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

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March 2025

**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 document sizable real effects of the shutdown: a $1 reduction in EXIM trade financing reduces exports by approximately $4.50. EXIM-dependent firms also experience a contraction in total revenues, investment, and employment. EXIM's shutdown has the largest effects for exporters facing financing frictions and selling to markets with high contractual frictions, indicating that even in well-developed financial markets, trade financing can be under-supplied by private banks. Consistent with the idea that EXIM support can help to address market frictions, we find that the shutdown increased capital misallocation, as firms with a higher ex-ante marginal revenue product of capital contracted more. These results provide a framework for the conditions under which Export Credit Agencies can boost exports and firm growth, and can act as a tool of industrial policy without necessarily leading to a misallocation of resources.

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*We thank conference and seminar participants for helpful conversations and feedback, particularly Andres Rodriguez-Clare, Antonio Coppola, Reka Juhasz, Pete Klenow, Arvind Krishnamurthy, Nathan Lane, Matteo Maggiori, Ken Rogoff, Pete Schott, Tim Schmidt-Eisenlohr, Jesse Schreger, and Jon Steinsson. We also thank Robin Bae, Olena Bogdan, Pablo Rodriquez, Yaqi Tu, Xiangyu Qiu, Wendy Yin, and Zhongyu Yin for excellent research assistance. Kabir acknowledges financial support from the Singapore Ministry of Education AcRF Tier 1 Research Grant No. A-8000758-00-00. Müller acknowledges funding from a Singapore Ministry of Education start-up grant and Presidential Young Professorship (A-0003319-01-00 and A-0003319-02-00).

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# 1 Introduction

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

Despite their widespread adoption, however, there is limited evidence on whether ECAs are effective at creating trade and real economic activity, and on whether they can do so without distorting the allocation of capital in the domestic economy.

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

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

Critics argue that ECA funding would at best have no impact and at worst create costly distortions by (i) funding financially unconstrained recipients and essentially providing a kind of "corporate welfare," (ii) merely shuffling market share among domestic competitors, and/or (iii) distorting the allocation of inputs, which would reduce overall productivity.

First, at the firm level, ECA funding, like other public spending programs earmarked for specific activities (e.g., facilitated lending, tax subsidies, direct aid), may go to businesses that do not need it, which would result in a pure profit windfall for the recipients. For example, firms may continue to invest in R&D even without innovation tax credits, and firms may invest and hire even in the absence of tax incentives that merely increase their profit margins (e.g., Slattery and Zidar, 2020).

Second, at the industry level, even if ECA funding increases the exports of its beneficiaries, it may do so at the expense of the country's non-recipient firms. This business-stealing would result

in a reallocation of market share that would leave the country's total exports unchanged.

Third, even if ECAs were able to raise a country's overall exports, these positive effects may be offset by increasing input misallocation in the domestic economy. If ECAs disproportionately reallocate capital to firms with a lower marginal revenue product of capital, this misallocation could lower the economy's total factor productivity (TFP) and potentially lower aggregate output (e.g., Hsieh and Klenow, 2009; Moll, 2014; Baqaee and Farhi, 2020; Bau and Matray, 2023).

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

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

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

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

"trade war" with China. Fourth, our analysis of the firm-level effects of the shutdown that uses firm-level exposure allows us to directly control for US-specific industry shocks and product shocks.

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

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

To better understand the impact of EXIM's shutdown on firms, we first examine its effect on firm-level maritime exports, for which we observe products and destination countries. We match EXIM financing contracts to firms and define treatment as having received EXIM support prior to the 2014 shutdown. Econometrically, the firm-level analysis of bilateral exports allows us to use variation within US industries and to control for US-specific product and destination shocks. This firm-level analysis thus relaxes the identifying assumption in our aggregate bilateral trade analysis that EXIM's shutdown is uncorrelated with unobserved US-industry-specific shocks.

With these direct effects on firm-level exports in hand, we next turn to understanding the impact on the domestic economy by studying the set of publicly listed firms that generate the majority of exporting activity, for which we observe all balance sheet and income statement items. We find that EXIM's shutdown reduced the total revenues (foreign and domestic) of EXIM-backed firms by an average of 12% relative to non-supported exporting firms. These estimates remain quantitatively similar and statistically significant after including additional firm-level controls such as firms' lobbying behavior, ex-ante profitability, and size. As additional robustness checks, we

show that the results are unchanged if we exclude the top recipients of EXIM financing, individual industries, or industries that rely on government contracts in general. We find similar effects when we restrict our sample to exporting firms, and to the subset that is disproportionately impacted by the specific operational constraints EXIM faced during the shutdow. The latter analysis further tightens the empirical strategy by using variation *within* the set of EXIM-financed firms based on the type of loans they usually rely on. Using quarterly data, we also find that the effects appear exactly after the shutdown begins in June 2015.

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

Following the loss in revenues that EXIM-dependent firms experience, we next trace out how these firms adjust their capital and labor. We find that on average, EXIM-financed firms see a relative drop in capital of -14% and in employment of -10%. In conjunction, our results provide causal evidence that EXIM financing affects real activity for both the average firm and industry.

In the second part of the paper, we turn to understanding the channels underlying the effect of EXIM on trade flows. Guided by the institutional details of EXIM's operations, we show that the effects of the shutdown are particularly large along two dimensions. First, firms that are ex-ante financially constrained experience the largest losses. Second, trade with destinations that face higher contractual frictions, for instance due to a limited rule of law (e.g., Nunn, 2007), are perceived to be riskier (e.g., Hassan, Schreger, Schwedeler and Tahoun, 2023), or are themselves financially constrained also systematically contract more.[1] These empirical findings demonstrate that EXIM financing addresses existing market gaps: financially constrained firms and trade with high-friction destinations were disproportionately affected by the shutdown, suggesting that private markets alone did not fully meet these financing needs.

The evidence that EXIM appears to alleviate market frictions also suggests that it may not necessarily worsen the allocation of capital in the economy. To systematically analyze this allocation effect, we develop an empirical framework that draws on the misallocation literature, in which frictions generate distortions in how inputs are distributed across firms. Within this framework,

[1]It is worth noting that while EXIM financing may be directed toward either exporters or foreign buyers, the economic impact ultimately affects the exporter's ability to complete international sales. When buyers lack financing, sellers could theoretically extend credit directly—but only if they themselves are not financially constrained. Thus, the shutdown effectively removed a source of liquidity from the overall trade financing ecosystem, regardless of which party directly receives the funds.

we interpret the differential effects of EXIM's shutdown on financially constrained exporters and destinations as a systematic increase in input cost wedges that disproportionately affect firms with a higher ex-ante marginal revenue product of capital (henceforth "MRPK").

We directly estimate the effect of EXIM's shutdown on capital misallocation using the Bau and Matray (2023) methodology, which links the change in misallocation to within-firm changes in investment across high and low MRPK firms. We consistently find that the cut in EXIM's financing particularly affects the investment of high MRPK firms, while low MRPK firms exhibit minimal or no changes in investment behavior. This result indicates that capital misallocation increases during the shutdown. In addition, it shows that EXIM financing is not uniformly marginal for all recipients, which lends validity to critics' concerns that EXIM financing would be inframarginal for financially unconstrained firms. Instead, the heterogeneity indicates that the effectiveness of EXIM's trade financing depends on firms' ex-ante returns to capital, with the greatest impact occurring precisely where returns are high due to market frictions.

Our findings are not dependent on the exact functional form of firms' production function nor on the measure of input cost wedges: for robustness, we employ additional MRPK measures from Hsieh and Klenow (2009) and Baqaee and Farhi (2019*a*), which use different methods to compute firm wedges, and which make different assumptions about firm production functions. While our findings speak only to changes in misallocation among publicly listed firms, these firms receive much of EXIM's financing and contribute to a large share of aggregate output. It is therefore plausible that these findings would extend to the overall economy.

An additional consideration in evaluating EXIM support as a policy tool is whether it relies on government funding by distortive taxes. Empirically, that does not appear to be the case: EXIM's balance sheets show that it profitably returned an average of $50 million annually to the US Treasury during our sample period. The profitability is not due to EXIM receiving a subsidized cost of capital but instead appears consistent with strong enforcement mechanisms resulting in low default and high recovery rates.

Our evidence naturally raises the question of why the private sector did not finance the exports that ended up receiving EXIM support and why it did not step in during the shutdown. We argue that such funding gaps can emerge for two reasons. First, fundamental frictions like asymmetric information and incomplete contracts—which are considerable in cross-border trade finance—would lead private banks to optimally constrain quantities in order to satisfy incentive compatibility constraints. Second, the specialized nature of international trade finance creates conditions in which banks may exercise market power and find it privately optimal to charge high markups and ration credit.[2] These frictions in the market for trade financing exist regardless of EXIM's presence.

[2]Rysman, Townsend and Walsh (2022) and Cavalcanti, Kaboski, Martins and Santos (2023) present evidence from other settings that despite the existence of several commercial banks, pre-emptive behaviors lead banks to

A public institution like EXIM can help to bridge funding gaps through multiple channels. First, as a government agency representing a major geopolitical power, it has access to additional enforcement mechanisms through international frameworks (e.g., the Paris Club), and it may possess superior information about country risks (e.g., through interagency cooperation). Second, and perhaps more fundamentally, even without such technological advantages, public financing can improve capital allocation simply by expanding credit supply in the presence of rationing, even when facing the same information and contractual constraints as the private sector (Bulow and Summers, 1986).[3] The key mechanism is that a government that places positive weight on social objectives (in EXIM's case, domestic employment) will optimally charge lower markups compared to purely profit-maximizing banks, thereby expanding credit access.

Our results on EXIM's effects should be interpreted within the institution's current scale and scope: EXIM is relatively small compared to the size of the exporting sector, and it is plausible that the marginal exports it finances have positive returns. Therefore, expanding the size of its programs indiscriminately could dampen the positive effects we find.

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

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

We also contribute to research examining how institutions and market structure in international trade affect resource allocation (Khandelwal, Schott and Wei, 2013) and firm behavior (e.g., Bernard, Redding and Schott, 2011), particularly in the presence of policy uncertainty (Pierce and

exert substantial market power. This behavior results in capital misallocation, as private banks maximize profits by constraining the supply of credit despite entrepreneurs having high returns to capital.

[3]Bulow and Summers (1986) study a model of rationing in the context of the labor market, where employers rather than banks face asymmetric information and set wages higher than the Walrasian frictionless wage, resulting in endogeneous wage differentials and excess demand. The conclusion that industrial policy is able to improve the allocation by promoting employment in sectors with high elicitation constraints would be similar in the context of banks rather than employers.

Schott, 2016). This literature has so far mostly focused on the role of tariffs. In contrast, we focus on the supply of trade financing from an export credit agency in a developed economy.[4] We show that policies alleviating financing frictions can have first-order effects on economic activity in the tradable sector, just like tariffs, with these effects being particularly pronounced for trade with destinations that private firms perceive as risky (Hassan, Schreger, Schwedeler and Tahoun, 2023). This suggests that export credit agencies play a crucial role in overcoming market frictions in international trade, especially where private markets are most constrained.

Second, we contribute to the empirical literature on finance and trade. Existing work has primarily focused on how changes in the provision of private credit affects firms' export activity (e.g., Amiti and Weinstein, 2011; Paravisini, Rappoport, Schnabl and Wolfenzon, 2014; Demir, Michalski and Ors, 2017; Xu, 2022; Beaumont and Lenoir, 2023; Friedrich and Zator, 2023; Bruno and Shin, 2023), and how banking networks can affect trade patterns (Michalski and Ors, 2012; Niepmann and Schmidt-Eisenlohr, 2017*a*,*b*; Xu and Yang, 2024).[5]

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

We also relate to the literature studying the real effects of export credit agencies and their provision of trade financing on firms. Existing work has almost entirely relied on firm-level correlations between exports and ECA credit, investigating the case studies of, among others, Germany (Felbermayr and Yalcin, 2013; Heiland and Yalcin, 2021), Austria (Badinger and Url, 2013), Pakistan (Zia, 2008; Defever, Riaño and Varela, 2020), and Korea (Hur and Yoon, 2022).[6] In contrast to these studies, the natural experiment of EXIM's shutdown allows us to estimate the causal effect of export credit agency support in an economy with a well-developed capital market and lower risk of political capture. Our results also indicate that export credit subsidies can have first-order effects on *firms*, particularly when they were financially constrained.

Kurban (2022) and Benmelech and Monteiro (2024) study the US EXIM bank, where the former

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

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

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

compares US exports across US industries and finds that EXIM positively impacts exports, while the latter provides a case study on Boeing in relation to one of the four EXIM programs.[7] Relative to these papers, we make three contributions. First, we study the allocative effect of EXIM's shutdown both in the aggregate and at the firm-level under milder identifying assumptions, which allows us to provide clean causal estimates. Second, we study how EXIM affects both the average firm and industry, and we also analyze its distributional effect and provide theoretically-grounded estimates of its impact on misallocation. Third, we develop a general framework backed by empirical evidence to assess whether ECAs have a positive effect on aggregate output.

Finally, our paper relates to recent work on trade and misallocation, where our contribution is to show how a policy focused on trade financing impacts misallocation in the economy more broadly (e.g., Khandelwal, Schott and Wei, 2013; Edmond, Midrigan and Xu, 2015; De Loecker, Goldberg, Khandelwal and Pavcnik, 2016; Brooks and Dovis, 2020; Berthou, Chung, Manova and Bragard, 2020; Finlay, 2021; Bai, Jin and Lu, 2024). Because ECAs can lower misallocation by reducing financing frictions, we contribute to the literature on financial frictions and misallocation, which shows theoretically how these frictions lead to capital misallocation (e.g., Buera, Kaboski and Shin, 2011; Midrigan and Xu, 2014; Moll, 2014), and empirically how government interventions can mitigate it (e.g., Bau and Matray, 2023).

# 2 Institutional Context and Theory

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

## 2.1 Importance of Financing for Trade

**Working capital necessity and counterparty 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 provides financing, it bears the risk that the buyer will not pay after receiving the goods.

[7] Our empirical results are quantitatively identical when we remove Boeing from the sample.

Export sales are transactions involving 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 default.

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

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

**Frictional financial markets.** In frictionless financial markets, firms would receive optimal levels of financing, and all profitable export opportunities would be funded. However, three key frictions in trade financing markets lead banks to optimally restrict credit supply, creating financing gaps.

First, *firm-specific frictions* arise from asymmetric information between lenders and borrowers (e.g., Stiglitz and Weiss, 1981; Holmstrom and Tirole, 1997) and incomplete contracts that limit firms' ability to pledge future cash flows (Banerjee and Newman, 1993). These frictions cause banks to ration credit to maximize expected profits, as restricting quantities helps to manage default risk by satisfying incentive compatibility constraints. The result is underprovision of financing, with certain firms—particularly those with limited collateral or credit history—becoming especially constrained.

Second, *destination-specific frictions* emerge in cross-border transactions due to heightened information asymmetries and contractual uncertainties with foreign counterparties. These frictions are amplified when dealing with customers in countries with weak institutional environments or unfamiliar legal systems. Banks respond by further restricting credit for exports to these destinations, creating additional financing constraints for otherwise viable international transactions.

Third, *bank market power* in international finance markets allows banks to charge particularly high markups, which artificially constrains the quantity of credit. This market power stems from the

substantial fixed costs of developing international operations, including establishing correspondent relationships, acquiring country-specific expertise, and implementing cross-border compliance systems.[8] These entry barriers create concentrated banking markets where profit-maximizing behavior leads to restricted credit supply and higher prices relative to competitive markets.

Any of these three frictions—contractual limitations, informational barriers, and bank market power—would create systematic underprovision of export financing. The resulting gaps vary across firms and destination markets, with transactions combining multiple sources of frictions facing the most severe constraints.

### 2.1.1 Export Credit Agencies

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

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

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

**Economic incidence of ECA funding.** Economically, ECA funding reduces financial constraints overall, regardless of whether the exporter or importer formally receives it. When financing is extended to the exporter, the ECA directly relaxes the seller's financing constraint, which allows it to indirectly relax the buyer's constraint. When the importer receives the ECA financing, it can

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

extend financing to the exporter by paying for the good in advance and thereby indirectly relax the exporter's constraint. In both cases, ECA financing alleviates the frictions that prevent the international transactions from occurring.

Operationally, ECAs attach funds to goods provided by specific firms so that even when loans are nominally extended to the importing buyer, the funds themselves are not received or held by the foreign party and instead are paid to the exporter. Thus, while the formal borrower may differ across programs or transactions, the economic effect remains the same: enabling international trade that would otherwise be constrained by trade financing frictions.

### 2.1.2 EXIM's Implementation Framework and Institutional Design

Established during the New Deal, the Export-Import Bank of the United States is the country's official export credit agency, and its mandate is to support jobs in the US by supplying export financing.[9] 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 and products in Appendix D.2 and Appendix D.2.2.

**Market role and positioning.**

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

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

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

- Profitability requirements: International organizations like the OECD and WTO as well as domestic US federal law require that EXIM operates profitably, i.e., at a price above its own 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.[10]

[9] EXIM's initial mission in 1934 was to support both exports and imports. The bank subsequently focused on exports, although the name remained unchanged.

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

In addition, EXIM has operated with a strict cap of 2% on its default rate.[11] The default rate is defined as the value in default (counting late payments and renegotiations) relative to total lending outstanding. Breaching the default rate cap causes the bank's operations to be immediately frozen by Congress.

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

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

**Institutional advantages.** As a government agency, EXIM also has access to capabilities for risk assessment and recovery of potential losses that the private sector does not have.

- Risk coverage capabilities: EXIM is statutorily required to consult with the Departments of State and Treasury on transactions involving significant country risk, creating established channels for risk assessment.[12] EXIM then provides comprehensive trade insurance that covers both commercial and political risks, and in particular includes coverage that is explicitly excluded from private contracts. This primarily includes country-level risks such as regime changes, capital controls, military events, or natural disasters. In addition, EXIM's coverage tends to have longer terms and higher coverage percentages.

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

- Informational advantages: EXIM may benefit from access to government information networks that complement traditional market intelligence. EXIM can draw on country-specific

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

[12] Since its 2019 reauthorization, EXIM has also increased its coordination with national security agencies on transactions with geopolitical implications.

assessments from US embassies where Foreign Commercial Service officers monitor local business conditions, institutional stability, and evaluate contract enforcement and create Country Commercial Guides. The intelligence collected through diplomatic networks may be especially valuable in markets where public information is limited or unreliable.

EXIM also maintains formal institutional relationships for interagency cooperation that are mandated by statute, which may also contribute to an informational advantage. As a member of the Trade Promotion Coordinating Committee (TPCC), EXIM regularly exchanges information with 19 federal agencies including the Departments of Commerce, State, and Treasury. These structured interagency processes provide EXIM with a broader contextual understanding of markets and counterparties that purely commercial institutions may lack.

**Takeaway.** EXIM is designed to fund profitable but liquidity-constrained export projects, particularly in markets where exporters face financial barriers due to information or contractual frictions.

### 2.1.3 The 2015 Shutdown of EXIM's Operations

Two events in July 2015 led to a significant disruption in EXIM's operations. First, on July 1st, EXIM's charter, which requires periodic re-authorization by Congress, was allowed to lapse for the first time since the agency's inception in 1934. Second, on July 20th, the Bank's board of directors lost its quorum, which was necessary for most of EXIM's activities.[13]

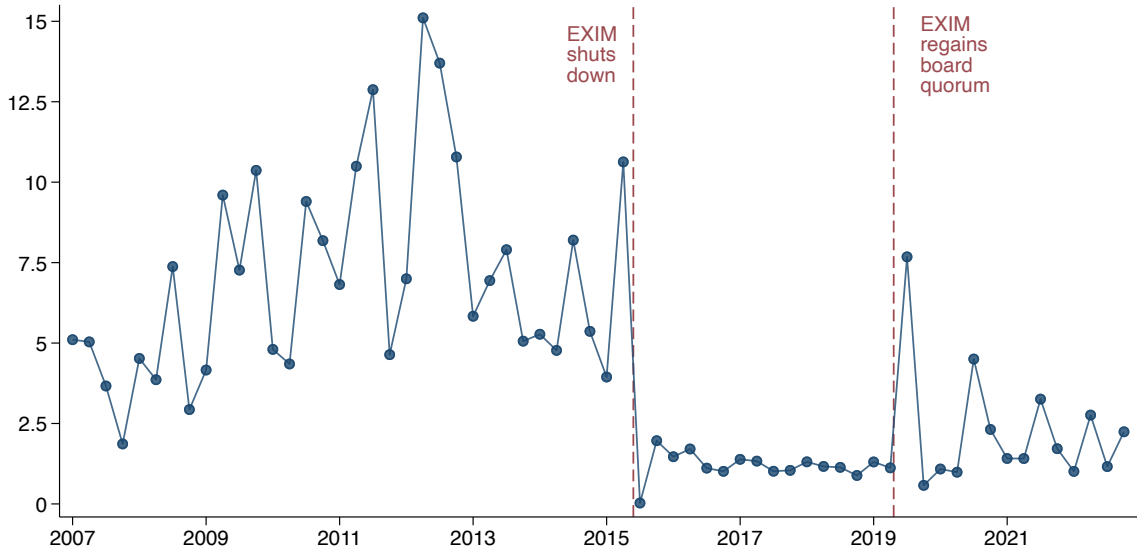
The lapse in EXIM's charter was primarily caused by a political dispute in the highly polarized environment following the 2012 Presidential election and the 2014 midterm elections. EXIM's lack of board quorum, which lasted for much longer than the initial shutdown, was led by Republican Richard Shelby, the chair of the Senate Banking Committee at the time, opposing all nominees for board positions during the second Obama Administration.[14] 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.

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

[14] An article in the New York Times on February 2016 described Shelby as having the "distinction of running the only committee in the Senate that has not acted on a single nominee in this Congress." https://www.nytimes.com/2016/02/24/us/politics/anxious-for-re-election-senator-richard-shelby-refuses-to-act-on-banking-nominations.html

Figure 1: EXIM's Supply of Trade Financing




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

### 2.2 Theoretical Predictions

In Appendix Section D.4, we develop a one-period model in which firms maximize their profits from foreign sales by choosing their capital investment for exporting, with trade financing obtained through private market and/or ECA debt. The model generates predictions on how firm investment responds to changes in the supply of trade financing from export credit agencies.

The key intuition is that if ECAs offer financing at a lower cost than the market, firms that are unconstrained in their access to trade financing will not expand but will instead treat the subsidized financing as a windfall. In contrast, constrained firms will use ECA trade financing to expand their exporting activity until they become unconstrained.

## 3 Data and Empirical Strategy

### 3.1 Data

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

**EXIM authorization data.** We use comprehensive records of EXIM loan authorizations and disbursements originating from 2007 to 2022, obtained from a FOIA request. These records include the date of authorization, the amount disbursed, the export product, and the exporting firm.

Products are reported at the NAICS-4 level so we convert to HS-4 using the concordances provided by Pierce and Schott (2012).

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

**Firm export data.** We measure exports at the firm level using data from Datamyne, a private vendor that collects and cleans maritime bills of lading.[15] 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). 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).

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

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

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

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

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

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

Table 1: Summary Statistics

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

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

## 3.2 Identification Strategy

### 3.2.1 Aggregate Exports

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

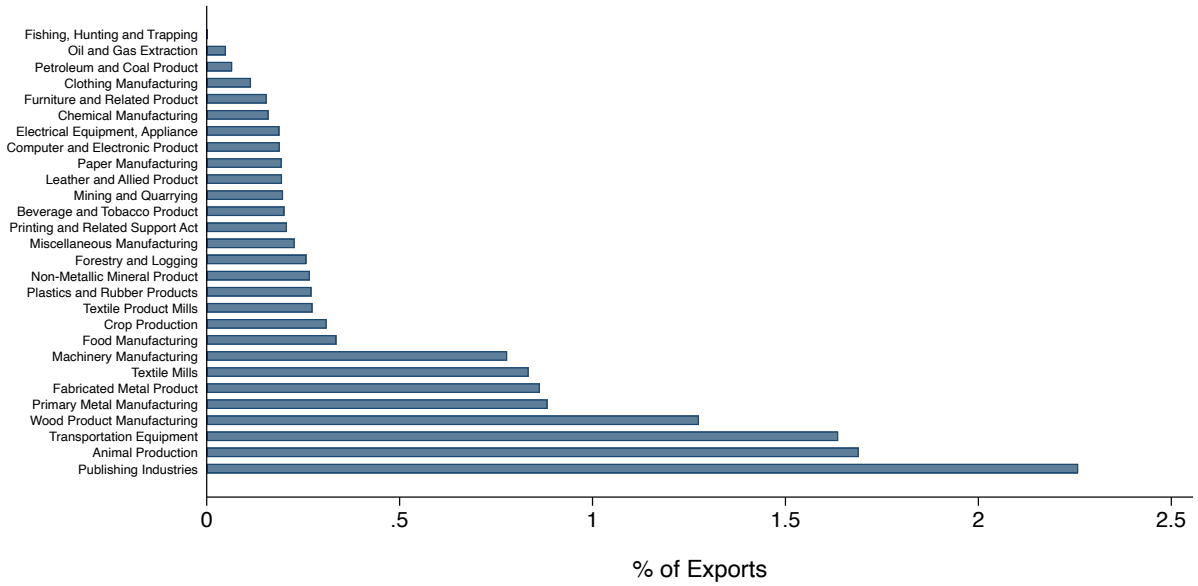
$$Y_{p,o,d,t} = \beta EXIM_{p,o} \times Post_t + \theta_{p,o,d} + \gamma_{p,d,t} + \delta_{o,t} + \varepsilon_{p,o,d,t} \tag{1}$$

where $Y_{p,o,d,t}$ is the value of exports of product $p$, originating from country $o$, to destination country $d$, at time $t$. To account for the possibility of exporters, destinations, and products systematically differing in unobserved ways, we include the vector of fixed effects $\theta_{p,o,d}$, which is the unit of observation each period, to remove all level differences across origin-destination countries and products. $\gamma_{p,d,t}$ absorbs demand shocks for product-destinations and $\delta_{o,t}$ accounts for exporting country supply shocks. $\beta$ 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 $\beta$ captures the total effect after accounting for any potential business stealing between EXIM-backed and non-EXIM-backed firms. $\beta$ therefore reflects the policy object of interest, which is total exports net of market share reallocation.

EXIM dependency $EXIM_{p,o}$ is defined as the average amount of EXIM trade financing a product received over 2007–2010, scaled by export flows in that product. Since EXIM is a US institution,

Figure 2: EXIM Financing Intensity By Industry (%)




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

$EXIM_{p,o}$ is by definition always equal to zero for non-US exporters ($EXIM_{i,US,t} = 0$ for $o \neq US$). Formally, $EXIM_{p,o} = \sum_{t=2007}^{2010} \sum_{i \in p} EXIM_{i,US,t} \Big/ \sum_{t=2007}^{2010} Export_{p,US,t}$ where $i$ denotes an individual EXIM loan and $p$ denotes an HS-4 product.

The collapse of EXIM financing during the shutdown means that the ex-ante cross-sectional variation in EXIM dependency ($EXIM_{p,o}$) captures the drop in the supply of EXIM financing to each product.[16] 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. We plot the distribution of treatment intensity across 3-digit industries in Figure 2, which shows the substantial variation across sectors.

Our estimation includes the relevant control group of countries $o$ that have similar export patterns to the US (e.g., Autor, Dorn and Hanson, 2013; Hombert and Matray, 2017), and that do not rely on EXIM.[17] By including trade flows from these countries, we are able to tightly control for unobserved demand shocks by including product-destination-year fixed effects ($\gamma_{p,d,t}$) and exporter

[16] As explained in Section 2.1.1, EXIM predominantly 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.6, we show that the estimated effects are very similar for each type of support, although for the reasons discussed, we do not interpret these as separate mechanisms.

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

supply shocks by including origin-year fixed effects ($\delta_{o,t}$).

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

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

where $\Delta Y_{p,o,d,t}$ is now the *change* of exports relative to a reference year, which we choose to be 2014, the year prior to the shutdown. The only difference between equations (1) and (2) is that since we are using the first difference operator, the time invariant exporter-product-destination fixed effects ($\theta_{p,o,d}$) from equation (1) no longer need to be included. All the other fixed effects remain since they are time-varying. We cluster standard errors at the HS-4 product level, which is the level of the shock (Cameron and Miller, 2015).

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

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

**Accommodating entry and exit in the trade data.** Trade data exhibits substantial entry and exit at the market (product-destination) 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.[18]

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

We overcome these challenges by following the methodology introduced by Beaumont, Matray and Xu (2024) that shows the aggregation properties of the midpoint growth rate in the context of trade data. In order to handle entry and exit in a well-defined manner that ensures this aggregation property, we create a balanced panel including every export market (product-destination) that is present at any point during the sample period, and we fill missing observations, which reflect

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

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.[19] 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.[20] This second property makes it possible to estimate how a shock affects the aggregate growth of the LHS variable, and it explicitly shows how control variables that are possible to include at more disaggregate levels of observation impact estimated coefficients at higher levels.

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

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

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

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

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

which such unobserved demand shocks might bias the estimate.

The remaining threat to identification is an unobserved shock to US products that correlates with EXIM exposure and occurs exactly when EXIM shuts down. Examples of such shocks would be a tariff that is levied specifically on US products but not on the same product from other developed countries, or a change in ECA financing from the other developed countries used in our control groups that is not caused by EXIM's shutdown, but which still correlates with the distribution of US products receiving EXIM financing. It is worth noting, however, that our estimates remain causally valid even if other countries adjust their ECA financing in response to EXIM's shutdown (e.g., through strategic competition). In those cases, $\beta$ captures the total causal effect of EXIM's shutdown operating through two channels: the first direct effect of tightening US exporters' financial constraints, and the second indirect effect of inducing strategic responses from foreign competitors.

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

### 3.2.2 Firm-level Effects

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

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

where $\Delta Y_{i,j,t}$ is the growth rate of various firm outcomes for firm $i$ in industry $j$ at time $t$ relative to the year 2014.[21] $EXIM_i$ is an indicator variable that takes the value one if firm $i$ received trade financing from EXIM during the pre-shutdown period. $\beta$ captures the semi-elasticity of firm outcomes to the supply of EXIM trade financing. It is estimated by comparing outcomes for firms that relied on EXIM financing relative to firms that did not, during the post-shutdown period relative to the pre-shutdown period.

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

The event study version is estimated using the following specification:

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

As in equation (2), we do not include time invariant unit fixed effects (firms in this case) because the dependent variables are measured in differences. This strategy ensures that we remove time-invariant heterogeneity across firms, and in particular accounts for possible ex-ante differences in characteristics between treated and control firms. Industry-by-year fixed effects $\gamma_{j,t}$ restrict the identifying variation to comparing firms within the same industry each period and controls for time-varying unobserved heterogeneity across industries, such as differences in industry cycles or shocks correlated with industry-level EXIM exposure.

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

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

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

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

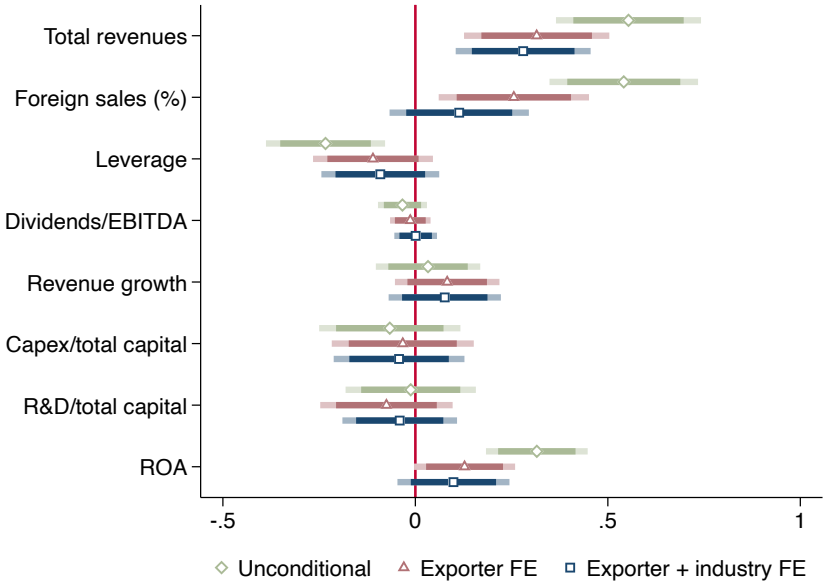
Along the remaining significantly different dimension of firm size, treated and control firms still share a large overlap in size, which ensures that effects can be identified across firms of similar size.

In addition, treated and control firms are similar in terms of the share of foreign sales, financing frictions proxied by their leverage and dividends intensity (defined as dividends over EBITDA). They also have similar growth rates of their sales and investment intensity (both in terms of physical investment and R&D), and they have similar ROA.

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

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

Figure 3: Firm Covariate Balance




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

# 4 Average Effects of EXIM's Shutdown

Our first set of results examines whether EXIM trade financing creates additional US trade. In the aggregate, we find that EXIM's exit leads to a sizable decline in exports of products that received more financing prior to the shutdown. We then trace out how this contraction in foreign sales affects firms' exports, total revenues, investment, and hiring decisions. We find that the shutdown had sizable negative impacts on firm real outcomes, indicating that EXIM financing influences marginal decisions on average.

## 4.1 Average Effects of EXIM's Shutdown on Exports

We begin by estimating equation (2) at various levels of aggregation. We weight the regressions using the value of the denominator of the midpoint growth rate in the origin-product (HS-4)-year cell such that we capture the effect of EXIM's shutdown on aggregate exports.[22]

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 $\beta$ recovers exactly the same point estimate and standard errors whether we work at the origin $\times$ (HS-4) product level, the origin $\times$ (HS-6) product level, or at the origin $\times$ (HS-6) product $\times$ destination level, as long as we include the same set of fixed effects, weight the regressions appropriately, and cluster standard errors correctly.[23]

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

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

[22] 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.

[23] 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 level. We then multiply this weight by $A_{o,p=hs4,t}$ to preserve the definition of $\beta$ as measuring the effect of EXIM on aggregate exports. This last part does not affect the (dis-)aggregation property of our estimator.

exports at the product level.

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

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

Table 2: Impact on US Product Exports

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

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

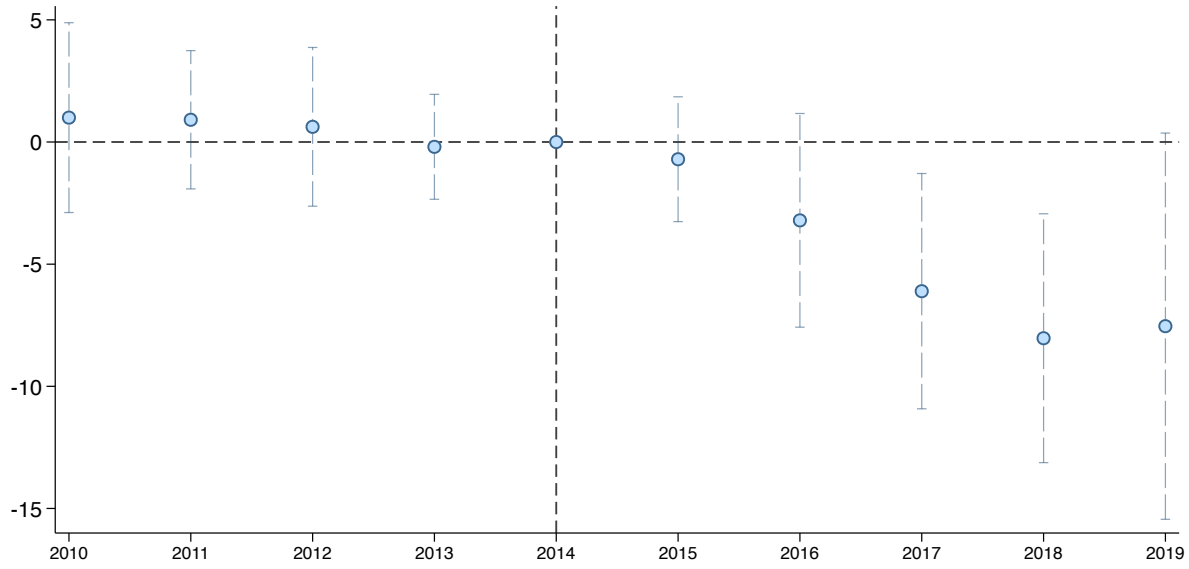
In Figure 4, we plot the yearly point estimate and the 95% confidence intervals of the annual event study. We find an absence of differential pre-trends prior to the shock, and a progressive decline throughout the period of EXIM's shutdown, with only a slight reduction in the gap in the last year, when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

Our specification tightly controls for time-varying product-by-destination demand shocks that might be correlated with EXIM's shutdown, as long as such demand shocks are not also exporter-

by-product specific. An example of such a shock would be tariffs levied specifically on products from the US that also normally receive EXIM trade financing.

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

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




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

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

Motivated by trade models where firms face both fixed and variable export costs (Ghironi and Melitz, 2005), we decompose export growth at the product-year level into three additive margins:

intensive (export growth to a destination we observe both before and after 2014), entry (export growth to destinations not present before 2014) and exit (export growth to destinations we no longer observe after 2014).

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

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

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

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

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

At the extensive margin, all the decline is accounted for by EXIM-dependent products having relatively lower entry. By contrast, the exit margin is unaffected both economically and statistically. The observed asymmetry between entry and exit also suggest trade financing involves significant upfront sunk costs, consistent with prior work (e.g., Das, Roberts and Tybout, 2007; Xu, 2022). This interpretation is also supported by literature on market entry mechanisms showing how trade financing has a critical role in allowing firms to learn about foreign market specificities (Koenig, 2009; Berman, Rebeyrol and Vicard, 2018; Atkin, Khandelwal and Osman, 2017).

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

Second, this magnitude is in line with expected working capital multiplier. Exporting typically generates working capital needs of 20–25% of foreign revenues. This concretely means that exporters must be able to pay \$0.20–0.25 upfront to generate each new \$ of foreign sales. Therefore, \$1 contraction of financing impacts export revenues by \$4–5.

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

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

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

## 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 studying the impact of the shutdown on firms. We start by confirming that EXIM's shutdown lowered firm exports using the universe of maritime exports that we observe in Datamyne, and we show that results are similar when we restrict to the subset of listed firms. We then turn to the sample of publicly listed exporters for which we can study additional firm outcomes like capital investment and employment. While our focus on publicly listed firms does not allow us to estimate a full decomposition of EXIM's shutdown on the US economy, exporting is an activity concentrated among large firms, and Compustat firms account for approximately 80% of aggregate exports, so we believe that we capture the majority of the relevant economic activity.[24]

[24]The US Census Bureau, which collects the customs trade data, does not report firms' equity status. We infer public firms' contribution to total US exports using the following estimates: approximately 70% of listed firms (i.e., approximately 2,000 firms) are exporters, and the top 2,000 exporters in the US contribute 80% of the value of exports. Assuming that the largest exporters are also publicly listed, we arrive at our final value of 80%. A more

#### 4.2.1 Effect on Firm Exports

We observe firm exports at the product-by-destination level in Datamyne. We measure exports using Twenty-foot Equivalent Units (TEU), a standard unit for maritime cargo. To handle the dimensionality of firm-by-product-by-destination data, we collapse the data into two periods: an average pre-shutdown period (2010–2014) and an average post period (2015–2019). Because of the large number of entries and exits at this level, we use the same Beaumont, Matray and Xu (2024) method as in Table 2, with appropriate weights.[25]

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

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

#### 4.2.2 Effect on Total Revenues

**Baseline effect.** To test whether the shutdown and contraction in exports affect firms' total revenues, we begin by estimating the compact $\beta$ coefficient in equation (4) that captures the average change in total revenues for EXIM-backed relative to non-backed firms over the post period (2015–2019) relative to the pre-period. Table 5 reports our results.[26] Column 1 is estimated with the sparsest set of controls: only year fixed effects. Column 2 includes industry-by-year fixed effects to account for the potential correlation between the treatment exposure and unobserved industry shocks (e.g., differential demand shocks). Column 3 is our preferred specification that includes both industry-by-year and exporter-by-year fixed effects, with the latter controlling for the correlation

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%.

[25] 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.

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

Table 4: Impact on Firm Maritime Exports

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

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

between the treatment and other trade-related shocks.

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

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

Columns 5 to 7 show that the effect of EXIM's shutdown is not driven by certain parts of the sample. Column 5 excludes non-exporting firms from the sample and finds identical point estimates to the specifications that isolate the identifying variation among exporters by including an exporter-by-year fixed effect (column 3).[27] In column 6, we exclude the ten firms with the highest reliance on EXIM support in the pre-period, which includes Boeing.[28] In column 7, we remove all industries that are in the top tercile of dependence on government spending, where we construct this dependence by regressing monthly stock returns for each industry on the measure of policy uncertainty specifically related to government policies and fiscal policies from Baker, Bloom and Davis (2016). The fact that the point estimate remains unaffected indicates that the effect is

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

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

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

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

The inclusion of the EXIM-by-year fixed effect now controls for any time-varying unobserved shocks that might be specific to the selection of EXIM-dependent firms, as it forces the coefficient of interest on the triple difference variables to be estimated *within* EXIM-dependent firms.[29] The coefficient and standard error is nearly identical to the baseline effect that we estimate in column 3, implying that the effect of EXIM's shutdown we estimate is unlikely driven by potential endogeneous selection of firms receiving EXIM in the first place.[30]

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

Figure 5 plots the yearly coefficients of $\beta_t$ and 95% confidence intervals of the growth of total revenues relative to 2014 for the dynamic event study in equation (5), controlling for the full set of firm characteristics (industry, exporter status, size, leverage, profitability).[31] Appendix Figure B.3 shows the event study in the quarterly data, which allows us to define the shock *within* 2015. As in our baseline specification, the figure shows visual evidence of the absence of differential pre-trends before the shock: sales of EXIM-supported firms trended similarly for firms not supported by EXIM up to the second quarter of 2015 (the last quarter prior to EXIM's shutdown), and diverged only after mid-2015. Afterward, treated firms' total revenues decline significantly relative to control firms and remain lower throughout the post period.

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

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

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

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

Table 5: Impact on Firm Total Revenues

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

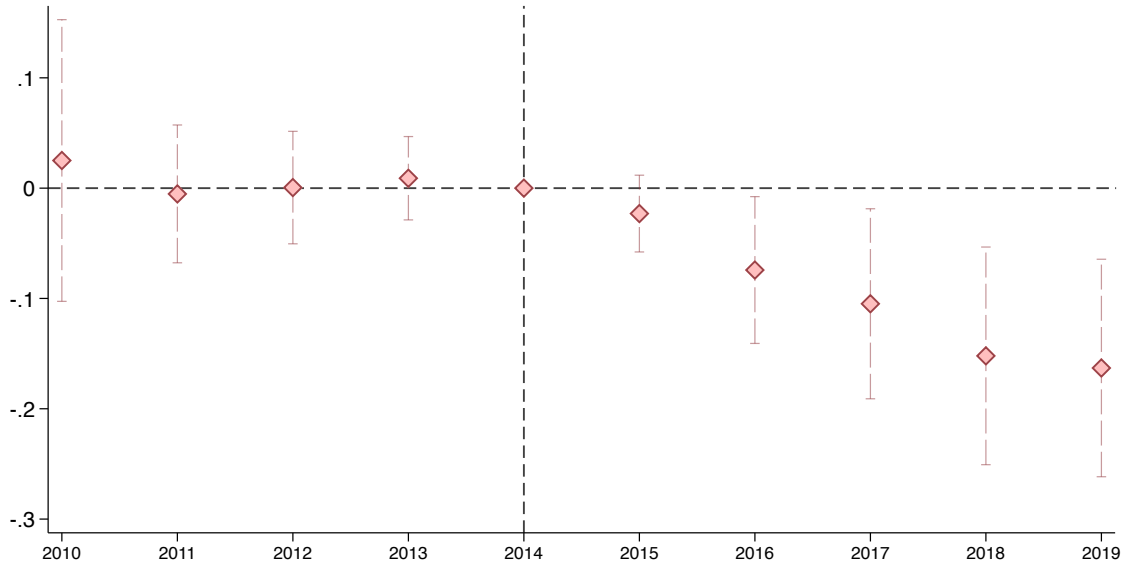
*Notes:* This table reports the estimated effects of EXIM's shutdown on firms' total revenue growth. The dependent variable is the growth rate relative to 2014 (the year prior to the shock) defined as $\Delta Y_{i,t} = (Y_{i,t} - Y_{i,2014})/Y_{i,2014}$. $Post_t$ is an indicator variable equal to 1 for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

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

We calculate the pass-through of the effect of EXIM on domestic sales from export sales as the ratio of the elasticities of sales: $\frac{\epsilon^{Domestic}}{\epsilon^{Exports}}$. We rewrite this ratio of elasticities in the following way: $\frac{\epsilon^{Domestic}}{\epsilon^{Exports}} = \frac{\Delta Domestic}{\Delta Exports} \times \frac{Exports}{Domestic}$, where $\Delta$ denotes the dollar change in sales in response to EXIM while "*Exports*" and "*Domestic*" denote initial levels of sales. We also use the accounting identity $\Delta TotalRevenues = \Delta Exports + \Delta Domestic$. From our previous estimations, we have that $\frac{\partial \text{Total revenues}}{\partial \text{EXIM}} = \hat{\beta}^{Compustat} = 4.9$ and $\frac{\partial \text{Exports}}{\partial \text{EXIM}} = \hat{\beta}^{US\ exports} = 4.49$, so $\frac{\partial \text{Dom}}{\partial \text{EXIM}} = 0.51$. This allows us to write that $\frac{\partial \text{Dom}}{\partial \text{EXIM}} \times \frac{\partial \text{EXIM}}{\partial \text{Exports}} = \frac{\partial \text{Dom}}{\partial \text{Exports}} \approx \frac{\Delta \text{Dom}}{\Delta \text{Exports}} = \frac{0.51}{4.49}$.

In order to calculate $\frac{Exports}{Domestic}$ (the share of export sales relative to domestic sales), we follow Bernard, Jensen, Redding and Schott (2018), which finds that export sales account for approximately 20% among all firms that have at least one dollar of exports. Given that exporting is

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




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

mostly concentrated among larger firms and that Compustat firms are larger than the average firm, this share is likely higher in our sample. For instance, the share of foreign revenues in Compustat segment is approximately 40%. Taking these two values as bounds, we calculate that $\frac{Exports}{Domestic} \in [0.25 - 0.66]$.[32]

**Implication for firm production functions and comparison with the literature.** Together, these magnitudes imply a pass-through of foreign to domestic sales of 2.8% to 7.5%. Such positive spillovers between foreign markets and the domestic market are at odds with the canonical Melitz (2003) model of firm-level trade that features constant marginal cost, in which demand shocks in one market do not affect a firm's sales in another. However, these results are consistent with models of intra-firm spillovers, that can emerge for instance from knowledge transfer,s vertical supply linkages, or financing frictions and internal capital markets.[33]

Our findings are particularly likely to reflect the role of internal capital markets because EXIM designs its program to service financially constrained firms (Table 7 and Appendix Section D.2). When firms face financing constraints and use internal capital markets to finance projects across different markets, theory predicts positive spillovers between markets Stein (1997). In our context,

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

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

the reduction in exports acts as a negative cash flow shock for treated firms, tightening their financing constraints and affecting their domestic sales.[34]

Our results differ from Almunia, Antràs, Lopez-Rodriguez and Morales (2021), which shows that Spanish manufacturers losing more domestic sales during the Great Recession experienced larger export growth. This work differs from ours in two important ways. First, Almunia, Antràs, Lopez-Rodriguez and Morales (2021) studies spillovers from domestic shocks to foreign sales, while we examine the opposite. To the best of our knowledge, studies examining pass-through from foreign to domestic sales have found positive spillovers similar to our results in France (Berman, Berthou and Héricourt, 2015), the US (Ding, 2024), and Denmark Jakel (2022). Second, their setting features exposure to an aggregate shock affecting all Spanish exporters during the Great Recession while we examine variation across firms based on their differential access to EXIM financing. As such, our results likely reflect the role of firm-specific financial constraints rather than an aggregate demand shock, which may have different implications for the pass-through of foreign to domestic sales.

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

### 4.2.3 Effect on Additional Firm Outcomes

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

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

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

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

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

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

non-dependent firms. The notable exception is the profit margin, for which we find an economically small and statistically insignificant point estimate (column 5), indicating that EXIM financing likely did not artificially boost their profit rates prior to the shutdown. Appendix Figure B.4 shows the event studies for each outcome.

# 5 Channels for EXIM's Impact

Our results show that EXIM financing spurs real economic activity rather than just benefiting well-connected firms or redistributing market share, demonstrating that EXIM provides marginal funding that enables new economic activity, not just exports that would have occurred anyway.

In this part of the paper, we assess the potential channels for EXIM's ability to create net trade. We first examine key institutional factors: the financing needs of firms engaged in longer-maturity international transactions, and the contractual frictions emerging from country-specific cross-border risks. We then explore additional channels that could explain EXIM's impact on exports.

Before examining specific frictions, it is important to emphasize that while EXIM financing may be formally directed toward either exporters or foreign buyers, the economic incidence affects the transaction itself.[35] The funding gap created by EXIM's shutdown impacts exports regardless of which party nominally receives financing, as constraints on either side of the transaction can impair trade. This interdependence guides our examination of both firm-level financing constraints and destination market frictions as channels for EXIM's impact.

[35]EXIM financing is attached to sales of goods from a specific American exporter such that even when EXIM formally contracts with the importer, it effectively finances the American firm, and foreign buyers cannot redirect those funds after securing the loan.

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

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

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

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

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

$\Delta Y_{i,j,t}$ denotes the growth rate of an outcome between $t$ and 2014, $I_{i,j}^{Constrained}$ is an indicator variable that takes the value one if either firm $i$ or industry $j$ is constrained in the pre-period, and $\otimes$ is the outer product so that we include all possible combinations of the different terms.[36] The full set of fixed effects includes EXIM-by-year, which allows us to absorb systematic differences between treated and control units.

[36] We have written equation (7) to allow for full flexibility in firm-by-industry outcomes, although empirically we will focus on constraints at either the firm $i$ level or the industry $j$ level.

### 5.1 Firm Financing Frictions

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

Table 7 reports the results using firm leverage (e.g., Giroud and Mueller, 2017; Friedrich and Zator, 2023) in column 2, dividend payments intensity (e.g., Fazzari, Hubbard and Petersen, 1988) in column 3,[37] the Hoberg and Maksimovic (2015) measure based on the textual analysis of firms' 10-K filings in column 4, and the industry coverage ratio (current liabilities over EBITDA, motivated by the fact that EXIM's trade financing is a source of short-term working capital) in column 5.

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

Table 7: Role of Financing Frictions

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

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

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

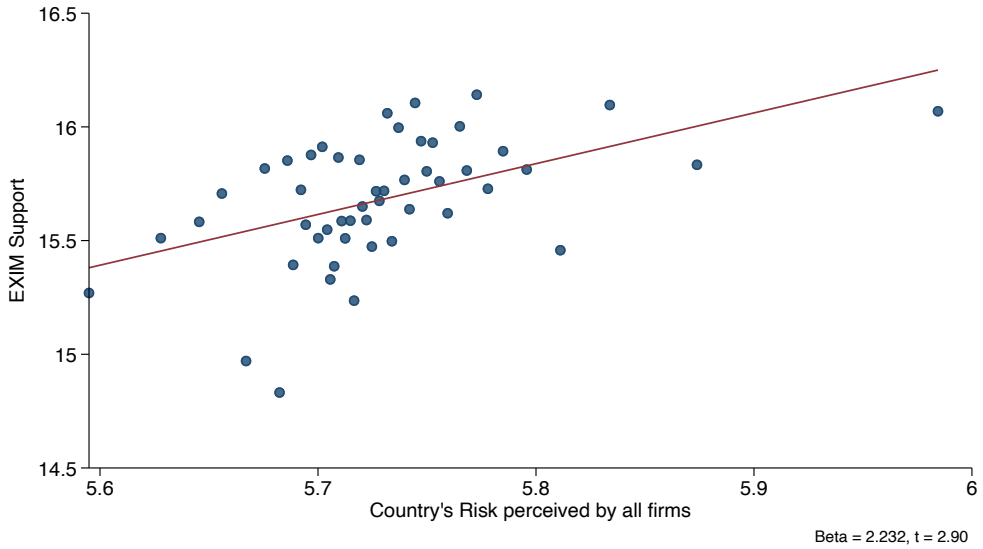
## 5.2 Destination Market Frictions

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

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

Figure 6 shows the relationship between the amount of EXIM financing a country receives relative to the perception of its risks by all firms, residualized on country and year fixed effects. The strong positive relationship indicates that, holding fixed time-invariant country characteristics and accounting for shocks across years, EXIM systematically provides more support to precisely those markets where private sector firms perceive the highest risks. In Appendix Table D.2, we also report the relationships between exposure and risk perceptions by subsets of different types of firms. Strikingly, the effects are most relevant for financial and foreign firms, which are precisely the ones whose views are relevant for international trade and trade financing.

Figure 6: EXIM Support and Country Risk




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

Next, we use three proxies for different dimension of destination market frictions: the amount of firms' (perceived) risk of a country; the quality of rule of law in the destination country; and finally the severity of financing frictions in the destination market.

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

Finally, we proxy the severity of financing frictions in the destination with the financial development of their country, measured with outstanding private credit relative to GDP from the World Bank. We provide more details about these data in Appendix D.3.1.

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

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

Table 8 reports the results for the different proxies of destination 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]

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

Table 8: Role of Destination Market Frictions

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

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

## 5.3 Discussion of Other Potential Channels

While our analysis shows that financing and contractual frictions play a key role in explaining EXIM's effects on trade and firm outcomes, we also consider alternative mechanisms that could contribute to our findings.

First, we consider the possibility that ECAs sometimes operate alongside broader export promotion initiatives. Although EXIM is primarily a financing institution rather than an export promotion agency, its activities could theoretically facilitate trade relationships and provide market intelligence. However, given EXIM's institutional focus on credit provision and risk mitigation rather than traditional export promotion activities such as trade missions or market research, we believe these promotional channels play at most a minor role in explaining our results.

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

are unable or unwilling to participate, the lack of entry is unlikely to be explained by fears of future competition with the agency. Finally, it is difficult to reconcile a general aversion to uncertainty with the cross-sectional heterogeneity by firm and destination market.

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

# 6 Implications for the Allocation of Capital

Our analysis above suggests that the effect of EXIM on trade and firm outcomes varies systematically with economic frictions at the firm and destination market level. These heterogeneous effects suggest that EXIM helps overcome market imperfections that distort the allocation of capital. Since capital misallocation is a key determinant of aggregate TFP, examining how EXIM affects the distribution of capital across firms with varying MRPK levels is crucial to evaluating its overall economic impact.

In this section, we formalize the analysis using a general misallocation framework that allows for heterogeneity in firm-level input cost wedges that encompass all underlying sources of trade financing frictions.

## 6.1 Framework

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

The firm's profit function is:

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

where $r_i$ is the (risk-adjusted) cost of capital for firm $i$, and $\tau_i$ is the potentially non-zero input wedge that governs the marginal return necessary to invest in an input, which introduces a gap between the firm's TFPQ and the firm's TFPR.[39] The firm's technological efficiency, i.e., its total

[39]We use "risk-adjusted cost of capital" rather than the "price of inputs" term more common in the literature to highlight the fact that dispersion in MRPK can come from mis-measurement in the dispersion of investment risks. David, Schmid and Zeke (2022) shows that this can over-estimate cross-sectional misallocation by up to 25%.

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.

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:

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

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

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

where $\lambda_i$ 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), $\alpha_i^x$ is the output elasticity with respect to $x$, $\tau_i^x$ 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 $A_i$.

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

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

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

Equation (10) illustrates that an increase in the total amount of capital used by industry $J$—i.e., an increase in investment for the average firm—will not in itself mechanically increase industry

TFP. The overall change in TFP can be negative if investment ($\Delta \log K_i > 0$) is concentrated among firms for which $\frac{\tau_i}{1+\tau_i} < 0$, such that the positive change in inputs is multiplied by a negative value. Since EXIM enters as an additional negative wedge, it may create or exacerbate allocative inefficiency by making it privately optimal for low MRPK firms to expand. Appendix D.5 illustrates this point graphically.

### 6.2 Estimating the Impact of EXIM on Misallocation

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

However, a well-documented empirical challenge of using cross-sectional dispersion in $\text{MRPK}_i$ to infer $\tau_i$ is that the dispersion in MRPK can reflect unobserved differences across firm rather than wedges. This upward bias in measures of misallocation has been shown to emerge from measurement error, model misspecification, productivity volatility paired with the costly adjustment of inputs, or informational frictions and uncertainty.[40] In short: any unobserved heterogeneity across firms limits the researcher's ability to accurately infer firm wedge by inverting the empirical distribution of firms' MRPK.

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

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

[41] Carrillo, Donaldson, Pomeranz and Singhal (2023) makes a similar argument for why looking at within-firm variation reduces mismeasurement in firm capital wedges. A somewhat related method would be to look directly at the changes in industry-level variance of (empirical) TFPR. While this method would also deal with the problem time invariant unobserved differences among firms that will produce dispersion in TFPR that are not related to dispersion

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

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

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

In Appendix Table D.3, we show that we obtain similar results when we fully estimate the production function following the control function approach of Olley and Pakes (1996), when we use the user-cost approach similar to Baqaee and Farhi (2019*a*), and if we compute the capital input cost wedge relative to other inputs under the assumption that the production function is a more general CES.

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

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

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

$\beta_1$ measures the marginal effect of EXIM's shutdown on investment for firms with high MRPK relative to low MRPK. To the extent that $I_i^{High\ MRPK_{i\in j}} \approx I_i^{High\ \tau_i}$, equation (12) is the empirical

in wedges, Bau and Matray (2022) shows that this change in industry variance in TFPR only identifies a change in misallocation in the data under the assumption of joint log-normality of TFPR and TFPQ, which in practice implies that firms with high and low capital wedges should react in the exact symmetric opposite way to the policy shock. Instead, the method we use allows for firms with high and low capital wedges to react differently. Detailed derivations and examples of cases where changes in industry variance in TFPR would be misattributed to changes in firm wedges when joint log-normality breaks can be found in Bau and Matray (2022).

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

counterpart to equation (10) (up to the two positive scalars). $\beta_1 < 0$ implies that capital differentially shrinks for firms with high ex-ante wedges, and capital misallocation rises. $\beta_2$ measures changes for low MRPK firms, and $\beta_1 + \beta_2$ measures the total effect on high MRPK firms. These coefficients therefore precisely capture the $\Delta \log K_i$ in equation (10) for high versus low $\tau_i$ firms.

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

**Identifying assumptions.** Equation (12) is identified under the standard triple difference assumption that the *difference* between high and low MRPK firms have a parallel trend for EXIM financed vs. non-financed firms. This is a weaker identifying assumption than the one we require to estimate the average effect of EXIM in the DID setting. We do not need for high and low MRPK firms to be on the same parallel trend, since this is controlled for by the interaction of $I_i^{High\,\tau_i}$ with year fixed effects, nor do we require that EXIM-backed firms and non-backed firms evolve on parallel trends, since this is controlled for by $EXIM_i \times Post_{t\geq 2015}$.

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

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

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

These results indicate that capital contracts relatively more for high MRPK firms such that misallocation increases following EXIM's shutdown. We provide graphical evidence of this pattern in Figure 7. The figure shows a lack of pre-trends for both high and low MRPK firms, consistent with our identifying assumption, and it shows an increasing difference after EXIM's shutdown. The fact that only high MRPK firms react to EXIM's shutdown while low MRPK firms are mostly

unaffected implies that the joint distribution of TFPR and TFPQ can no longer be log-normal.[43]

In addition, the heterogeneity in these effects provides further evidence that EXIM's impact stems from its ability to reduce frictions facing constrained exporters (i.e., those facing high capital input cost wedges). When exporters are less constrained (and hence have lower MRPK), EXIM's shutdown has limited effect. This much more muted real effects for lower MRPK firms aligns with critics' arguments that EXIM financing would be inframarginal for recipients that can access alternative funding sources.

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 has increased. This could be the case for instance if high MRPK firms are also smaller, and smaller firms face higher risks post EXIM shutdown.

Given this possibility, we provide robustness checks in columns 4–6 by sorting firms within their industry *and* quartile of size. We can include an interaction in the specification between all the fixed effects and the size-quartile fixed effects, so $\beta_1$ 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%).

### 6.3 Interpretation of the Effects

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

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

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

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

Table 9: Impact on Capital Misallocation

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

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

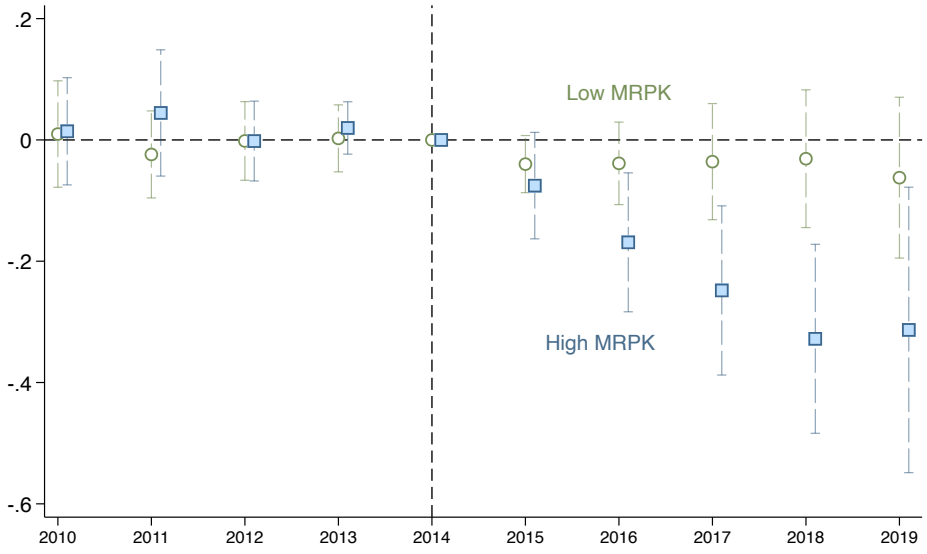
that misallocation increased, given that the estimated coefficient of $EXIM_i \times Post_{t\geq 2015} \times MRPK_i$ is negative. A threat to this interpretation would be a differential effect of the EXIM shutdown on the risk-adjusted cost of capital for firms with high vs. low wedges.

Two points are worth discussing. First, even if the shutdown affected the risk-adjusted cost of capital, our results imply that 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 affects the allocation of capital by allowing high MRPK firms to expand because it reduces their input wedges or their risks more.

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

To see why our results are unlikely to be explained by a risk-adjustment channel, consider the

Figure 7: EXIM's Shutdown Amplifies Capital Misallocation




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

following empirical results. In our firm-level regressions, we account for the possibility of differential risk exposure by including a large set of firm-level controls interacted with year fixed effects, and show in particular that the misallocation results remain unchanged within size quartile. In the aggregate product-level regressions, we include product-by-destination-by-year fixed-effects. In this case, we identify the effect of EXIM for exporters facing the same exporting risk, at the same point in time. Given that we find, if anything, larger point estimates in Table 2 after including those controls, $\beta_1$ 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 ($\tau$).

**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 $\tau_i$. However, it is also possible that firms might vary along their ability to change an output wedge $\mu_i$. 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 $\mu_i$ is the output wedge. Our results do not take a stance on whether EXIM's shutdown increased misallocation by leading firms with ex-ante high MRPK to contract their investment more because it increased the firm input price wedge $\tilde{\tau}$ or because firms increased their output markup $\mu$.

In addition, 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 $\tau$ between $\mu$ and $\tilde{\tau}$ is irrelevant. The increase in output from an improved allocation of inputs are the same whether this improvement comes from capital being allocated more to firms with a higher transformation rate into output (high MRPK), or because firms with higher output wedges invest more, or because firms with higher input wedges invest more.

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

## 6.4 Discussion of EXIM as Industrial Policy

We have shown that EXIM affects many firm outcomes, including investment and employment, and particularly for firms facing higher financing and trade frictions. We also find evidence that the EXIM shutdown increased rather than decreased capital misallocation within a set of firms that acount for a large share of economic activity. We now provide a discussion of EXIM's interaction with the broader economy. First, we discuss the potential costs of financing the bank through tax revenues, which may require raising distortive taxes elsewhere. Second, we use our framework to illustrate how EXIM could target broader industrial policy goals.

### 6.4.1 EXIM Profitability

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

We systematically collect the balance sheets and income statements from EXIM's annual reports, which allows us to reconstruct information on EXIM's profitability. 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.

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

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

the market price, and especially so if the firm is more constrained.

Second, relative to private banks, ECAs may have different marginal costs (Section 2.1.2). In EXIM's case, its marginal costs may be lower because as a US government agency, it has access to different contract enforcement technologies that raises its recovery rates. In addition, EXIM does not need to pay the high costs of regulatory compliance that govern private commercial banks' domestic and international operations. EXIM's lower marginal cost does *not* come from accessing the US government's cost of capital, as EXIM has historically paid interest to the Treasury on its balance sheet at a higher rate than the 30-year Treasury bond rate (Appendix D.2.4).

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

### 6.4.2 EXIM as a Tool for Other Industrial Policy Objectives

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

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

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

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

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

# 7 Conclusion

Can governments boost exports by providing targeted trade financing? The results in this paper, based on the natural experiment of the US EXIM's temporary shutdown, suggest that the answer is yes. When EXIM's sudden closure cut off financing to the exporters that it had previously supported, they experienced lower growth in revenues and cut back their capital and employment. These effects were particularly pronounced for financially constrained firms and for exports to riskier and less financially developed markets, supporting the view that EXIM financing alleviated credit constraints. Overall, US industries more dependent on EXIM saw lower export growth than those that were not.

Taken together, the effects of the EXIM lapse we document are not consistent with the view that EXIM is a pure transfer from taxpayers to unconstrained firms. In addition, while the EXIM-dependent firms shrank considerably, this effect was more (not less) pronounced for firms with higher marginal returns to capital before the shock, indicating that EXIM reduced domestic capital misallocation within this set of firms.

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

First, our analysis estimates the effect of EXIM within its operational environment. It does not speak to the optimal size of ECA support, nor does it imply that these programs would continue to have the positive effects that we find if they were to operate 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. However, other policy interventions targeting the same firms or an indiscriminate increase in ECA support would likely reduce the marginal impact of additional support, and thus could even increase the misallocation of capital.

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 EXIM's programs on the US economy, and more generally on the global economy. Understanding how our micro estimates aggregate to the macro level, and how countries interact in the market for export credit subsidies, represents a fruitful avenue for future work.

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

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March 2025

## Table of Contents

**A Additional Tables** **A.2**

**B Additional Figures** **A.9**

**C Additional Details on Data Construction** **A.12**

C.1 Matching between EXIM, Compustat, and Datamyne . . . . . A.12

C.2 Data cleaning . . . . . A.13

C.3 Variable Definitions . . . . . A.14

C.4 Additional datasets . . . . . A.15

**D Additional Institutional Detail on ECAs and EXIM** **A.15**

D.1 ECAs around the world . . . . . A.15

D.2 EXIM . . . . . A.23

D.3 EXIM and Country Risks . . . . . A.26

D.4 Theory: The Impact of ECA Financing on Firm Outcomes . . . . . A.27

D.5 Industry Misallocation and Industry Average Wedge . . . . . A.32

D.6 Industry Misallocation: Alternative Measures of Capital Cost Wedge . . . . . A.33

# A Additional Tables

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

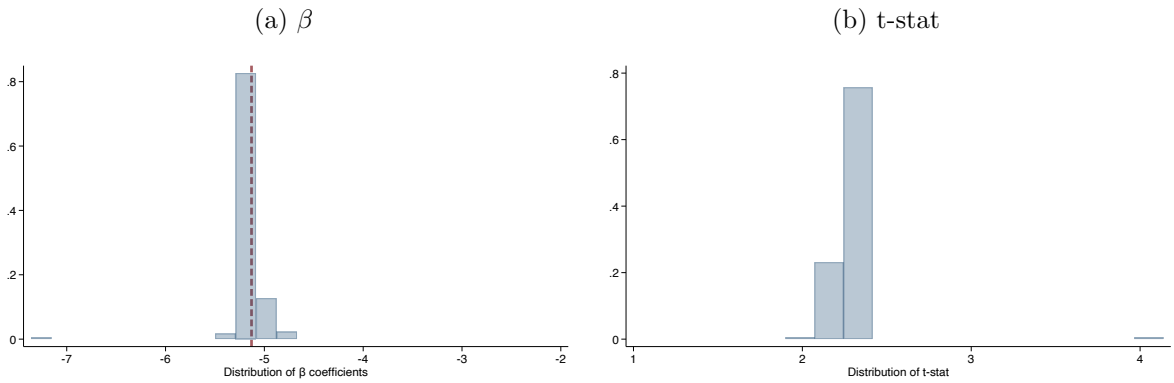
Table A.8: Impact on Employment, Capital, and Profit Rates: Robustness to LHS Winsorization

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

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

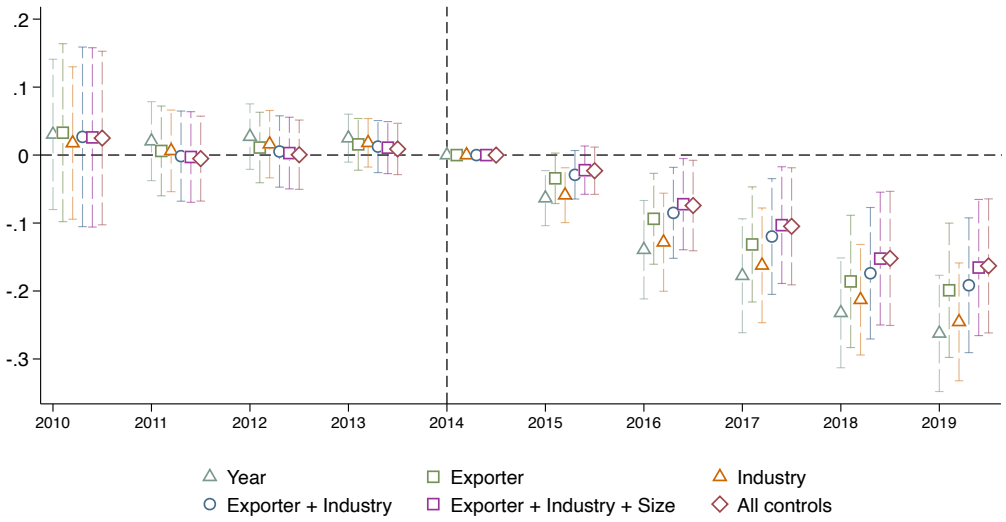
# B Additional Figures

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



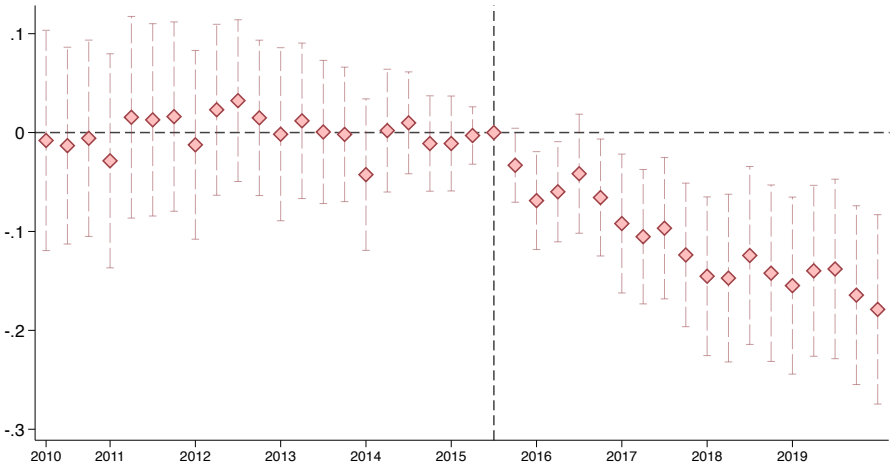

*Notes:* This figure reports the distribution of $\beta$ and t-stats for the average effect of EXIM's shutdown on aggregate export at the product-by-destination level taken from BACI, as estimated in Table 2, when we exclude products (HS-4) one-by-one. Panel (a) plots the $\hat{\beta}$ reported in Table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

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



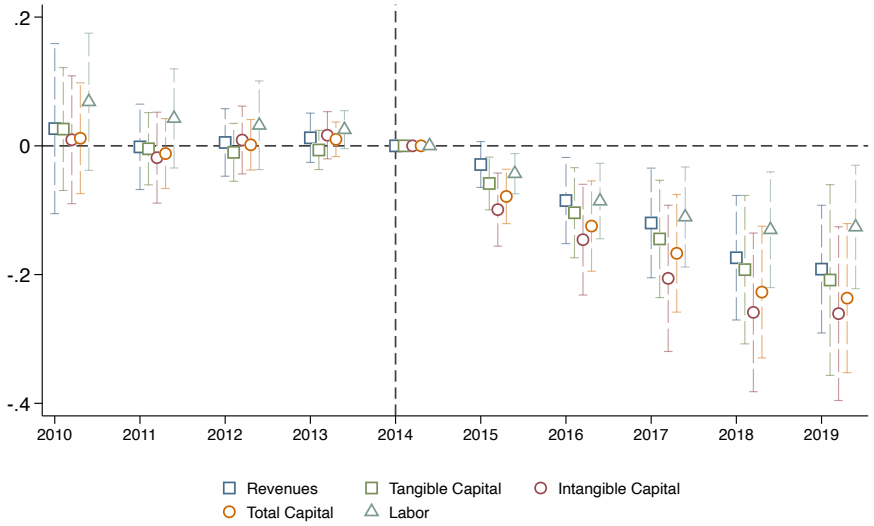

*Notes:* This figure shows the point estimates and 95% confidence intervals when estimating equation (5) and progressively including more stringent sets of fixed effects. The dependent variable is the growth rate relative to 2014 (the year prior to the shock) defined as $\Delta Y_{i,t} = (Y_{i,t} - Y_{i,2014})/Y_{i,2014}$.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

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



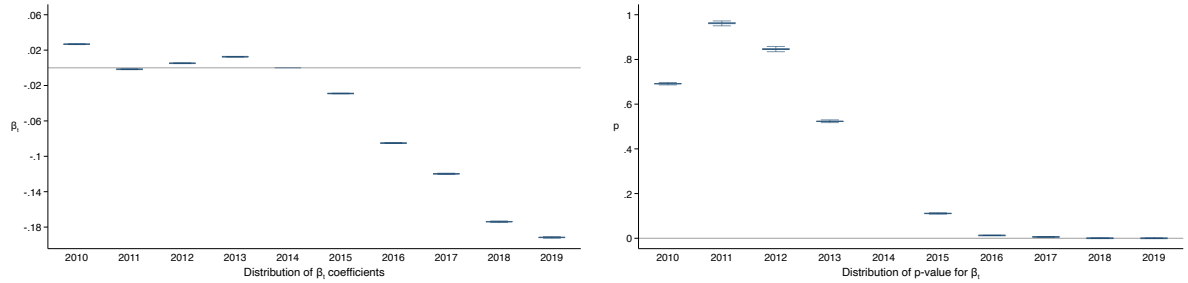

*Notes:* This figure plots the point estimate and 95% confidence intervals when estimating equation (5) with quarterly firm total revenues including industry-by-year and exporter-by-year fixed effects. The omitted time period is the second quarter of 2015, corresponding exactly to the quarter of EXIM's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

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



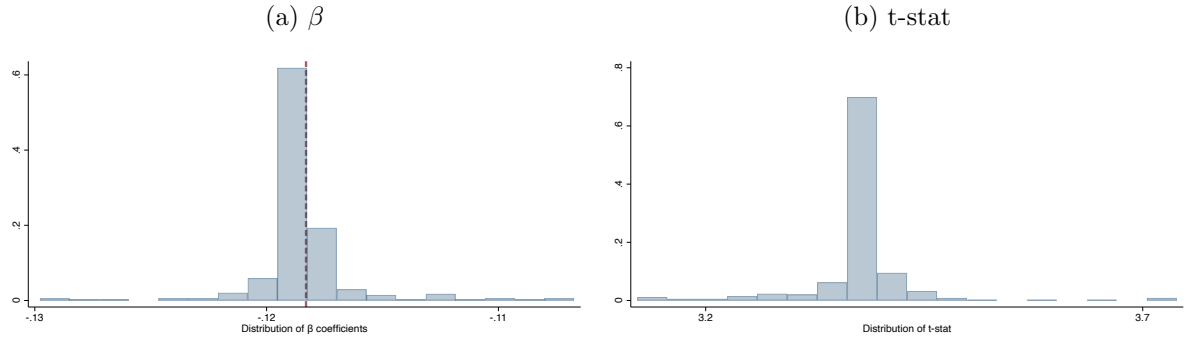

*Notes:* This figure plots the point estimate and 95% confidence intervals when estimating equation (5) for the following outcomes: total revenues, tangible capital (PP&E), intangible capital (Peters and Taylor, 2017), total capital (tangible + intangible), and employment. The dependent variable is the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

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




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

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




*Notes:* This figure reports the distribution of $\beta$ 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, Compustat, and Datamyne

**Algorithmic match.** All datasets are collapsed at the unique level of name (firm name), city and state. EXIM and Datamyne contain 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 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 is 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 is 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 is cases of holding or group companies that may refer to several firms. For example, "Magna Group" could refer to the Canadian car parts manufacturer or to Magna International, the Korean subsidiary of lubricant producer ITW PP & F headquartered in Shanghai, or several other chemical companies called Magna. In these cases, we also do not treat them as matches.

## C.2 Data cleaning

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

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

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

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

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

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

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

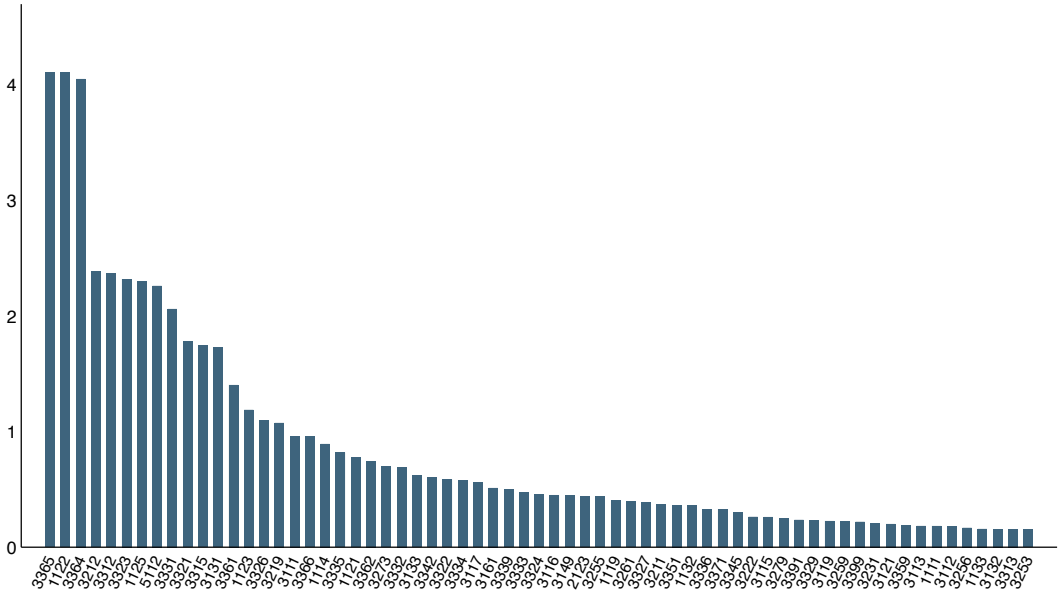
2. Remove the cells where the US never exports. We do this because our preferred specification when studying the effect of EXIM on aggregate export includes destination-by-product (HS6) interacted with year fixed effects ($\gamma_{p,d,t}$). As a result, this set of fixed effects restricts the identifying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

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

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

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

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




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

## C.3 Variable Definitions

| Variable | Definition |
|---|---|
| Exporter | Firm reports positive value of: foreign taxable income ($txfo$ and $pifo$), or maritime export in Datamyne, or EXIM financing, or appears in the Hoberg and Moon (2017) dataset |
| Asset | $at$ |
| Capital | $ppent$ |
| Employment | $emp$ |
| Total sales | $sale$ |
| ROA | $(oibdp - dp)/at$ |
| Leverage | $(dltt + dlc)/ppent_{t-1}$ |
| Lobbying | $sum_lobby_exp/sale$ |
| Financing friction in 10K | $delaycon$ in Hoberg-Maskimovic dataset |
| Profit margin | $(ib + dp)/sale$ |
| MRPK | $sale/ppent$ |
| Dividend intensity | $dvc/ebitda_{t-1}$ |
| Coverage ratio (industry) | Median at SIC-4 of $dlc/ebitda$ |

### C.4 Additional datasets

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

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

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

## D Additional Institutional Detail on ECAs and EXIM

### D.1 ECAs around the world

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

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

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

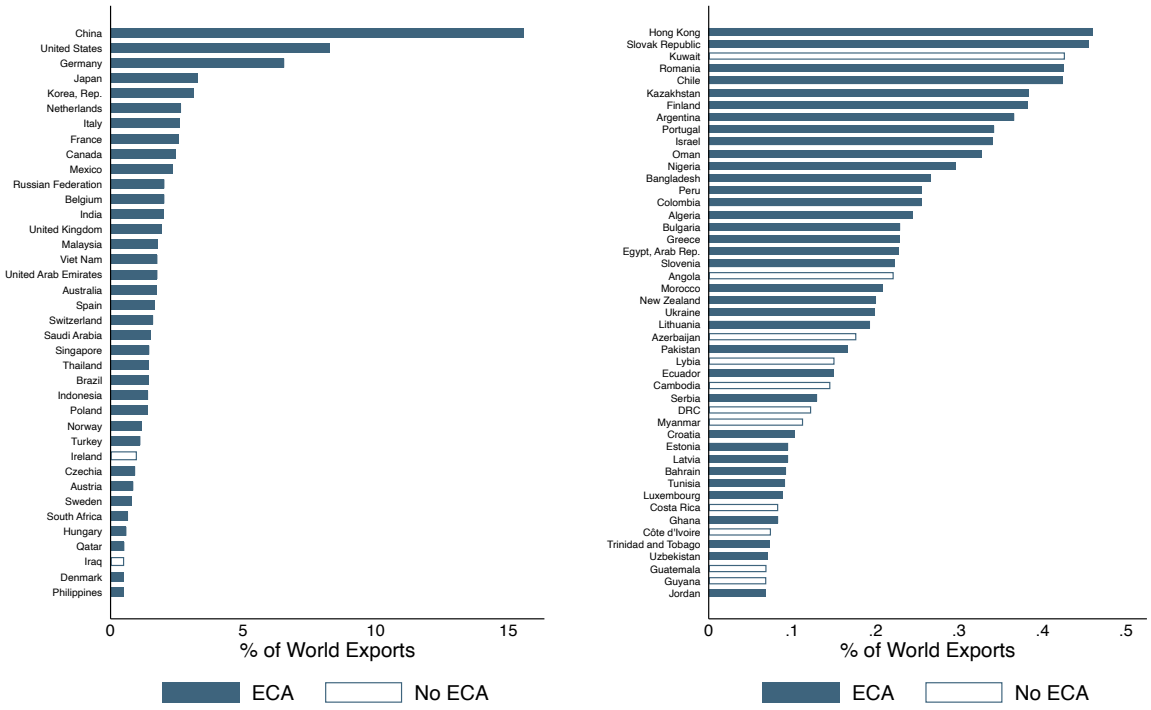
[1] OECD: https://www.oecd.org/trade/topics/export-credits/documents/links-of-official-export-credit-agencies.pdf. EXIM's competitiveness reports: https://www.exim.gov/news/reports/competitiveness-reports.

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

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

Figure D.1: Export Credit Agencies Around the World

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




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

Table D.1: Export Credit Agencies by Country

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

*Continued on next page*

Table D.1 – *Continued from previous page*

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

*Continued on next page*

Table D.1 – *Continued from previous page*

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

*Continued on next page*

Table D.1 – *Continued from previous page*

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

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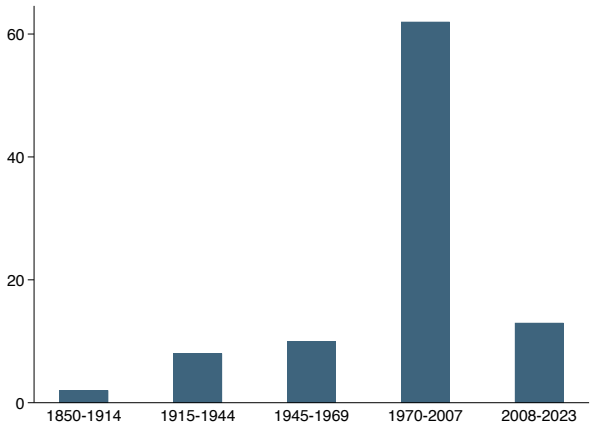
Table D.1 – *Continued from previous page*

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

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

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

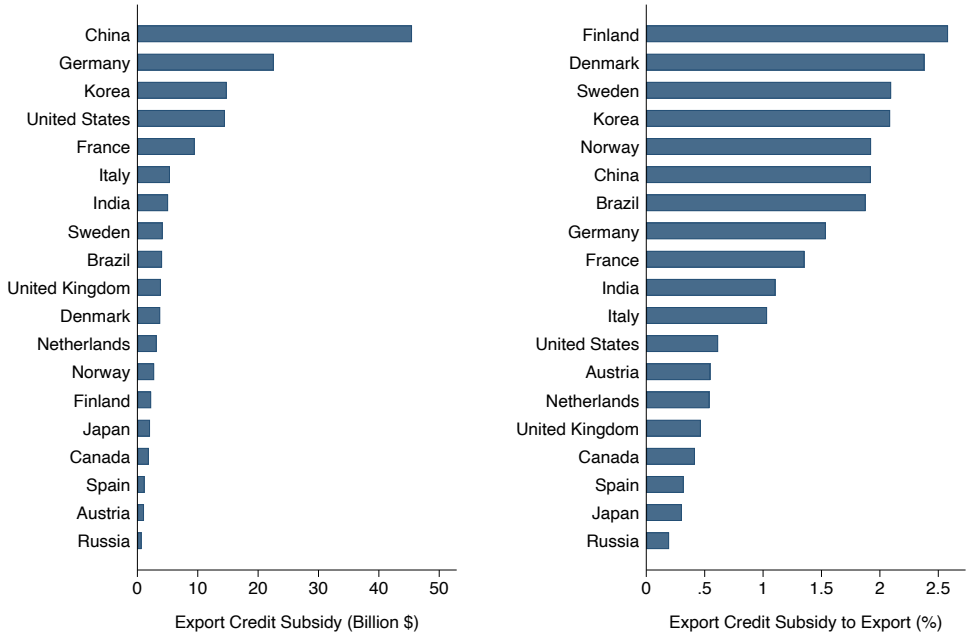
Figure D.2: Export Credit Agencies: Number Founded by Time Period




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

Figure D.3: Export Credit Agency Support by Country

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




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

### D.1.1 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, Turkey, 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.1.2 ECA tools

ECA tools 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. 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, 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. One of the main products that EXIM offers is 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, 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.

### 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

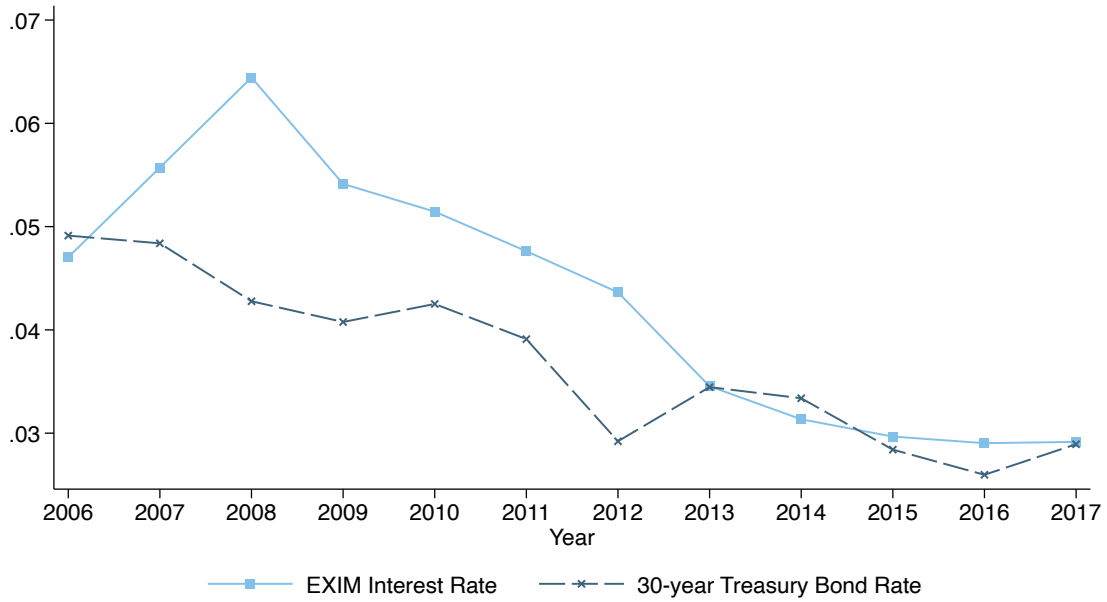
We collect all of the Annual Reports published by EXIM from 2006 to 2023 where we focus on the bank's "Balance sheet" and its "Statement of net costs" in each publication.

**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.

[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 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%).

Figure D.4: EXIM's Annual Interest Expense




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

## D.3 EXIM and Country Risks

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

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

### D.3.1 Data and estimation

**Perception of country risk.** Our main independent variable, country risk, comes from Hassan, Schreger, Schwedeler and Tahoun (2023), where it is defined as aggregated risk associated with a given country perceived by publicly traded firms around the world that hold earnings calls in the

English language. We also distinguish between four measures of country risk based on the subset of firms it is assessed on: any, financial, domestic, and foreign.

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

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

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

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

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

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

This subsection develops a framework that generates predictions for how firm investment 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 from exporting by choosing their capital investment, which they finance with private market and/or ECA debt.

The main intuition from the model is that even if ECAs supply trade 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." If by contrast firms are constrained, they will use ECAs' financing to expand operations up to the point where they become unconstrained.

### D.4.1 Setup

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

Table D.2: EXIM Support and Country Risk

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

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

**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 exporting 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.[3]

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 trade financing $D$ in order to invest in $K$ to generate foreign sales. 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:

[3]Here, we simplify notation and define $f(.)$ as the *revenue* production function, which was given by $p_i \times q_i(K_i)$ in equation (8) of Section 6. 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.

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

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

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

At this lower level of capital, constrained firms have a higher marginal revenue product than their market rate $r_{i,m}$: $f'_{i,m}(K^\tau) > r_{i,m}$ and therefore behave as if they face a higher cost of capital than unconstrained firms. This difference in behavior implies that there exists a positive $\tau_{i,m}$ such that $f'(K^\tau_{i,m}) = (1 + \tau_{i,m})r_{i,m}$. $\tau_{i,m}$ acts as a wedge on the market price of capital.[4]

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 a destination-market specific friction. Note that the wedges that generate quantity constraints endogeneously arise out of banks' expected profit maximization. As such, even though firms find it profitable to borrow at $r_{i,m}$, banks do not find it profitable to lend at that rate.

### D.4.2 Theoretical Predictions for the Role of ECAs

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

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

With ECA financing, the firm profit maximization problem becomes:

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

[4] $\tau$ 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).

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. The impact of ECA financing is *purely inframarginal*.

We illustrate this case in Figure D.5a and Figure D.5b. The firm's profits without ECA financing are in light blue in Figure D.5a while the additional firm profits after receiving ECA financing are in dark blue in Figure D.5b.

Unconstrained firms will only use ECA financing if $r_{i,m}^{ECA} < r_{i,m}$. In Figure D.5b the optimal behavior of unconstrained firms is to first borrow from the ECA at a price $r_{i,m}^{ECA}$ to the fullest extent possible, which we denote $D_{i,m}^{ECA}$. The firm invests in $K_{i,m}^{ECA} = D_{i,m}^{ECA}$ levels of capital. At that size, the marginal return to capital is $f'(K_{i,m}^{ECA}) > r_{i,m}$, implying that it is optimal for the firm to expand until returns are equalized at $K_{i,m}^{*}$. The firm therefore raises the remaining capital $(K_{i,m}^{*} - K_{i,m}^{ECA})$ from the market.

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

**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.

Figure D.5c shows a constrained firm's choices of capital and its profits. Figure D.5d shows the impact of accessing ECA financing when $r_{i,m}^{ECA} \leq r_{i,m}$. We draw the figure such that firms remain constrained: $D_{i,m}^{ECA} + D_{i,m}^{\tau} < D_{i,m}^{*}$. We also provide an extension in which we relax this condition.

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

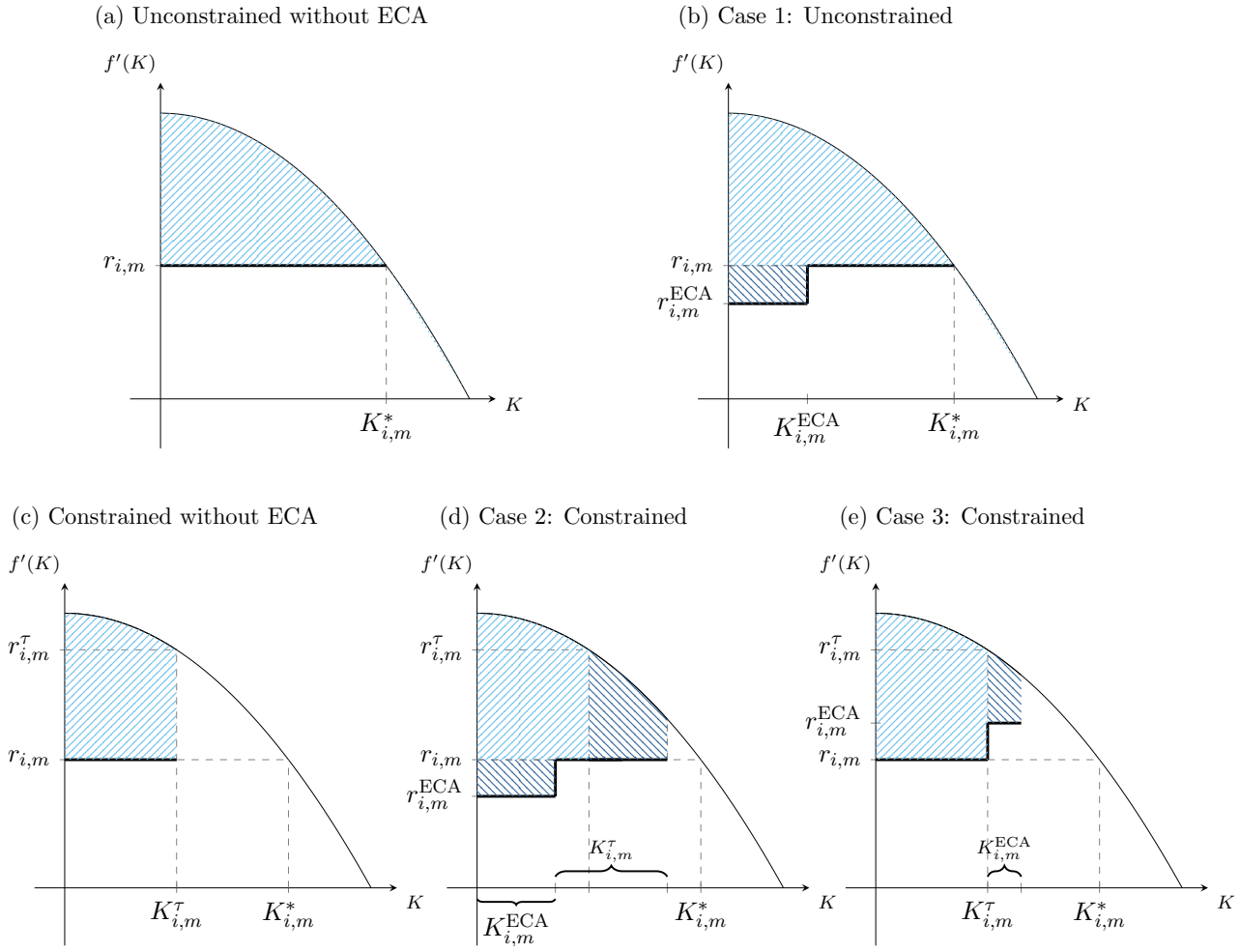
Firm profits increase, but the change in firm profit rate (total profits divided by capital) is ambiguous and depends on the value of the subsidized financing $(K^{ECA} \times (r_{i,m} - r_{i,m}^{ECA}))$ relative to the decreasing returns to scale in the firm's production function.

**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.

Figure D.5e illustrates this case when $r_{i,m}^{ECA} < r_{i,m}^{\tau}$. Recall that constrained firms will use ECA financing as long as it is offered at a price below the firm's shadow price of capital so ECA financing does not need to be provided at below market rates. Despite ECA financing being offered at a *higher* price, firms still find it optimal to use ECA financing because it is below their shadow price of capital.

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

Figure D.5: Unconstrained and Constrained Firm Optimization



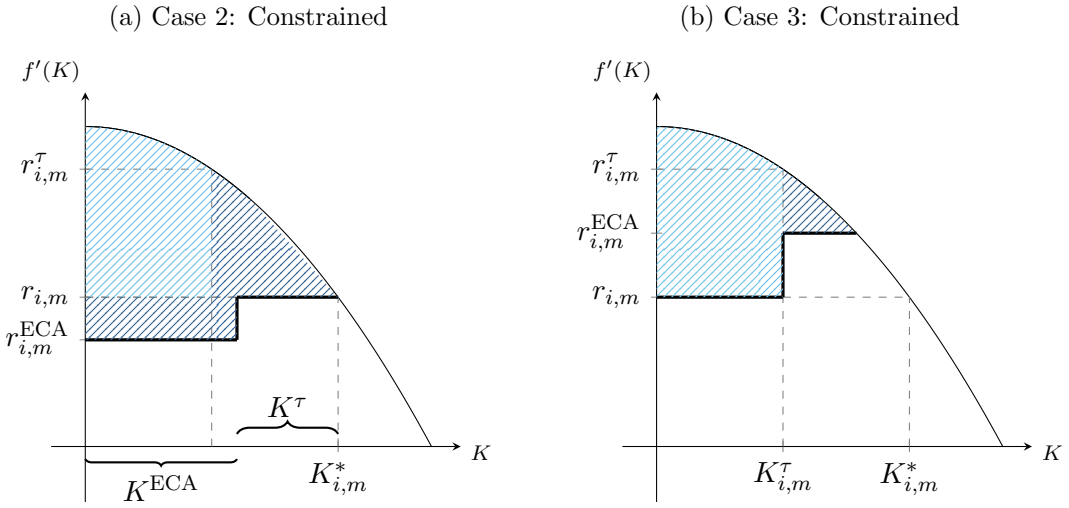

*Notes:* This figure plots the firm's marginal revenue production function. The bold black line traces out the capital that the firm invests and the rate at which it invests. The light blue shading is the firm's original profits without ECA financing. The dark blue shading is the additional new profits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

**Case 4: Extension to becoming unconstrained.** Figure D.6 illustrates the effect of access to ECA financing when firms that are initially constrained become unconstrained. We assume that firms cannot access as much ECA financing as before, but 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 $K^{\tau}_{i,m} + K^{ECA}_{i,m} = K^{*}_{i,m}$.

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.

Figure D.6: 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.

## D.5 Industry Misallocation and Industry Average Wedge

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

The overall amount of capital invested in the industry depends on the average value of wedges among firms that belong to the industry, which we denote $\overline{\tau_J} = \mathbb{E}_J[\tau_{i \in J}]$. Around this average, firms can be heterogeneous in the value of their $\tau_i$, as represented in Figure D.7a.

As discussed in section 4, a way to model how EXIM financing affects firms' real outcomes is by reducing the *average* $\tau$ for firms in a given industry, as depicted in Figure D.7b.

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

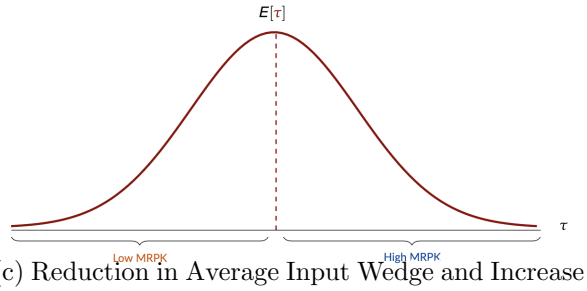
- A change in misallocation but no change on average investment: This would happen if the change in the spread of $\tau_i$ preserves the mean value $\mathbb{E}[\tau_i]$. In this case, misallocation can increase (high MRPK firms shrink, while low MRPK expand), or decrease (high MRPK expand and low MRPK 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 $\tau_i$ is preserved. This occurs if the entire distribution shifts to the left.

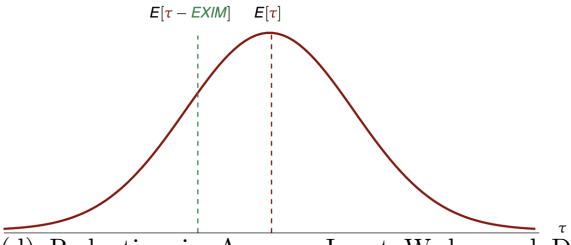
- An increase in misallocation **and** a change in average investment: This case corresponds to Figure D.7c in which the change in the average wedge in the industry is driven by a larger expansion of the low MRPK firms (Figure D.7c), which implies that misallocation increases.

Figure D.7: Effect of EXIM on Average Investment and Misallocation

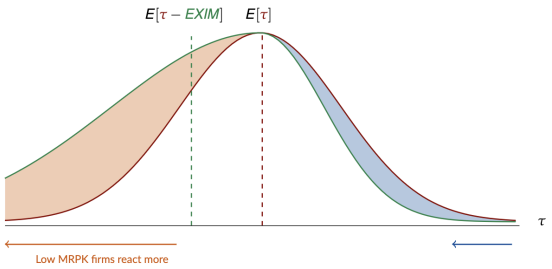
(a) Distribution of input wedge for firms $i$ around the average in industry J



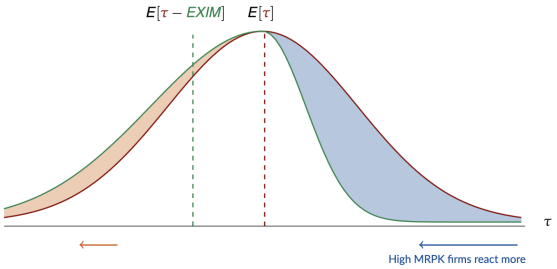

(b) Effect of EXIM's Trade Financing on Average Input Wedge




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




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




- A decrease in misallocation **and** a change in average investment: This case corresponds to Figure D.7d in which the change in the average wedge in the industry is driven by a larger expansion of the high MRPK firms (Figure D.7d), which implies that misallocation decreases.

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

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

This section discusses alternative ways of measuring the dispersion in firm capital input cost wedge and reports the results in Table D.3. In columns 1–2, we directly estimate firms' production function using the control approach of Olley and Pakes (1996), and compute firm MRPK. In columns 3–4, we follow Baqaee and Farhi (2019*a*) and adopt the user cost approach that is also used in Gutierrez and Philippon (2016), as well as Foster, Haltiwanger and Syverson (2008). This technique computes the user-cost of capital following Hall and Jorgenson (1967), where the rental price incorporates the risk-free rate, industry-specific depreciation, and industry-level risk premia. The Appendix of Baqaee and Farhi (2019*a*) provides a detailed explanation of the computation. In columns 5–6, we extend our analysis to examine the dispersion in TFPR, estimated using the technique of Olley and Pakes (1996). Following Hsieh and Klenow (2009), this dispersion reflects the dispersion in cost wedges for all inputs that the firm uses.

When firms have a more general CES production function (where Cobb-Douglas represents the special case when the elasticity of substitution across inputs equals one), it is no longer possible

to estimate the capital input cost wedge specifically. However, one can still estimate the capital cost wedge relative to other inputs used by the firm, as highlighted in Whited and Zhao (2021). To formalize this intuition, assume that firms have a standard CES production function where a firm $i$ in section $s$ generates total revenue $Y$ by using capital and labor:

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

where $\alpha_s$ is the relative weight of capital in production, $\gamma$ is the elasticity of substitution between capital and labor, and $A_{si}$ is the firm's technological efficiency parameter. In the non-distorted economy, firms pay their capital $r$ and labor $w$, but as is standard in the misallocation literature, each input can have an extra wedge. The firm's nominal profit $\pi_{si}$ is given by:

$$\pi_{si} = Y_{si} - \left[(1+\tau^K si)rKsi + (1+\tau^L si)wLsi\right], \tag{D.5}$$

where $\tau_{si}^X$ represents the additional wedge on input $X$ (either capital or labor) that determines the marginal return required for investing in that input.

The firm's profit maximization problem can be solved in two steps. First, the firm minimizes its cost by choosing $K$ and $L$ subject to achieving a fixed output level $\bar{Y_{si}}$ in equation (D.4). This optimization yields the following solution for the optimal ratio of capital to labor:

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

As long as $\alpha_s$ and $\gamma$ do not vary within firms in a sector or sector-by-size bin, firms in the same cell should have similar input ratios, and dispersion within a cell will reflect differences in the value of the ratio of input cost wedges. Thus, while we can no longer measure the capital cost wedge directly (which is possible under Cobb-Douglas production), we can still measure it relative to the value of the wedge on the other input. In this framework, the labor to capital ratio reveals the relative capital cost wedge.

We implement this approach empirically in columns 7–10. We use two alternative measures to capture the relative input wedges: the ratio of COGS (Cost of Goods Sold) over capital (columns 7–8) and the ratio of labor over capital (columns 9–10). COGS provides an alternative measure of variable input costs that may be less subject to measurement error than reported labor costs in some contexts.

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

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

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

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