✓	✓	✓	✓	✓
Observations	25147	24768	25009	23576	25147

Notes: This table reports the estimated effects of EXIM's shutdown on several 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 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

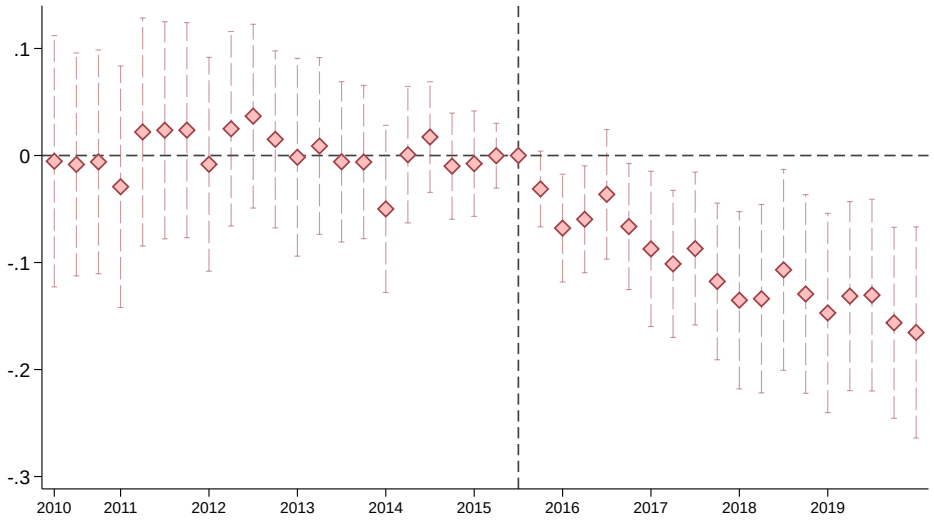


Notes: This figure reports the distribution of β and t-stats for the average effect of EXIM's shutdown on aggregate export at the product-by-destination level taken from BACI, as estimated in Table 2, when we exclude products (HS-4) one-by-one. Panel (a) plots the $\hat{\beta}$ reported in Table 2 column 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-3 level.

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

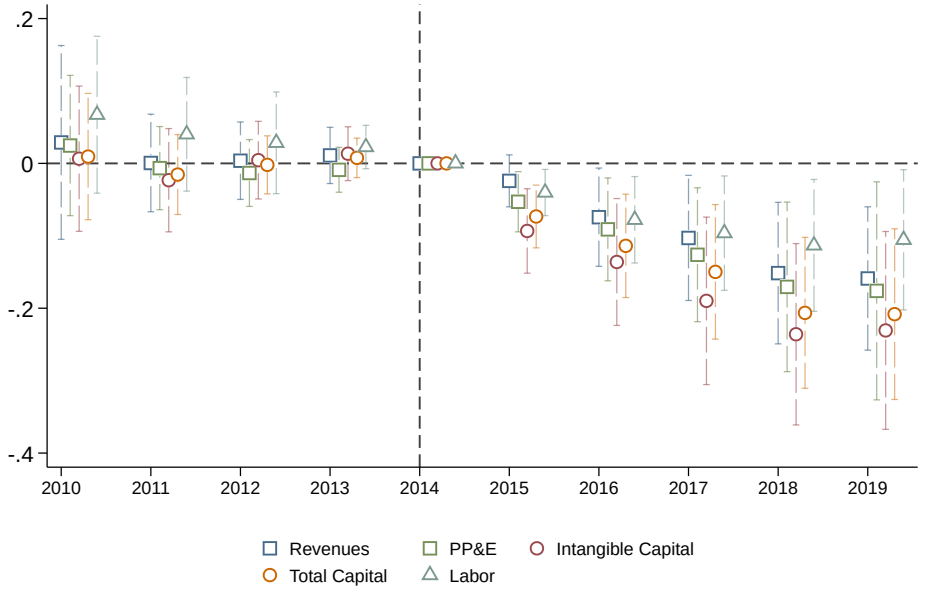
Notes: This figure shows the point estimates and 95% confidence intervals when estimating equation (7) and progressively including more stringent sets of fixed effects. The dependent variable is the growth rate relative to 2014 (the year prior to the shock) defined as $\Delta Y_{i,t} = (Y_{i,t} - Y_{i,2014})/Y_{i,2014}$. Standard errors are clustered by firm.

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



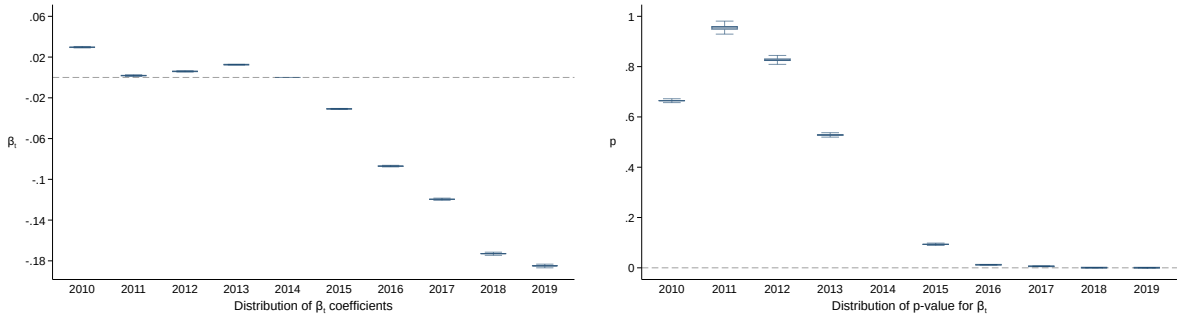
Notes: This figure plots the point estimate and 95% confidence intervals when estimating equation (7) with quarterly firm total revenues including industry-by-year and exporter-by-year fixed effects. The omitted time period is the second quarter of 2015, corresponding exactly to the quarter of EXIM's 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



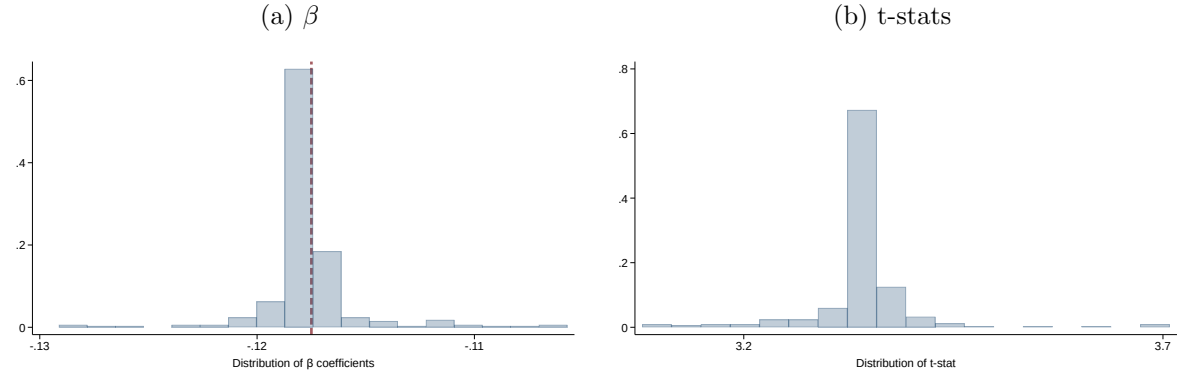
Notes: This figure plots the point estimate and 95% confidence intervals when estimating equation (7) for the following outcomes: total revenues, physical capital (PP&E), intangible capital (Peters and Taylor, 2017), total capital (tangible + intangible), and employment. The dependent variable is the 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 6 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



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.

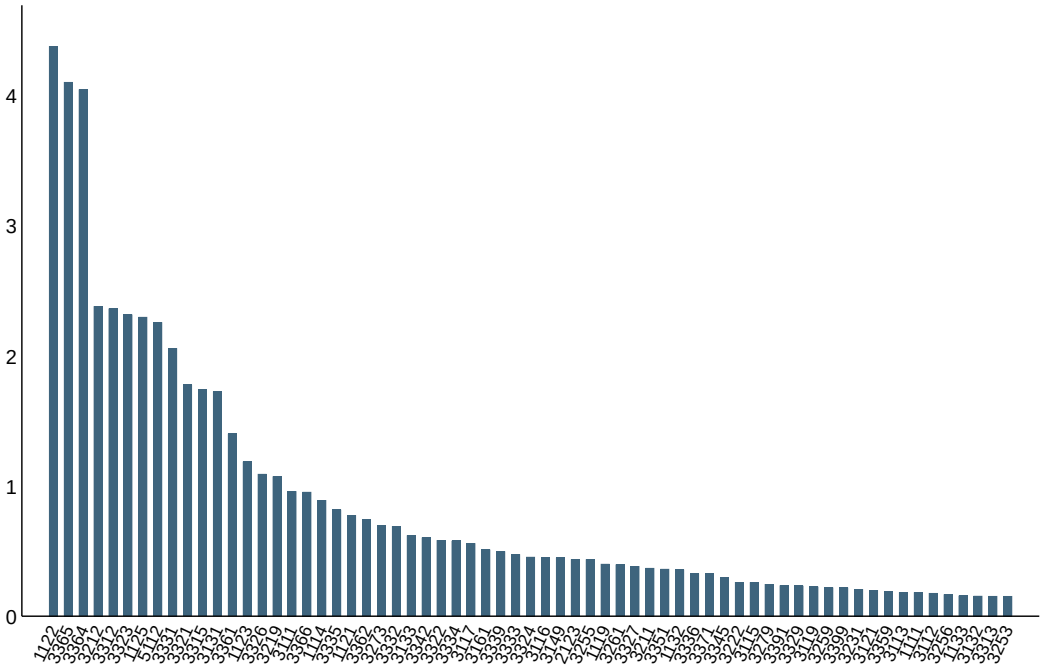
BACI. BACI corresponds to the raw Comtrade data that have already been cleaned and harmonized, so the data requires limited cleaning. We impose two filters.

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 ($EXIM_{o,p}$); 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.7 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.7: 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	$(ib + dp)/sale$
Net profit margin	$ni/sale$
MRPK	$sale/ppent$
Dividend intensity	$dvc/ebitda_{t-1}$
Current coverage$_i$	$dlc/ebitda$
Current coverage (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

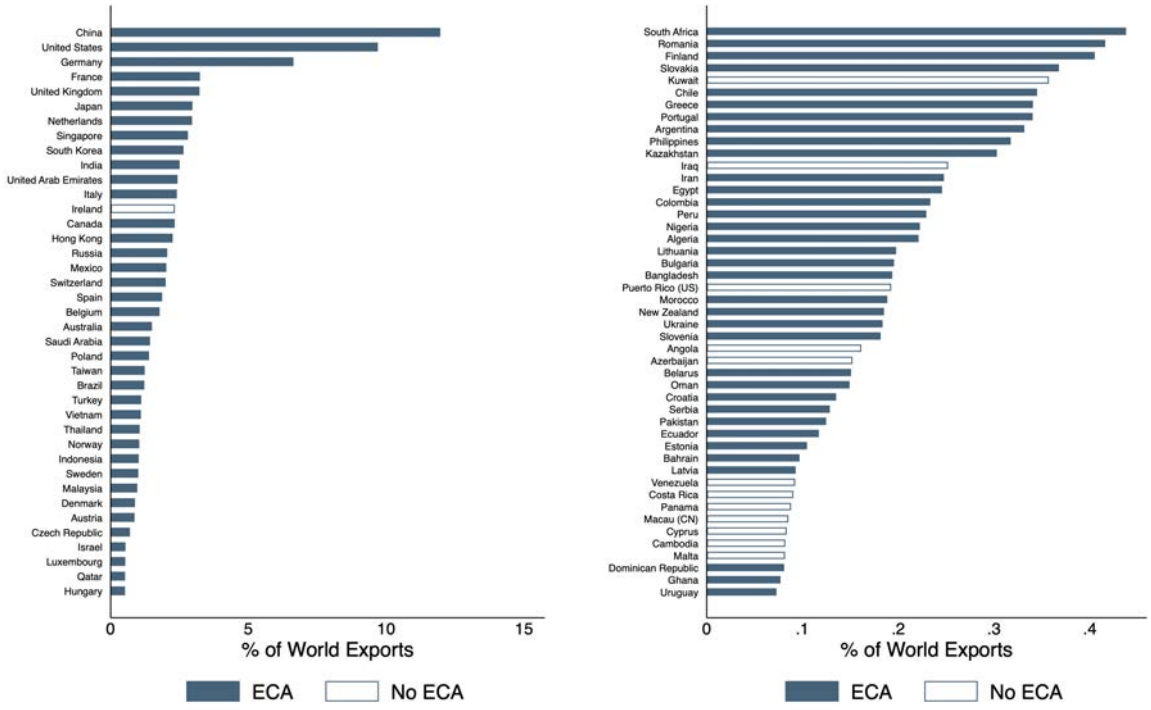
[1] OECD: https://www.oecd.org/trade/topics/export-credits/documents/links-of-official-export-credit-agencies.pdf. EXIM's competitiveness reports: https://www.exim.gov/news/reports/competitiveness-reports.

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. Panel (b) includes approximately fifty additional countries that each contributes less than 0.5% of the overall 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
Argentina	0	Banco de Inversion y Comercio Exterior	1992

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Table D.1 – *Continued from previous page*

Country	OECD	Name	Year Founded
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
Germany	1	Euler Hermes Aktiengesellschaft	2002

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Table D.1 – *Continued from previous page*

Country	OECD	Name	Year Founded
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
Philippines	0	Philippine Guarantee Corporation	1977

Continued on next page

Table D.1 – *Continued from previous page*

Country	**OECD**	**Name**	**Year Founded**
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

Continued on next page

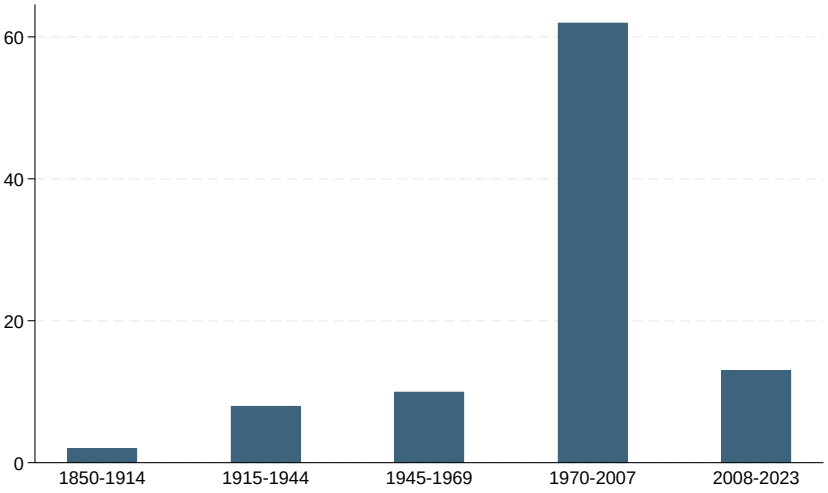
Table D.1 – *Continued from previous page*

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

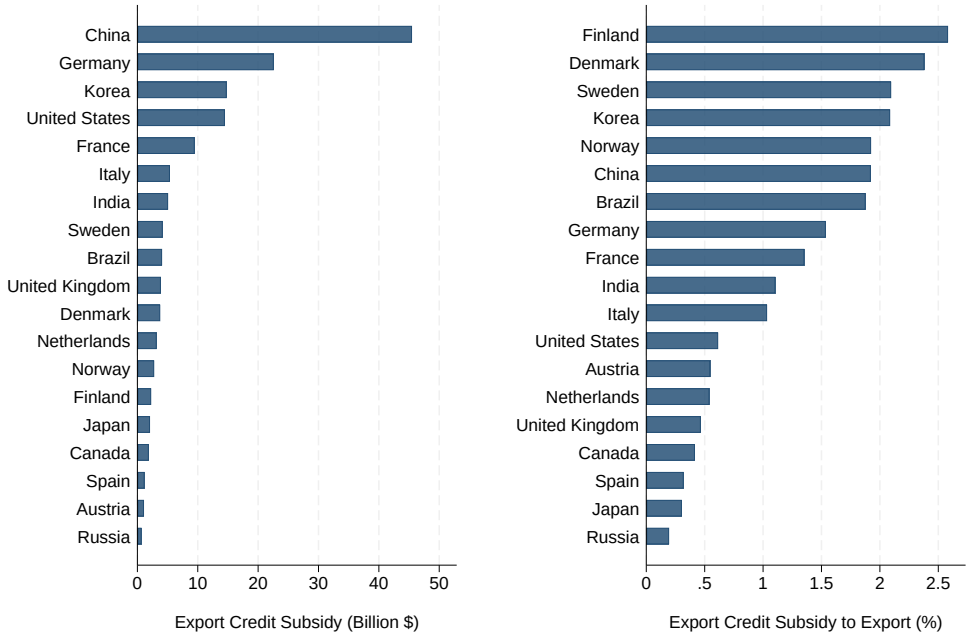


Notes: This figure documents the number of ECAs founded in different periods of history based on information in Table D.1. Regional ECAs are not included in this figure.

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.

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

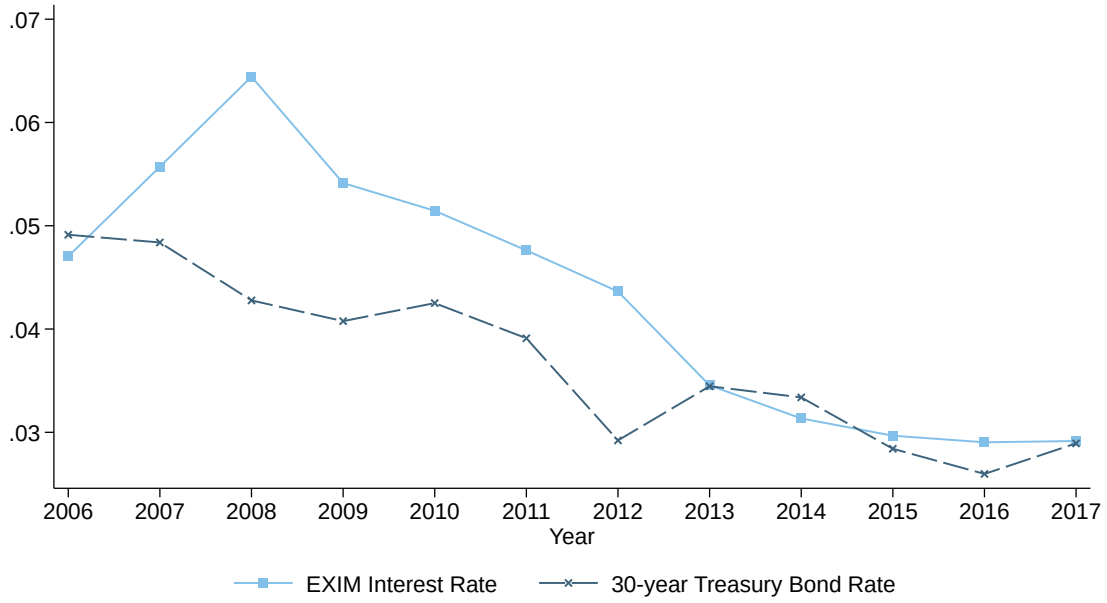
We collect all of the Annual Reports published by EXIM from 2006 to 2023 where we focus on the bank's "Balance sheet" and its "Statement of net costs" in each publication.

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 author's 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.

First, the guarantees that EXIM offers as one of its largest products are comprehensive and explicitly insure against all commercial *and* country risk. Second, there is a strong positive correlation in the data between the amount of support that EXIM provides to an export destination and the riskiness of that country.

D.3.1 Data and estimation

Perception of country risk. Our main independent variable, country risk, comes from Hassan, Schreger, Schwedeler and Tahoun (2021), where it is defined as aggregated risk associated with a given country perceived by a certain subset of firms. 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.

We also use data from the World Bank on countries' GDP (Worldwide Development Indicators Database), the rule of law (Worldwide Governance Indicators Database), and market capitalization per capita (World Federation of Exchanges database) for the 2006–2022 period as control variables. We complete the GDP dataset with UN National Accounts Statistics, and INSEE for French overseas territories.[3] The rule of law captures the perceptions of the extent to which agents have confidence in and abide by the rules of society. The information on the country's financial development comes from the FMI Financial Development Index Database. The financial development index is a ranking of countries on the depth, access, and efficiency of their financial institutions and financial markets.

Estimation. We estimate the model in the following way:

$$log(EXIM)_{it} = \beta_1 log(Risk)_{it} + \alpha_i + \gamma_t + \boldsymbol{X}'_{it}\beta_2 + \epsilon_{it} \tag{D.1}$$

We estimate this model from 2006 to 2022. $EXIM_{it}$ is the total amount of EXIM exposure to country i in year t. The vector $\boldsymbol{X}'_{it}$ contains a rich set of controls for the country's yearly trade fluctuations and GDP. 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.

In Figure D.5, we plot the relationship between the amount of EXIM support a country receives relative to the perception of its risk by all firms, with all control variables, analogous to column 1 of Table D.2.

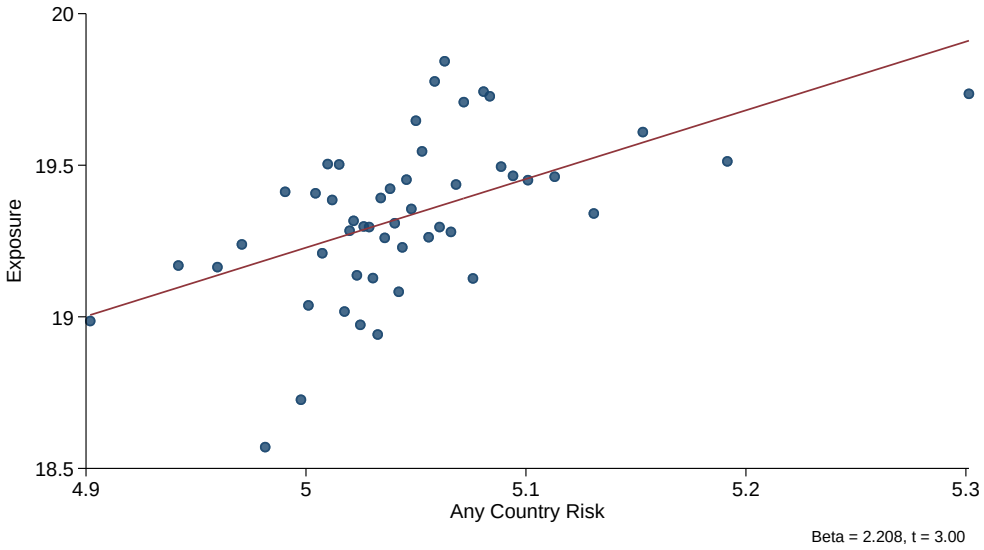
[3]We also use local government statistics for the Falkland Islands' and Anguilla's GDP for 2018 and 2022, respectively.

Table D.2: EXIM Support and Country Risk

	(1)	(2)	(3)	(4)	(5)
Risk (by all)	2.208***				
	(0.739)				
Risk (by financial)		2.027***			
		(0.607)			
Risk (by foreign)			1.433*		
			(0.810)		
Risk (by domestic)				0.041	
				(0.077)	
Local Crisis					0.120**
					(0.058)
Controls	✓	✓	✓	✓	✓
Fixed Effects					
Country	✓	✓	✓	✓	✓
Year	✓	✓	✓	✓	✓
Observations	795	795	795	651	795

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 (2021). 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. Controls include a country's total exports, total imports, exports and imports to the US specifically, and GDP (all in logs). Results are robust to alternative configurations of control variables. Standard errors, in parentheses, are clustered at the country level. ***, **, * indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

Figure D.5: 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, as well as a country's total exports, imports, exports and imports relative to the US specifically, and GDP (all in logs). The reported t-statistic is based on standard errors are clustered at the country level. The measure of perceived country risks comes from Hassan, Schreger, Schwedeler and Tahoun (2021).

E Additional Theoretical Results

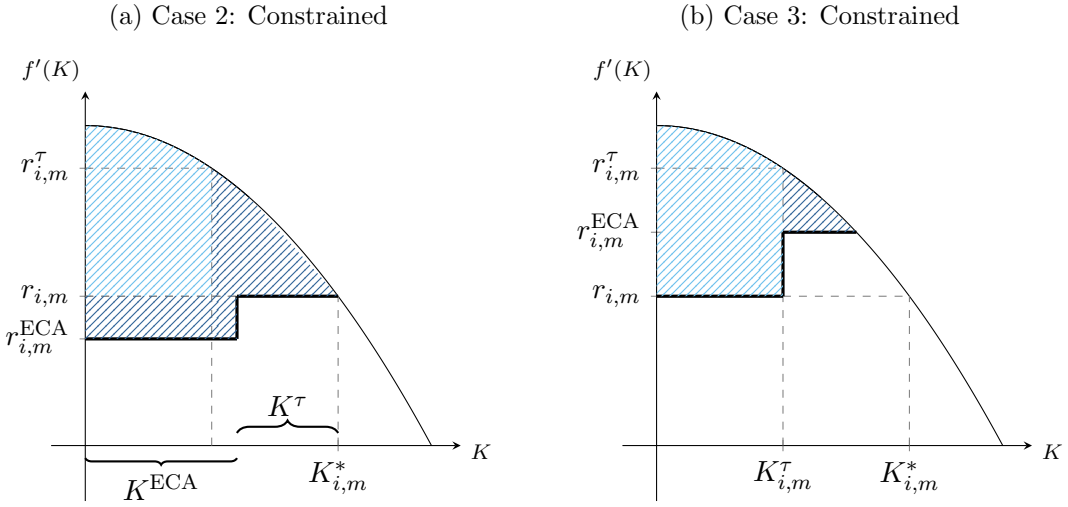
E.1 Exporters' Financing Frictions and Effect of EXIM

Figure E.1 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 E.1: Constrained Firm Optimization: Extension



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.

E.2 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 5).

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 E.2a.

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 E.2b.

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.

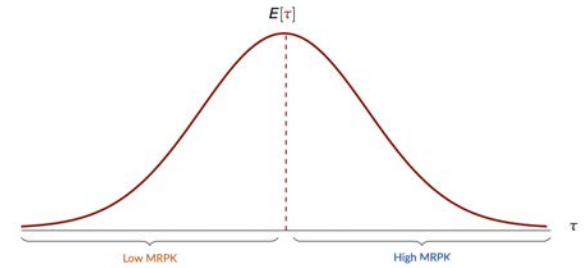
- An increase in misallocation **and** a change in average investment: This case corresponds to Figure E.2c in which the change in the average wedge in the industry is driven by a larger expansion of the low MRPK firms (Figure E.2c), which implies that misallocation increases.

- A decrease in misallocation **and** a change in average investment: This case corresponds to Figure E.2d in which the change in the average wedge in the industry is driven by a larger expansion of the high MRPK firms (Figure E.2d), which implies that misallocation decreases.

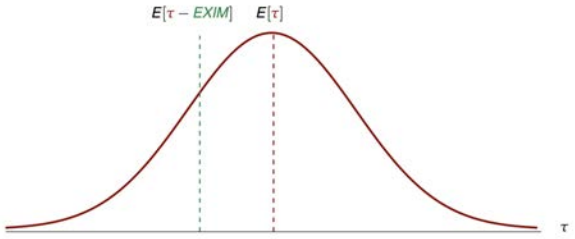
Notice in both cases 3 and 4, EXIM's supply of trade financing has exactly the same effect on the average investment in the industry ($\mathbb{E}_J[\tau_{i\in J} - EXIM_i]$), but completely opposite consequences for the industry TFP. These different cases clarify that it is never possible to infer how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

Figure E.2: Effect of EXIM on Average Investment and Misallocation

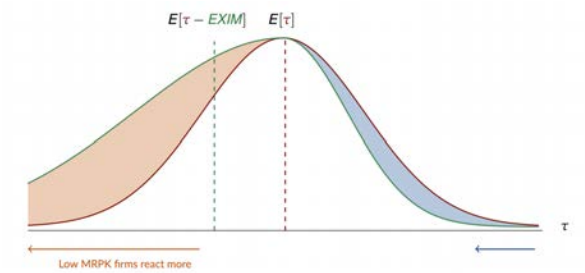
(a) Distribution of input wedge for firms i around the average in industry J



(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