Industrial Policy and Capital Misallocation in Exporting*

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Abstract

Trade financing through Export Credit Agencies is a key tool of modern industrial policy. We provide a theory to evaluate its welfare effects and study its causal impact on trade, firm investment, and capital misallocation by using the effective shutdown of the Export-Import Bank of the United States (EXIM) from 2015–2019 as a natural experiment. First, we show that EXIM has large causal effects: comparing industries exposed and un-exposed to the shutdown, we find that exposed industries experience a product-level export reduction of approximately $4.49 for each $1 lost in EXIM financing. EXIM-dependent firms also experience substantial contractions in revenues, investment, and employment. Second, shutting down EXIM increases capital misallocation because firms with high marginal revenue product of capital (MRPK) disproportionately contract while low-MRPK firms are largely unaffected. Countervailing forces, namely terms-of-trade adjustments and freeing capital for domestic producers, do not appear to offset these welfare losses empirically. Our results indicate that even in advanced economies with developed financial markets, industrial policy that lowers financing constraints for exporters can raise output, improve capital allocation, and generate welfare gains.

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1 Introduction

A central challenge in the design of industrial policy is identifying market failures that are both quantitatively important and empirically targetable. Much of the traditional case rests on positive externalities such as external economies of scale, whose magnitude and sources are often difficult to measure. In this paper, we study a distinct rationale for government intervention that applies even absent externalities: financing constraints that lower output and create capital misallocation. These constraints are particularly acute in international trade as firms finance production and shipment while bearing substantially higher contract-enforcement, political, and payment-risk exposure than in domestic sales. The severity of these frictions has motivated governments around the world to provide financing through Export Credit Agencies (henceforth "ECAs").

ECAs are government-backed banks that provide trade financing, broadly defined, to boost exports. They are among the most prominent tools of industrial policy, built on the rationale that by financing firms' exporting activity, they can ease constraints in the private market and stimulate the domestic economy. ECAs are widespread, operating in over one hundred countries that together generate more than 92% of global trade (Matray, Mueller, Xu and Shen, 2026), and they are especially prevalent among advanced economies with well-developed financial markets (Juhász, Lane, Oehlsen and Pérez, 2022).

Despite their widespread use, the causal effects of government financing on a country's exports, firm behavior, and capital allocation remain poorly understood and the subject of a heated policy debate. Viewed favorably, ECAs are a form of "good" industrial policy: by relaxing the financing frictions that keep productive exporters below their efficient scale, they raise exports and improve capital allocation. These same tools, however, are a natural candidate for "bad" industrial policy because a government lender is exposed to lobbying and capture by politically connected firms.

A more critical view thus holds that ECAs primarily provide inframarginal financing to firms that would have secured funding from the private sector anyway, resulting in a pure "profit windfall" for the beneficiaries. An additional concern, even setting aside inframarginal investment, is that lowering recipients' cost of capital may direct resources toward firms with lower marginal returns rather than those facing the tightest financing constraints, thereby distorting the allocation of capital and ultimately lowering aggregate productivity.

In this paper, we address the debate on the role of financing-based industrial policy in the exporting sector by developing a theoretical framework to evaluate the conditions under which ECAs are welfare enhancing. Our model features heterogeneous firms that finance upfront working capital for exporting but face a borrowing (collateral) constraint, which results in capital misallocation and lowers aggregate exports relative to a frictionless benchmark. ECA support raises firms' effective financing capacity. We show that this policy only impacts output if firms are financially constrained; otherwise, it is inframarginal. Conditional on having an effect, high marginal revenue product of capital (henceforth "MRPK") firms endogenously respond more than low-MRPK firms. As long as

the policy dose is identical across exporters and independent of firm characteristics, or at least is not so tilted toward low-MRPK firms that it offsets the larger response by high-MRPK firms, the policy lowers capital misallocation.

The model allows us to specify a clear criterion for evaluating the success (or failure) of ECA financing based on elasticities that we can map to our empirical estimates. The policy has positive aggregate effects if the two gains (increased revenues from exports and better allocation of capital) exceed the net resource cost of the policy and two countervailing general equilibrium forces (a deterioration in the terms of trade and potential crowding out of capital from domestic production).

We then use this framework to evaluate the causal impact of a specific ECA, the US EXIM Bank. EXIM provides a particularly clear illustration of the economic rationale for ECAs as its official mandate states that it seeks to promote jobs and investment in the US "by facilitating the export of US goods and services [...] *when private sector lenders are unable or unwilling to provide financing*" (emphasis added). Its temporary shutdown from 2015 to 2019 provides a natural experiment for identifying each elasticity in our framework and estimating its overall effect on welfare.

Our empirical analysis draws on a comprehensive administrative dataset that records all of EXIM's financing tools (e.g., direct loans, loan guarantees, and insurance of foreign receivables), which allows us to precisely measure firm- and product-level exposure to EXIM support. During the shutdown, the total value of EXIM's support for exporting activities across all its programs collapsed by 84% relative to prior years. Because firms and industries differ in their reliance on EXIM, we can compare the evolution of their outcomes before and after the shutdown to identify the average and allocational impact of this large and exogenous shock to ECA-backed trade financing.

In the first part of our empirical analysis, we assess whether EXIM achieves its primary policy objective of increasing US exports. Aggregate product-level bilateral customs data allow us to estimate the effect net of market share reallocation among US exporters. Comparing exposed to non-exposed industries, we find large causal effects: a $1 reduction in EXIM support reduces U.S. export sales in a product by approximately $4.49, a magnitude consistent with the financing-intensive nature of cross-border trade.

At the firm-level, we find that EXIM-dependent firms experience a 12% decline in total revenues, a 14% contraction in capital investment, and a 10% reduction in employment relative to non-dependent exporters. The average effects for firms are not driven by the largest recipients of EXIM support nor those with strong ties to the government: the results are unchanged if we exclude all of the top recipients of EXIM financing, control for firms' lobbying, exclude industries that rely on government contracts, or exclude individual industries one-by-one.

Firms affected by the shutdown are unable to offset export losses through domestic sales. Given the magnitude of the shutdown's impact on exports and firm sales, we calculate a positive pass-through from export losses to domestic sales of 2.3–6.0%. This positive pass-through is consistent with models of within-firm scope and scale (e.g., Ding, 2024), which would arise from financing frictions and internal capital markets (e.g., Lamont, 1997; Stein, 1997).

Second, we find that EXIM's shutdown increases capital misallocation. In a first step, we follow the framework of Bau and Matray (2023), which links changes in misallocation to within-firm changes in investment across firms with ex-ante high and low MRPK, and we show that EXIM financing particularly affects investment by high MRPK firms. In contrast, low MRPK firms exhibit minimal to no changes in investment behavior. Our effects are robust to measuring MRPK using a variety of methods, including those in Hsieh and Klenow (2009) and Baqaee and Farhi (2020), and adjusting for differences across firms' size and risk. In a second step, we show that EXIM's policy was uniformly applied, or if anything, positively tilted towards high-MRPK firms, such that the program's implementation did not undo the larger response of high-MRPK firms.

The heterogeneous responses of high- and low-MRPK firms also speak to two important dimensions of the debate about the effectiveness of ECAs. First, the limited investment response among low-MRPK firms indicates that ECA support does not mechanically translate into higher growth, and in fact lends credence to concerns that such financing would be inframarginal when firms are not financially constrained. Second, because the effect of EXIM's shutdown is concentrated among high MRPK firms, our findings indicate that ECA support can help to overcome genuine barriers to the efficient allocation of capital. Consistent with this latter interpretation, we show that the effects are largest for firms and destination countries exhibiting particularly binding financing constraints and contractual frictions.

Throughout the paper, our identification strategy uses variation in exposure to EXIM across countries, products, and firms. In our aggregate analysis at the exporting country-by-product-by-destination level, we use variation within products across exporters, which allows us to control for changes in demand specific to a destination-product pair, as well as changes in supply specific to an exporting country that might correlate with EXIM exposure. Critically, we do not need to assume that exports of all products would have evolved similarly absent the shutdown, nor do we require random allocation of EXIM financing. Our identifying assumption is simply that there were no US-specific product-level shocks correlated with EXIM exposure occurring precisely when the shutdown began. We complement these results with a firm-level analysis that directly absorbs US-specific industry and product shocks and relaxes the identifying assumption required at the industry level, and we find similar effect sizes for the EXIM shutdown.

Additional evidence supports a causal interpretation of our results. First, the shutdown was arguably not driven by economic considerations, but rather by the Tea Party's political strategy of systematically blocking President Obama's nominations in Congress. Second, we observe no differential pre-existing trends, and the reduction in the exports of affected products starts precisely after the shutdown in mid-2015, persisting all the way through 2019. As such, any concurrent shock would have had to occur exactly at the time of EXIM's shutdown. Third, the distribution of our point estimates is tightly concentrated around the baseline estimates when we exclude individual industries or destinations one by one, implying that our effects are not due to specific supply or demand shocks including those potentially impacted by the 2018 "trade war" with China.

Our findings on capital misallocation use heterogeneity in firms' investment responses across MRPK and financial constraints. We use variation across firms within progressively narrower groups when defining the high-vs-low MRPK comparison: within four-digit industries, within industry-by-size and industry-by-risk quartiles, and within industry-by-size-by-destination cells. Each successive binning allows us to absorb more shocks correlated with cross-firm heterogeneity in capital shares, risk-adjusted returns, and destination-specific trade costs, such that declines in investment among financially constrained firms, or demand shocks from risky countries during the shutdown, cannot by themselves explain our results. More generally, because we focus on changes within firms, any confounding shock would need not only to coincide with EXIM exposure, but also to correlate differentially along these firm and destination dimensions at the exact time of the shutdown.

In the final part of the paper, we evaluate whether forces beyond these partial equilibrium estimates attenuate the aggregate welfare gains. The model identifies three margins: terms-of-trade movements, crowding out in domestic capital markets, and the net resource cost of the program. We use reduced-form regressions to assess the first two and EXIM's balance sheets to provide separate evidence on the federal budget and on the likely magnitude of operating costs and credit losses. Export unit values do not respond significantly to EXIM exposure, consistent with recent estimates of small US terms-of-trade elasticities.[1] Non-EXIM firms in industries and states most exposed to EXIM-backed firms show no detectable change in revenue, indicating no measurable crowding out of domestic production, consistent with a relaxation of financing constraints in which EXIM unlocks capital, and consistent with its small size overall (1.8% of US exports). EXIM also imposed no net cost on the federal budget: between FY2009 and FY2015, the Bank transferred $3.1 billion to the Treasury in surplus receipts (recorded in federal budget accounts as "negative subsidy receipts") (Section 7.1.3). The standard potentially offsetting general equilibrium effects are therefore not empirically significant in this setting, so the reduced-form estimates we report plausibly approximate the welfare-relevant aggregate magnitudes.

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 extend such financing during EXIM's shutdown. We argue that such funding gaps are endogenous to the market structure of private trade financing emerging from fundamental frictions such as limited enforcement and pledgeability. These frictions are considerable in cross-border trade finance, and would lead profit-maximizing private banks to optimally constrain quantities to satisfy incentive compatibility constraints. As a result, credit rationing by private banks represents the privately optimal equilibrium response, which simply become more apparent during EXIM's shutdown.[2]

[1] See e.g., Amiti, Redding and Weinstein (2019), Fajgelbaum, Goldberg, Kennedy and Khandelwal (2020), Cavallo, Gopinath, Neiman and Tang (2021), and Jiao, Liu, Tian and Wang (2024).

[2] A separate, distinct source of funding gaps is that the specialized nature of international trade creates conditions in which banks may exercise market power and find it privately optimal to charge high markups and thereby ration credit through prices: Rysman, Townsend and Walsh (2022) and Cavalcanti, Kaboski, Martins and Santos (2023) show that even in competitive banking environments, pre-emptive behavior allows banks to exert market power to maximize profits. This behavior also results in capital misallocation, and does not change the qualitative predictions

In contrast, by extending credit beyond the privately enforceable limit through public liquidity provision, guarantees, or instruments that directly ease collateral requirements, a public institution such as an ECA eases these financing constraints. Doing so does not require superior information about idiosyncratic risk, "picking winners," or subsidies to the risk-adjusted cost of capital (e.g., Holmström and Tirole, 1998; Itskhoki and Moll, 2019), and can instead be implemented even by a policy that is orthogonal to exporters' characteristics. In addition, because trade financing can target specific markets (i.e., products and destination), it can be applied selectively and thus potentially minimize introducing other costly distortions.

The financing-wedge channel at the heart of our analysis is distinct from the standard externality justifications for industrial policy such as external returns to scale, and thus provides a different rationale for industrial policy. Our model nonetheless clarifies that ECAs can also target such social wedges in the economy while continuing to meet their own output objectives when those wedges correlate positively with financing frictions.

Related literature. Our work contributes to a growing literature that provides new empirical evidence and theory on how industrial policy affects firms and economic development (e.g., Juhász, 2018; Itskhoki and Moll, 2019; Kim, Lee and Shin, 2021; Lane, 2023; Choi and Levchenko, 2025; Garin and Rothbaum, 2025). Existing work studying the real effects of ECAs has focused on firm-level effects and often relies on correlations between exports and ECA credit, including studies of Germany (Felbermayr and Yalcin, 2013), Austria (Badinger and Url, 2013), and Korea (Hur and Yoon, 2022). In contrast, 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.[3]

Beyond identifying a causal effect, our framework clarifies when export financing has positive impact and when it does not. This distinction reconciles our results with evidence from settings where export credit was absorbed by well-connected firms that likely did not face binding constraints, and therefore did not expand exports (e.g., Zia, 2008, in Pakistan). Whether financing-based industrial policy is effective thus relies on its incidence relative to firms' financing constraints, an object that can be inferred in many empirical settings.

More broadly, a substantial literature shows theoretically how financing frictions lead to capital misallocation (e.g., Buera, Kaboski and Shin, 2011; Midrigan and Xu, 2014; Moll, 2014; Kehrig and Vincent, 2026), and empirically how government interventions can mitigate or amplify it (e.g., Bau and Matray, 2023; Carrillo, Donaldson, Pomeranz and Singhal, 2023; Quincy and Xu, 2025). Our results highlight a role for ECAs as policy tools that lower misallocation by reducing trade-specific financing frictions.

of our framework.

[3] Kurban (2022) studies the aggregate effect of the US EXIM shutdown focusing on US industries, and Benmelech and Monteiro (2024) studies the specific case of Boeing. Our empirical results are quantitatively identical when we remove Boeing from the analysis.

While much of the work on trade policy has focused on tariffs, we contribute to the broader literature examining how institutions and market structure in international trade affect firm behavior (e.g., Bernard, Redding and Schott, 2011), particularly in the presence of policy uncertainty (e.g., Ramondo, Rappoport and Ruhl, 2013; Pierce and Schott, 2016) and domestic frictions (Ramondo, Rodríguez-Clare and Saborío-Rodríguez, 2016). This includes work that specifically studies the connection between trade and misallocation (e.g., Khandelwal, Schott and Wei, 2013; Edmond, Midrigan and Xu, 2015; Finlay, 2021; Bai, Jin and Lu, 2024). Our analysis shows that public institutions that alleviate financing frictions, such as ECAs, can also have first-order effects on economic activity in the tradable sector.

Finally, we contribute to the empirical literature on finance and trade. Existing work has primarily focused on how changes in the provision of private credit affect firms' export activity (e.g., Amiti and Weinstein, 2011; Manova, 2013; Paravisini, Rappoport, Schnabl and Wolfenzon, 2014; Muûls, 2015; Demir, Michalski and Ors, 2017; Xu, 2022; Beaumont and Lenoir, 2023; Bruno and Shin, 2023), and how banking networks can affect trade patterns (Niepmann and Schmidt-Eisenlohr, 2017*a*,*b*; Xu and Yang, 2024). Models of how financing frictions and financial development can affect international trade include Caggese and Cuñat (2013), Manova (2013), Chaney (2016), Kohn, Leibovici and Szkup (2016), and Leibovici (2021). We extend this literature in two ways. First, we identify the effect of a shock to credit supply specific to exports separately from a broader effect of changes in financing conditions that would affect firm production in general, and thus indirectly also 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.

2 Institutional Context

2.1 Financing Needs of Trade

Export transactions involve distant counterparties operating in different legal jurisdictions, which creates two distinct challenges for exporters in accessing financing. First, firms must finance extended working capital needs arising from the longer delay, relative to domestic transactions, between paying for inputs and receiving payment from buyers. Second, exporters face heightened counterparty risk across different legal jurisdictions.[4]

Financial institutions play a critical role by providing not only capital but also risk mitigation through specialized financial instruments such as export credit insurance, factoring, and receivables financing. These instruments transform invoiced exports into secured assets and protect against international trade risks, effectively raising the collateralizable share of a firm's wealth (e.g., Demir and Javorcik, 2018; Crozet, Demir and Javorcik, 2022).

[4]Counterparty risk is inherent regardless of payment terms: buyers risk non-delivery after prepayment, and sellers risk non-payment after shipping. Schmidt-Eisenlohr (2013) and Antràs and Foley (2015) provide theoretical frameworks for these contractual frictions and their implications for trade financing.

Frictional markets. With complete and frictionless financial markets, exporters can finance and insure all profitable opportunities and invest optimally based on their productivity. By contrast, financially constrained exporters must operate at suboptimal scale because they cannot fully cover working capital requirements or adequately insure against international cash flow risks (Rampini and Viswanathan, 2010).

Three frictions are particularly relevant for financing and insuring international trade. First, *firm-specific frictions* stem from asymmetric information between lenders and borrowers (e.g., Stiglitz and Weiss, 1981) and incomplete contracts that restrict firms' ability to credibly pledge future cash flows (e.g., Banerjee and Newman, 1993). These informational and contractual limitations lead banks to ration credit as a profit-maximizing strategy to maintain incentive compatibility. This rationing creates significant financing constraints, particularly affecting firms with limited collateral or credit history.

Second, *destination-specific frictions* characterize cross-border transactions because of exacerbated information asymmetries and contractual uncertainties with foreign counterparties, especially where institutions are weak or legal frameworks unfamiliar. Financial institutions respond by imposing stricter credit limits for exports to these destinations, generating additional financing constraints that impede otherwise economically viable international transactions.

Third, *market power* in international finance enables profit-maximizing financial institutions to impose markups that artificially constrain credit and insurance. This market power derives from the substantial fixed costs of establishing international operations, including developing correspondent banking networks, acquiring market-specific expertise, and implementing complex cross-border compliance systems.[5]

Any one of these three frictions (contractual limitations, informational barriers, and bank market power) would generate systematic underprovision of export financing, forcing exporters to artificially constrain investment below the optimal level dictated by their productivity (Manova, 2013). This financing gap also likely results in misallocating capital among exporting firms, skewing the distribution of capital toward financially unconstrained firms with lower MRPK (Chaney, 2016).

2.2 Export Credit Agencies (ECAs)

ECAs are mandated to support domestic exporters and overseas investments by providing financial services that commercial lenders are unwilling or unable to offer due to commercial, political, or country risks. We refer interested readers to Matray, Mueller, Xu and Shen (2026) on ECA operations around the world and Appendix C.3 for more details on the US EXIM in particular.

Role and tools of ECAs. ECAs relax the constraints on financing exports through two primary

[5]Market power in international finance typically exceeds that in domestic lending markets due to the specialized investments required. Banks require established correspondent relationships or foreign subsidiaries, detailed knowledge of counterparties' credit and legal environments, and compliance systems for international regulations that impose additional due diligence. These fixed costs naturally create concentrated markets dominated by a few large institutions (e.g., Niepmann and Schmidt-Eisenlohr, 2017*a*).

types of products: loans and insurance.

- Loans predominantly take two forms: *direct loans* and *loan guarantees*. In the former, ECAs lend directly; in the latter, ECAs guarantee payment on principal and interest in case of default, thereby expanding the amount commercial banks are willing to lend per dollar of the firm's pledgeable net worth.

- Insurance protects exporters against non-payment by foreign buyers due to commercial risks (buyer default, insolvency, payment delays) and political risks. By doing so, it transforms uncertain export receivables into secure assets that can be used as collateral, raising the pledgeable value of an export sale.

Economic incidence of ECA funding. Operationally, ECAs predominantly structure programs so that disbursed funds flow directly to domestic exporters, even when the official borrower is a foreign importer, so that foreign firms cannot redirect the funds. This design reflects the core objective of targeting domestic export activity constrained by private-sector financing gaps.

Regardless of whether financing is formally extended to the exporter or importer, ECA funding serves the same economic function: easing financial constraints that impede international trade. When exporters receive direct financing, their constraints are relaxed, enabling them to fulfill orders they otherwise would be unable to produce or deliver. When importers receive financing, they can directly pre-pay exporters to enable production.

2.2.1 EXIM's Implementation Framework and Institutional Design

Established during the New Deal, EXIM is the US's official ECA, and its mandate is to support US jobs by supplying export financing.[6] We highlight the main characteristics of EXIM that are important for our analysis (see Appendix C.3 for details of each point below).

EXIM offers all the standard ECA instruments: direct loans, loan guarantees, working capital guarantees, and credit insurance. For clarity, in the rest of the paper, we use the term "EXIM financing" to encompass *all* instruments used by EXIM.

Market role and positioning. EXIM operates as a residual financier of export-credit constrained firms by design: firms must demonstrate they could not secure financing from private lenders. This design precludes cream-skimming and makes EXIM complementary to the private market.

Institutional advantages. As a US government agency, EXIM also has access to information-sharing arrangements (with the State and Treasury Departments, US embassies, and the Trade Promotion Coordinating Committee) and enforcement technologies (e.g., conversion of commercial claims into sovereign obligations) that the private sector does not. These institutional advantages

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

are not necessary for the welfare argument in our model, but they help explain why EXIM operates in markets that private financiers typically shy away from.

Operational constraints. EXIM operates under three key constraints: annual Congressional appropriations that strictly constrain its balance sheet size and prevent it from reinvesting its profits to grow, a statutory requirement to operate at zero or negative net subsidy under the Federal Credit Reform Act, and a 2% cap on its default rate.

Takeaway. EXIM is designed to fund profitable but liquidity-constrained export projects, particularly in markets in which exporters face informational or contractual frictions that exacerbate private market financing frictions.

2.2.2 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 many of EXIM's activities.

The lapse in EXIM's charter was primarily caused by a political dispute in the highly polarized environment following the 2012 Presidential and 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, who opposed all nominees for board positions during the second Obama Administration.[7]

During this period, the bank's operations collapsed by 84% relative to the years prior even as applications stayed constant.[8] Figure 1 shows the change in the agency's total supply of new financing across all its different instruments.

3 A Model of Export Financing

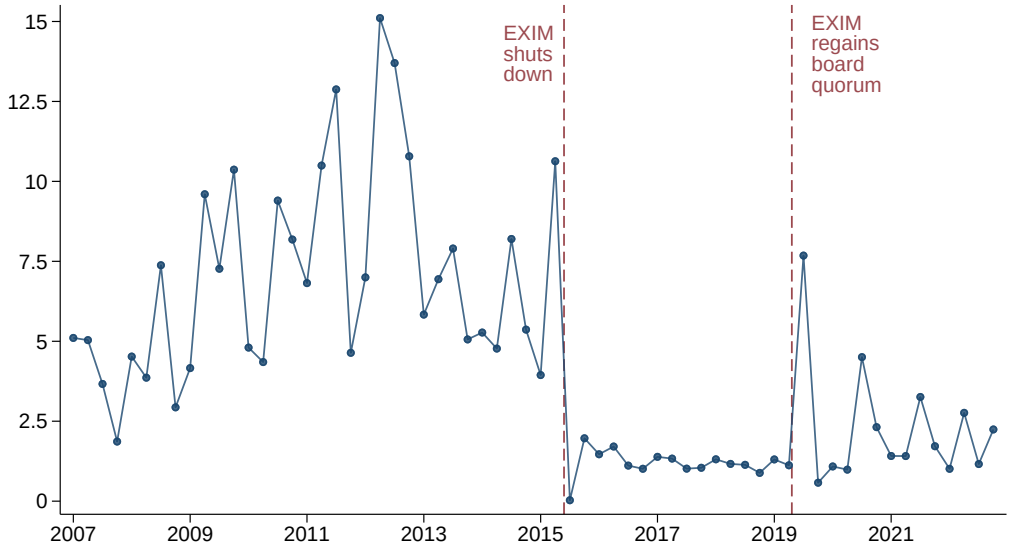
This section develops a static model of financing-based industrial policy for the export sector. The model delivers a framework for evaluating ECA-like industrial policy even in the absence of externalities, and provides the conditions under which ECAs can be welfare improving with elasticities that can be directly estimated in the data.

Exporters must finance upfront working capital needs and face a financing (collateral) constraint arising from the limited pledgeability of future export revenues. Because exporters are heterogeneous in their wealth, this constraint generates inefficiently low export levels and capital misallocation among exporters. A policy that relaxes export finance constraints can raise exports

[7] 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."

[8] Appendix C.3 provides detailed summary statistics on the composition of EXIM's portfolio by product, program type, and firm characteristics during the pre-shutdown period (2007–2014). When EXIM regained its full operational status, it had accumulated a pipeline of $40 billion in active applications.

Figure 1: EXIM's Supply of Trade Financing



Notes: This figure plots the quarterly dollar amount (in $ billions) of new trade financing issued by EXIM across all instruments. The vertical line marks the July 2015 charter lapse.

and lower capital misallocation through two forces: a growth effect from more capital, and a reallocative effect from ex-ante more constrained exporters growing more. This reallocative force generates an overall reduction in misallocation under a uniform policy that applies to all exporters equally, and it is reinforced when the policy is tilted toward more constrained firms.

The growth in capital and the reduction in capital misallocation raise aggregate revenue and welfare if they outweigh three countervailing forces: falling export prices (a terms-of-trade loss), a higher economy-wide cost of capital that may crowd out domestic production, and the net resource cost of the program. The model maps firm responses, export revenue, capital misallocation, capital market crowding-out, and offsetting terms-of-trade effects into empirical objects that we estimate in the data. Information on EXIM's balance sheet separately informs the question of whether it presents a net resource cost. Appendix E provides the full equilibrium system, derivations, and detailed proofs.

3.1 Environment

Markets and revenue. Home firms i sell in markets $m \in \{d, x\}$, the domestic market d and the export market x. Following the small-economy logic in Bartelme, Costinot, Donaldson and Rodriguez-Clare (2024), Foreign is treated as exogenous: Foreign expenditure and Foreign firms' prices, both in Home and in the export market, are fixed from Home's perspective. Consumers have CES preferences over differentiated varieties, and each firm is a monopolistic supplier of a single variety, so firms face a downward-sloping demand curve with constant elasticity. Firms choose capital inputs taking the rental rate of capital r_f as given to maximize profits. With constant-

returns production, this gives the reduced-form firm revenue function:

$$R_{i,m} = \mathcal{Z}_{i,m} k_{i,m}^{\alpha}, \qquad m \in \{d, x\}, \qquad \alpha \equiv \frac{\sigma - 1}{\sigma} \in (0, 1), \tag{1}$$

where $k_{i,m}$ is capital used to serve market m, $\mathcal{Z}_{i,m}$ collects market size, the destination price index, and firm productivity, and σ is the elasticity of substitution between goods.[9] Appendix E.2 gives the CES foundation and price index system.

Export working capital. Exporting requires additional upfront working capital because export sales involve production, shipment, and payment lags before foreign revenue is received.[10] We model this working capital requirement as firms needing to finance a fixed overhead $F_x > 0$ to export (for documentation, compliance, and inventories in transit), and a share $\phi_x \in (0, 1)$ of the capital $k_{i,x}$ input.[11] Exporters to a common export market x take the risk-adjusted cost of capital $\bar{r}_x$ as given,

$$\bar{r}_x = r_f + \zeta_x, \tag{2}$$

where r_f is the baseline rental rate and ζ_x is the market-specific risk premium.

Firm-specific financing constraints arise from limited pledgeability of firm resources (Banerjee and Newman, 1993; Kiyotaki and Moore, 1997). We summarize this limited-commitment friction with a common pledgeability parameter θ_x and firm-specific pledgeable net worth a_i. The export financing constraint for firm i is therefore

$$\phi_x k_{i,x} + F_x \leq \theta_x a_i. \tag{3}$$

A firm exports if and only if export profits net of financing cost are non-negative:

$$R_{i,x}^* - \bar{r}_x k_{i,x}^* - \bar{r}_x F_x \geq 0 \tag{4}$$

where $(k_{i,x}^*, R_{i,x}^*)$ are the firm's optimal export market choices. Note that a firm with abundant net worth a_i can still be constrained in a market x for which future export revenue is hard to pledge, for example a destination and/or product where claims are costly to enforce.

[9] This concave reduced-form revenue function follows from CES demand and constant-returns production, and is isomorphic to a production function with decreasing returns to scale that comes from a span-of-control formulation (Buera, Kaboski and Shin, 2015).

[10] See, for example, Hummels and Schaur (2013), Feenstra, Li and Yu (2014), Antràs and Foley (2015), and Aristizábal-Ramírez, Baldomero-Quintana, Bonadio, Echeverri and Posso (2025).

[11] For simplicity, we assume that domestic sales require no external working capital financing, reflecting their much shorter payment lags relative to cross-border transactions. Consistent with this, exporters are more financially constrained and their exports react more to financial shocks, while their domestic sales are unaffected (Amiti and Weinstein, 2011; Buono and Formai, 2018; Finlay, 2021).

3.2 The Export-Finance Wedge

Firm i chooses domestic-market and export market capital to maximize its profits

$$\max_{k_{i,d},\, k_{i,x} \geq 0} R_{i,d} - r_f k_{i,d} + R_{i,x} - \bar{r}_x k_{i,x} - \bar{r}_x F_x \quad \text{subject to (3) and (4).} \tag{5}$$

Let $\bar{r}_x \lambda_i \geq 0$ be the multiplier on (3), so that λ_i is normalized by the common export user cost. The comparative statics below focus on active exporters and hold fixed which firms are active exporters, so the participation constraint (4) is slack locally. The first-order condition for export capital,

$$\frac{\partial R_{i,x}}{\partial k_{i,x}} - \bar{r}_x - \bar{r}_x \phi_x \lambda_i = 0,$$

equates the marginal revenue product to the common export user cost plus the shadow cost of the working capital constraint. Collecting terms gives

$$\text{MRPK}_{i,x} \equiv \frac{\partial R_{i,x}}{\partial k_{i,x}} = \bar{r}_x (1 + \phi_x \lambda_i) \equiv \bar{r}_x (1 + \tau_{i,x}), \tag{6}$$

where the wedge $\tau_{i,x}$ can be written explicitly as

$$\tau_{i,x} = \phi_x \lambda_i. \tag{7}$$

$\tau_{i,x}$ is monotonically increasing in the shadow price λ_i of the firm's export financing constraint, and is similar to the accounting misallocation wedge of Hsieh and Klenow (2009) that generates across-firm dispersion in MRPK within an export market x. An important difference is that in our setting, the wedge is endogenous and derived from the primitive of limited pledgeability.

Policy Intervention. A policy that improves access to export financing raises firms' effective financing capacity, $\theta_x a_i$. We summarize the local policy-induced relaxation for firm i with

$$IP_i \equiv d \log(\theta_x a_i) = d \log \theta_x + d \log a_i.$$

This reduced-form shock IP_i can be implemented through higher pledgeability, higher pledgeable resources, or both. For constrained firms, $IP_i > 0$ induces a lower shadow cost of financing λ_i.

Lemma 1 (Inframarginal Benchmark)**.** *If the export financing constraint is slack ($\lambda_i = 0$) for every firm affected by the policy, then a local change in effective financing capacity has no direct effect on export capital or export revenue:*

$$\frac{\partial k_{i,x}}{\partial(\theta_x a_i)} = \frac{\partial R_{i,x}}{\partial(\theta_x a_i)} = 0.$$

When the constraint is slack, export scale is pinned down by the unconstrained first-order condition rather than by the firm borrowing constraint, and policy intervention is inframarginal.

3.3 Local Comparative Statics

Assumption 1 (Constrained Benchmark)**.** *(i) There are two types of firms in the Home economy. Both Home firms are active exporters, share common baseline pledgeability θ_x, and are ordered by pledgeable net worth $a_1 < a_2$*[12]*; (ii) both export financing constraints (3) bind; (iii) the active-exporter set and the binding status of each export financing constraint remain unchanged after the policy-induced change in financing capacity IP_i; (iv) firms share a common export revenue shifter, $\mathcal{Z}_{1,x} = \mathcal{Z}_{2,x} \equiv \mathcal{Z}_x$.*

We maintain Assumption 1 throughout this subsection. Because the two exporters share a common export shifter, $a_1 < a_2$ implies $k_{1,x} < k_{2,x}$ and $\text{MRPK}_{1,x} > \text{MRPK}_{2,x}$; see Appendix E.3.

Proposition 1 (Differential Investment Response)**.** *Let $\varepsilon_i \equiv \partial \log k_{i,x} / \partial \log(\theta_x a_i)$ denote firm i's export capital elasticity to its own effective financing capacity, evaluated at the common baseline θ_x. The high-MRPK exporter (firm 1) has the larger per-unit response: $\varepsilon_1 > \varepsilon_2$.*

For constrained exporters, capital is pinned down by the financing constraint, $k_{i,x} = (\theta_x a_i - F_x)/(\phi_x)$. A marginal increase in effective financing capacity therefore relaxes the constraint proportionally more for the initially more constrained, higher-MRPK firm, which expands strictly more ($\varepsilon_1 > \varepsilon_2$). This differential per-unit response is the within-firm reallocation margin of Bau and Matray (2023).

A policy that instead subsidized the common destination risk premium ζ_x carries a different prediction for which firms respond, so the differential response distinguishes a reduction in the risk premium ζ_x from a relaxation of firm-specific financing capacity.

Corollary 1 (Identifying the Form of the Policy Intervention)**.** *Consider two active constrained exporters in a common product-destination market, and hence with common r_f, ζ_x, and $\mathcal{Z}_x$. A change in the common cost of export capital (equivalently, a change in the risk premium ζ_x) generates no differential response:*

$$\frac{d \log k_{1,x}}{d\zeta_x} - \frac{d \log k_{2,x}}{d\zeta_x} = 0.$$

Constrained firms' capital choices are pinned down by the collateral ceiling, $k_{i,x} = (\theta_x a_i - F_x)/(\phi_x)$, which is not directly affected by ζ_x. Within a given product-destination market, the general equilibrium price index and rental-rate feedback are identical across firms and difference out. If the less-constrained firm is at an unconstrained interior instead, a drop in ζ_x increases its size while the constrained firm follows its collateral ceiling, thereby tilting capital *toward* the low-MRPK firm. Relaxing financing constraints does the opposite, as high-MRPK firms invest more. Appendix E.3.2 derives all expressions.

Let $k_x = k_{1,x} + k_{2,x}$ be aggregate Home export capital, and let $s_{i,x} \equiv k_{i,x}/k_x$ and $\varpi_{i,x} \equiv R_{i,x}/\mathcal{R}_x$ denote firm i's shares of Home export capital and total export revenue ($\mathcal{R}_x = R_{1,x} + R_{2,x}$). Define

[12] The two-firm case keeps the notation transparent; the propositions extend to N exporters under the standard reallocation conditions of Hsieh and Klenow (2009).

the allocation index as

$$\Phi_x \equiv \left(\frac{k_{1,x}}{k_x}\right)^{\alpha} + \left(\frac{k_{2,x}}{k_x}\right)^{\alpha}.$$

The index Φ_x is the degree of "allocative efficiency" in the economy as it measures how efficiently a given stock of export capital is spread across firms: it rises when capital shifts toward exporters that generate more revenue per unit of capital.[13] Its change is the covariance between a firm's revenue share in excess of its capital share ($\varpi_{i,x} - s_{i,x}$) and its capital growth,

$$d\log\Phi_x = \alpha(\varpi_{1,x} - s_{1,x})\,(d\log k_{1,x} - d\log k_{2,x})\,.$$

Allocative efficiency improves precisely when the high-MRPK exporter, which earns a higher revenue share than capital share ($\varpi_{1,x} > s_{1,x}$), grows faster than the low-MRPK one ($d\log k_{1,x} > d\log k_{2,x}$), making $d\log\Phi_x > 0$.

Whether the high-MRPK exporter grows faster than the low-MRPK one depends on two components: its per-unit response (Proposition 1) and the policy dose it receives. Let IP_i denote firm i's local policy dose. The policy is *uniform* when every firm receives the same dose, $IP_1 = IP_2$. More generally, $\rho \equiv \mathrm{Cov}(IP_i, \lambda_i)$ records whether support is tilted toward the more constrained, higher-MRPK firms ($\rho > 0$) or away from them ($\rho < 0$), and is zero under a uniform policy.

Lemma 2 (Policy Design)**.** *When the policy dose varies across firms, each firm's export capital response is its per-unit elasticity times the dose it receives, $d\log k_{i,x} = \varepsilon_i\, IP_i$. The net shift of export capital toward the high-MRPK firm then decomposes as:*

$$d\log k_{1,x} - d\log k_{2,x} = \underbrace{\bar{\varepsilon}\,(IP_1 - IP_2)}_{\textit{policy targeting}} + \underbrace{\overline{IP}_x\,(\varepsilon_1 - \varepsilon_2)}_{\textit{per-unit response}}.$$

Capital shifts toward the high-MRPK firm for two distinct reasons: (i) initially more constrained firms respond more (Proposition 1); (ii) for an average reaction, firms that receive a bigger shock react more.[14] A uniform policy ($\rho = 0$) therefore already improves allocation through the per-unit channel alone; only support tilted away from constrained firms ($\rho < 0$), and strong enough to outweigh that channel, can reverse the shift.

Proposition 2 (Export Capital Reallocation)**.** *If $\rho \geq 0$, including the case of a uniform policy, a local increase in effective financing capacity reduces within-export capital misallocation, equivalently raising the export allocative efficiency index: $d\log\Phi_x > 0$.*

The index Φ_x rises whenever capital moves from the low-MRPK to high-MRPK exporter, since

[13] Φ_x is the reallocation component of the Solow residual in Baqaee and Farhi (2020), i.e., aggregate TFP holding each firm's own productivity fixed.

[14] In the two-firm benchmark, cross-firm averages are $\bar{\varepsilon} \equiv \frac{1}{2}(\varepsilon_1 + \varepsilon_2)$ and $\overline{IP}_x \equiv \frac{1}{2}(IP_1 + IP_2)$; and $\rho = \frac{1}{4}(IP_1 - IP_2)(\lambda_1 - \lambda_2)$ with $\lambda_1 > \lambda_2$. The two-term decomposition is exact for two firms; with more than two firms it carries an additional interaction term between policy doses and per-unit responses across firms. See Appendix Lemma 4 for the exact N-exporter decomposition.

the latter has the higher marginal return; a positive $d\log\Phi_x$ therefore records a fall in within-export misallocation. The high-MRPK exporter is smaller, with higher revenue per unit of capital, so $\varpi_{1,x} > s_{1,x}$. Lemma 2 gives $d\log k_{1,x} - d\log k_{2,x} > 0$ for $\rho \geq 0$, which implies $d\log\Phi_x > 0$.

Combining these two channels, the total change in effective export capital is

$$E_x \equiv \underbrace{\alpha\, d\log k_x}_{\substack{\text{aggregate export capital} \\ \text{effect}}} + \underbrace{d\log\Phi_x}_{\substack{\text{within-exporter} \\ \text{reallocation effect}}},$$

which summarizes the two channels through which the shock raises aggregate export revenue: an increase in exporters' investment, and a reduction in capital misallocation among exporters.

Corollary 2 (Implementation Equivalence)**.** *Consider two local policies, one implemented through pledgeability θ_x and one through pledgeable resources a_i. If the policies induce the same firm-level shock to effective financing capacity $IP_i = d\log(\theta_x a_i)$ for every active constrained exporter, then they generate the same export capital responses $\{d\log k_{i,x}\}_i$, the same change in allocative efficiency $d\log\Phi_x$, and the same change in effective export capital E_x.*

Proposition 3 (Aggregate Export Revenue)**.** *Let $\mathcal{R}_x = R_{1,x} + R_{2,x}$ denote aggregate Home export revenue, let $\mathcal{R}_{F,x}$ denote Foreign export revenue in the export market, and let $w_x \equiv \mathcal{R}_x/(\mathcal{R}_x + \mathcal{R}_{F,x})$ denote Home's export market share. Then*

$$d\log\mathcal{R}_x = \frac{1-w_x}{1-\alpha w_x}\left[\alpha\, d\log k_x + d\log\Phi_x\right] = \frac{1-w_x}{1-\alpha w_x}E_x,$$

Under Proposition 2, $E_x > 0$ so:

$$d\log\mathcal{R}_x > 0.$$

Proposition 3 separates the revenue response into a quantity expansion and a price offset. The effective capital term E_x is the expansion of the Home export bundle: it combines the scale of new export capital, $\alpha\, d\log k_x$, with the reallocation of capital toward higher-return exporters, $d\log\Phi_x$, both positive under Proposition 2. Because Home faces a downward-sloping foreign demand curve, a larger bundle sells only at a lower price, so revenue rises by less than E_x. The pass-through $\dfrac{1-w_x}{1-\alpha w_x} < 1$ is the fraction that survives this terms-of-trade offset, and it declines in Home's export market share w_x: the larger Home's presence, the more its own expansion moves the price against it. A small exporter ($w_x \to 0$) keeps the full gain, while a dominant one cedes most of it to a lower price. Appendix Lemma 3 derives the exact factor by letting the destination price index adjust to Home's expansion.

Corollary 3 (Terms-of-Trade Offset)**.** *Let $P_{H,x}$ denote the CES price index of Home varieties in the export market, and define Home's terms of trade as $TOT_x \equiv P_{H,x}/\bar{p}_{F,d}$, the price of Home exports relative to the fixed price of the Foreign good that Home imports. By Proposition 3, $d\log\mathcal{R}_x = \dfrac{1-w_x}{1-\alpha w_x}E_x$, so for a given effective export capital expansion $E_x > 0$, the revenue gain*

shrinks in Home's existing export share,

$$\frac{\partial}{\partial w_x} d\log \mathcal{R}_x = -\frac{1-\alpha}{(1-\alpha w_x)^2} E_x < 0,$$

because export expansion lowers the Home export bundle price relative to the fixed import price,

$$d\log TOT_x = d\log P_{H,x} < 0.$$

Intuitively, as Home expands exports the CES price index of Home varieties falls, $d\log P_{H,x} < 0$. Because the imported Foreign good's price $\bar{p}_{F,d}$ is fixed, this decline is one-for-one a deterioration in Home's terms of trade, $d\log TOT_x < 0$: the revenue attenuation in Proposition 3 is exactly a worsening of the price at which Home trades with the rest of the world.

Capital market crowding-out. An expansion of exporters generates competition for capital with purely domestic firms in the integrated capital market. By relaxing the financing constraints of exporters, the policy raises export capital demand and, under the standard capital market stability condition, bids up the rental rate, $d\log r_f > 0$.[15] Home market producers then face a higher cost of capital but also higher income, so the net effect on domestic capital is ambiguous.

Proposition 4 (Capital Market Crowding-Out)**.** *The Home-market capital response reduces to an income effect and a rental-rate effect,*

$$d\log k_{i,d} = d\log I - \sigma(1-\alpha w_d)\, d\log r_f,$$

where w_d is the Home producer share of Home market spending. The policy therefore crowds out Home-market capital, $d\log k_{i,d} < 0$, if and only if the rental-rate effect dominates the income effect,

$$\sigma(1-\alpha w_d)\, d\log r_f > d\log I.$$

To see where the two forces come from, note that domestic firm i chooses capital from $\alpha \mathcal{Z}_{i,d} k_{i,d}^{\alpha-1} = r_f$, so its capital responds to three general equilibrium objects,

$$d\log k_{i,d} = \frac{1}{1-\alpha}\Big[\underbrace{\frac{1}{\sigma} d\log I}_{\text{income}} + \underbrace{\alpha\, d\log P_d}_{\text{price index}} - \underbrace{d\log r_f}_{\text{rental rate}}\Big].$$

Because domestic Home firms set a constant markup over the rental rate, the domestic price index moves with it, $d\log P_d = w_d\, d\log r_f$. The price index channel is thus itself driven by the rental rate, collapsing the response to the income and rental rate effects. Higher export income shifts Home market capital demand outward, while the higher rental rate pulls it back.

[15] The condition is $K_s'(r_f) - \tilde{k}_{d,r} - \tilde{k}_{x,r} > 0$, with $\tilde{k}_{m,r} \equiv \partial \tilde{k}_m / \partial r_f$ how market-m capital demand responds to the rental rate.

Untreated exporters and market-share reallocation. The two-exporter benchmark treats both exporters as exposed to the policy. The same equilibrium logic also describes cases with many exporters when only a subset receive support. Untreated exporters are affected only through two general equilibrium channels: the terms-of-trade decline that lowers their revenue shifter $\mathcal{Z}_{j,x}$, and the rental-rate pressure that raises their cost of capital. Let $\mathcal{T}$ be the set of treated active exporters and $\mathcal{U}$ the untreated set, with $IP_j = 0$ for $j \in \mathcal{U}$, holding fixed which firms export and which financing constraints bind. Any exporter's revenue decomposes into a shifter response and a capital response,

$$d\log R_{j,x} = d\log \mathcal{Z}_{j,x} + \alpha\, d\log k_{j,x}.$$

The revenue shifter is common to all Home exporters in market x and falls with Home's own expansion,

$$d\log \mathcal{Z}_{j,x} = -\frac{(1-\alpha)w_x}{1-\alpha w_x} E_x < 0,$$

the terms-of-trade channel of Proposition 3 (Appendix Lemma 3), where E_x is defined over all active Home exporters in market x. The two firm types differ only in the capital response: a treated firm's $d\log k_{j,x}$ carries the direct policy relaxation, while an untreated firm's ($j \in \mathcal{U}$) moves only through general equilibrium effects. A constrained untreated exporter is pinned to its collateral ceiling, so $d\log k_{j,x} = 0$ and its revenue moves one-for-one with the shifter $\mathcal{Z}_{j,x}$; an unconstrained one adjusts capital as the rental rate rises, $d\log k_{j,x} = \dfrac{1}{1-\alpha}(d\log \mathcal{Z}_{j,x} - d\log \bar{r}_x)$, so its revenue absorbs both the terms-of-trade decline and rental-rate pressure (Appendix E.4.3).

These same forces also reallocate revenue *shares* across Home exporters. If $\Omega_{\mathcal{T},x} \equiv \mathcal{R}_{\mathcal{T},x}/(\mathcal{R}_{\mathcal{T},x} + \mathcal{R}_{\mathcal{U},x})$ is the treated exporters' revenue share among Home exporters, then[16]

$$d\log \Omega_{\mathcal{T},x} = (1-\Omega_{\mathcal{T},x})\left(d\log \mathcal{R}_{\mathcal{T},x} - d\log \mathcal{R}_{\mathcal{U},x}\right).$$

Since treated exporters additionally receive the direct effective-capacity relaxation, the policy reallocates export market shares toward treated exporters whenever the direct treated-firm expansion dominates these common offsets.

Welfare Accounting. Under CES preferences, the representative consumer's indirect utility equals real Home income, $W = I/P_d$, with $I = \mathcal{R}_d + \mathcal{R}_x - T$, where T denotes the net resource cost of the export finance program as defined in Appendix E.4.1.

Define the Home market effective capital change by $E_d \equiv \alpha\, d\log k_d + d\log \Phi_d$, where Φ_d is the Home-market analog of Φ_x and $d\log \Phi_d = 0$ because firms face no firm-specific Home-market wedge. Let $\chi_m \equiv \mathcal{R}_m/I$ denote the revenue share of market m in Home income and let w_d denote the Home producer share of Home market expenditure. Since in equilibrium the following equalities

[16] Log-differentiating $\Omega_{\mathcal{T},x} = \mathcal{R}_{\mathcal{T},x}/(\mathcal{R}_{\mathcal{T},x} + \mathcal{R}_{\mathcal{U},x})$ and using $d\log(\mathcal{R}_{\mathcal{T},x} + \mathcal{R}_{\mathcal{U},x}) = \Omega_{\mathcal{T},x}\, d\log \mathcal{R}_{\mathcal{T},x} + (1 - \Omega_{\mathcal{T},x})\, d\log \mathcal{R}_{\mathcal{U},x}$ gives the log-share identity below.

hold $D_d = I$, $\chi_d = w_d$, the local welfare change is

$$d\log W = \underbrace{\chi_x \frac{1-w_x}{1-\alpha w_x} E_x}_{\text{export revenue}} + \underbrace{\chi_d \frac{1-w_d}{1-\alpha w_d} E_d}_{\text{Home-market revenue}} + \underbrace{\frac{w_d}{(\sigma-1)(1-\alpha w_d)} E_d}_{\text{Home price index}} - \underbrace{\frac{dT}{I}}_{\text{net resource cost}} \tag{8}$$

Equation (8) collects four channels. The first converts the effective export capital expansion into welfare, passed through the terms-of-trade offset $\frac{1-w_x}{1-\alpha w_x}$ of Proposition 3. The next two are Home market effects: if rental rate pressure crowds out domestic capital, E_d falls, lowering both Home market revenue and, through a higher consumer price index, the purchasing power of Home income. The last term is the net resource cost of the program.[17] Appendix E.4 derives equation (8), and the proof of Proposition 4 establishes the crowding-out condition.

3.4 Mapping the Model to the Empirics

The model guides the empirical analysis in four steps. First, Lemma 1 gives the inframarginal benchmark: if EXIM financing relaxes only slack financing constraints, changes in export financing support should not affect export capital or export revenue. The average effect estimates in Section 5 test this benchmark by asking whether exports and firm scale fall when EXIM support is withdrawn.

Second, Lemma 2 separates the allocative effect into two objects: firms' per-unit responses to an effective-capacity shock and the targeting of policy support across firms. The per-unit response is positive for allocation when high-MRPK firms react more strongly, as in Proposition 1. The targeting of policy support can then reinforce or offset this force depending on whether EXIM exposure is tilted toward or away from constrained firms. Section 6 therefore examines both the differential response of high-MRPK firms to the shutdown and the distribution of EXIM exposure across firms.

Third, the same heterogeneous response helps to identify the form EXIM's intervention takes. A change in the common borrowing cost ζ_x would generate no differential response across the MRPK distribution within narrow comparison groups, whereas relaxing financing constraints through $\theta_x a_i$ makes initially constrained, high-MRPK firms respond more (Corollary 1). The high-versus-low-MRPK exercise in Section 6 therefore speaks both to capital allocation and to whether EXIM operates on the price of capital or on the financing constraint.

Fourth, the welfare accounting highlights the aggregate offsets that could attenuate these gains: terms-of-trade effects, capital-market crowd-out, and the net resource cost of the program. We examine these forces in Section 7.

[17] Each term is already a net effect on real income. Under the closure $D_d = I$ (so $\chi_d = w_d$), the multiplier from Home spending its income at home cancels against the response of the domestic price index, so no $1/(1-\chi_d)$ factor survives; see Appendix E.4.

4 Data and Empirical Strategy

4.1 Data

(1) EXIM authorization data. We use comprehensive records of EXIM loan authorizations and disbursements originating from 2007 to 2022, obtained through 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, which we convert to HS-4 using the concordances provided by Pierce and Schott (2012).

(2) Aggregate product export data. We construct a panel of bilateral trade flows at the origin-destination-product-year level using BACI (Gaulier and Zignago, 2010). 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 that accounts for updates to product classifications.

(3) Firm export data. We measure exports at the firm level using data from Datamyne, a private vendor that collects and cleans maritime bills of lading. Datamyne provides detailed information on individual shipments, including product codes, destination countries, and the weight of the shipped products. We match firms in Datamyne to EXIM's loan portfolio (see Appendices C.1.1 and C.1).

(4) Firm data. We measure outcomes for publicly listed firms from Compustat that we match to EXIM's authorizations (see Appendices C.1.1, C.1, and C.2). Publicly listed firms account for approximately half of the value of authorizations, and they generate approximately 80% of aggregate exports.[18] We measure lobbying activity using LobbyView (Kim, 2018).

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.

4.2 Empirical Strategy

4.2.1 Aggregate Exports

To assess whether EXIM generates net exports for the US, we estimate dynamic difference-in-differences regressions of the following form:

$$\Delta^{2014} Export_{p,o,d,t} = \sum_{k=2010, k\neq 2014}^{2019} \beta_k \Big[EXIM_{p,o} \times \mathbb{1}(t=k) \Big] + \gamma_{p,d,t} + \delta_{o,t} + \varepsilon_{p,o,d,t} \tag{9}$$

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

Table 1: Summary Statistics

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

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

where the dependent variable $\Delta^{2014}Export_{p,o,d,t}$ is the growth rate in export values relative to 2014 (the year before the shutdown), measured at the product p, exporting country o, destination country d, and year t level. Defining our dependent variable as a growth rate eliminates all time-invariant differences at the product-origin-destination level, equivalent to first-differencing a log-level specification, and it removes the need for a unit fixed effect.[19]

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).[20] Including these countries allows us to absorb unobserved demand shocks with product-destination-year fixed effects ($\gamma_{p,d,t}$) and exporter supply shocks with origin-year fixed effects ($\delta_{o,t}$).

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

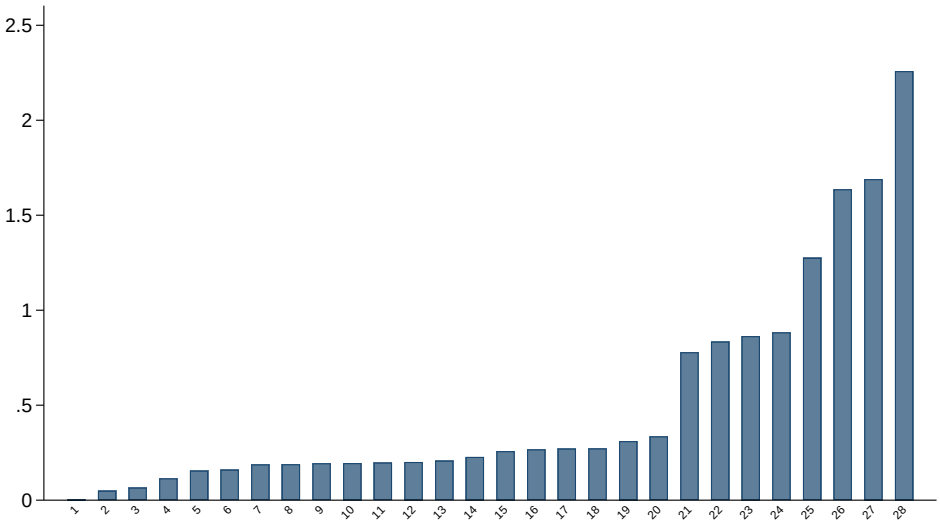
$$EXIM_{p,o} = \sum_{t=2007}^{2010} \sum_{i \in p} EXIM_{i,o,t} \Big/ \sum_{t=2007}^{2010} Export_{p,o,t}$$

where i denotes an individual EXIM contract and p denotes an HS-4 product. Since EXIM is a

[19] The log-levels specification with a unit fixed effect (country-product μ_{po}) would take the form: $log(Export_{p,o,d,t}) = \sum_{k=2010,k\neq2014}^{2019} \beta_k \Big[EXIM_{p,o} \times \mathbb{1}(t = k) \Big] + \gamma_{p,d,t} + \delta_{o,t} + \mu_{p,o} + \varepsilon_{p,o,d,t}$. First differencing relative to the reference year 2014 eliminates the unit fixed effect: $log(Export_{p,o,d,t}) - log(Export_{p,o,d,t=2014}) = \sum_{k=2010,k\neq2014}^{2019} \beta_k \Big[EXIM_{p,o} \times \mathbb{1}(t = k) \Big] + \gamma_{p,d,t} + \delta_{o,t} + \varepsilon_{p,o,d,t}$. The dependent variable can equivalently be expressed as $log(\frac{Export_{p,o,d,t}}{Export_{p,o,d,t=2014}})$, which is a growth rate that we can abbreviate as $\Delta^{2014}Export_{p,o,d,t}$.

[20] The list of countries includes: Australia, Denmark, Finland, Germany, the UK, Japan, New Zealand, Spain, and Switzerland. Appendix Table A.2 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.

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.

US institution, $EXIM_{p,o}$ is by definition always equal to zero for non-US exporters ($EXIM_{p,o} = 0$ for $o \neq US$). Figure 2 plots the distribution of treatment intensity across 3-digit industries in the US and shows substantial variation across sectors. A higher value of $EXIM_{p,o}$ thus indicates a product whose US exporters relied more heavily on EXIM financing in the pre-period, and that was therefore more exposed to the supply shock when EXIM shut down.

We use the pre-shutdown cross-sectional variation in EXIM dependency ($EXIM_{p,o}$) to capture the supply shock to each product rather than the realized change during the shutdown.[21] Pre-period exposure was determined before the political shock and is plausibly exogenous to post-2015 export dynamics, whereas the realized change is potentially endogenous to outcomes. Our estimates are therefore intent-to-treat (ITT) effects, which recover the causal effect of treatment assignment even when the shutdown is incomplete (e.g., Imbens and Rubin, 2015).

The dependent variable aggregates US firms within each product-destination market:

$$\text{Export}^{\text{US}}_{p,d,t} = \sum_i \mathbb{I}\{\text{Backed}_i\} \cdot \text{export}_{i,p,d,t} + \sum_i \mathbb{I}\{\text{Not Backed}_i\} \cdot \text{export}_{i,p,d,t},$$

where $\mathbb{I}\{\text{Backed}_i\}$ equals one if US firm i received EXIM financing prior to 2015 and zero otherwise. Within-market business stealing among US firms therefore nets out by construction so that the sequence of β_k coefficients captures the policy object of interest: the impact on overall US exports by industry, net of market share reallocation between firms.

[21] $EXIM_{p,o}$ aggregates exposure across *all* EXIM products, reflecting that firms financed under one program could have shifted to others absent the shutdown. While it is theoretically possible to estimate the impact of each EXIM program separately, doing so would require having as many instruments as programs. In Appendix Table A.5, we show that the estimated effects are very similar for each broad category of support (loans and insurance), although we do not interpret these as separate mechanisms given firms' ability to substitute across programs.

To quantify the overall magnitude of EXIM's shutdown effect on exports, we estimate a pooled regression that combines the dynamic effects:

$$\Delta^{2014} Export_{p,o,d,t} = \beta EXIM_{p,o} \times Post_{t \geq 2015} + \gamma_{p,d,t} + \delta_{o,t} + \varepsilon_{p,o,d,t} \tag{10}$$

Throughout, we cluster standard errors at the HS-4 product-level.

Accommodating entry and exit in the trade data. Our specification requires using annual export data disaggregated by product and destination to absorb demand shocks ($\gamma_{p,d,t}$). These export markets exhibit substantial entry and exit, generating zeros that complicate the estimation of growth-rate regressions.[22]

We address these challenges using the disaggregation invariance methodology of Beaumont, Matray, Tu and Xu (2026), which relies on value-weighted regressions in which we measure the dependent variable $\Delta^{2014} Y_{p,o,d,t}$ as a midpoint growth rate:

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

We implement this methodology by creating a balanced panel of every export market (product-destination) present at any point during the sample period. Specifically, we fill in zeros for missing observations with zero to account for changes in the extensive margin.

Beaumont, Matray, Tu and Xu (2026) shows that this methodology has two appealing properties. First, it captures the full causal elasticity along both intensive and extensive margins by handling entry and exit without ad hoc log transformations or non-linear estimators. Second, with proper regression weights, the coefficients at any coarser level disaggregate exactly to finer levels.[23] This "disaggregation invariance" is important in our setting because while entry and exit are absent at the HS-4 product level for the US, they are substantial at the HS-6-by-destination level, and this estimator ensures that the disaggregated and aggregated estimates are consistent.

Industry-level 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 evolved similarly absent the shutdown.

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 exporting risks when

[22] While transformations of the log function have been used to accommodate zeros (e.g., log(x+1) or the arcsine-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).

[23] Fonseca and Matray (2024) provides more details and an application to firm entry/exit across cities and industries.

selling to specific countries. For example, a country may levy a tariff on products that received more EXIM financing in the US. The bilateral product data allow us to control for such confounders (which would be absorbed by $\gamma_{p,d,t}$) at a granular level, so that we only compare the exports of the same HS-6 product to the same destination at the same time. Differences in the estimated β with and without these controls are informative about the extent to which such unobserved demand shocks might bias the estimates.

The remaining threat to identification is an unobserved shock to US products that correlates with EXIM exposure and occurs exactly when EXIM shuts down. Including a US-product-by-year fixed effect would relax the identifying assumption. While that is not possible with country-product data because our treatment varies by US-product-by-year, the firm-level bilateral exports analysis that we outline next uses firm-level exposure and thus creates variation in EXIM dependence within a given product. We can therefore fully saturate the specification with exporter-by-product-by-destination-by-year ($\zeta_{p,o,d,t}$) fixed effects and absorb all unobserved demand shocks that are specific to US exporters. In our analysis of overall firm-level effects, we can similarly include US industry-by-year fixed effects.

4.2.2 Firm-level Effects

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

$$\Delta Y_{i,j,t} = \sum_{k=2010, k\neq 2014}^{2019} \beta_k \Big[\mathit{EXIM}_i \times \mathbb{1}(t=k) \Big] + \gamma_{j,t} + \mathit{Exporter}_{i,t_0} \times \delta_t + X_{i,t_0} \times \delta_t + \varepsilon_{i,j,t} \quad (11)$$

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.[24] EXIM_i is an indicator variable that takes the value of one if firm i received support from EXIM during the pre-shutdown period. β_k captures the yearly semi-elasticity of firm outcomes with respect to EXIM trade financing relative to 2014.

The standard difference-in-difference is estimated using the following specification:

$$\Delta Y_{i,j,t} = \beta \mathit{EXIM}_i \times \mathit{Post}_t + \gamma_{j,t} + \mathit{Exporter}_{i,t_0} \times \delta_t + X_{i,t_0} \times \delta_t + \varepsilon_{i,j,t} \quad (12)$$

As in equation (9), 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, which 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 control for time-varying unobserved heterogeneity across US industries, such as differences in industry cycles, or shocks

[24] At the firm level, we do not need to accommodate entry and exit so we 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.6.

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, international activity in its 10-Ks (Hoberg and Moon, 2017), exports in Datamyne, or taxable foreign income over the pre-shutdown period. $Exporter_{i,t_0} \times \delta_t$ restricts the identifying variation to firms that would be eligible for EXIM financing and are exposed to similar worldwide aggregate demand shocks. Because this vector of fixed effects ensures that EXIM-dependent exporters are compared to a set of non-dependent exporters, the identifying variation is the same as that from dropping firms that were not exporting prior to 2015 from the sample.[25] $X_{i,t_0} \times \delta_t$ is a vector of firm characteristics defined prior to 2015, where each characteristic is separately interacted with year fixed effects. We cluster standard errors at the level of the shock, which is at the firm-level.

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. We estimate these differences 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, by definition, only exporters are eligible for EXIM support. 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).

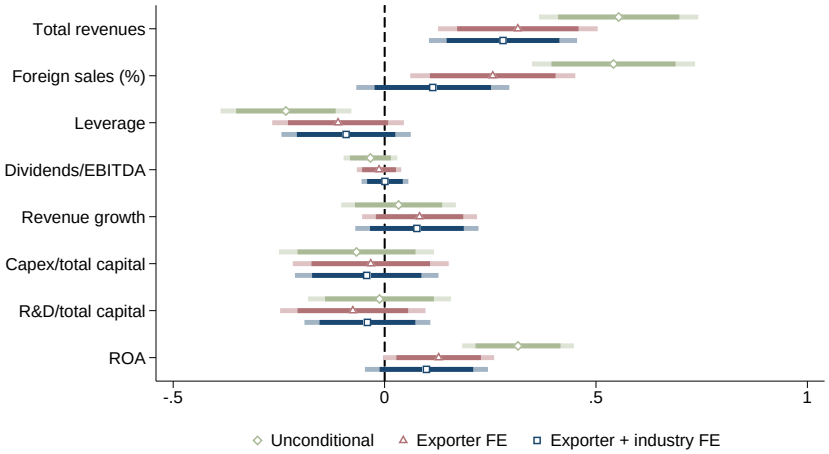
Along the only remaining significantly different dimension of firm size, treated and control firms still share a large overlap, which ensures that effects can be identified across firms of similar size. In addition, treated and control firms are similar in terms of their share of foreign sales and financing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

Firm-level 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.

Including additional control variables, such as firms being in the same industry-geography and a battery of firm characteristics (size, balance sheet metrics, lobbying activities, government contract dependency) interacted with time fixed effects, absorbs the impact of unobserved shocks correlated with these characteristics. For example, including total asset tercile-by-year fixed effects ensures that our coefficient of interest β is not driven by differences in time-varying unobserved shocks

[25] We report this exercise in column 5 of Table 3 and show the point estimate and standard error are the same as when we use the full sample.

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 international activity in its 10-Ks, has positive exports in Datamyne, or reports taxable foreign income. "Industry" is defined at the SIC2 level. Leverage is defined as total debt over assets, revenue growth is computed over 2010–2014, ROA is defined as EBITDA over assets, total capital is computed as the sum of property, plant, and equipment and intangible capital measured by Peters and Taylor (2017).

affecting firms of different sizes, effectively matching firms within comparable size categories. Similarly, controlling for lobbying behavior matches firms with similar political engagement, ensuring that the estimated effects are not attributable to shocks to the value of political connections.

Our approach of controlling flexibly for observable characteristics acts similarly to propensity score matching, but with three advantages: it is transparent, preserves the full sample without dropping observations, and accommodates non-parametric relationships between covariates and outcomes rather than imposing linearity assumptions typical in matching methods.

5 Average Effects of EXIM's Shutdown

Our first set of results examines whether EXIM trade financing creates US exports. In the aggregate, we find that EXIM's exit led to a sizable decline in exports of products that received more financing prior to the shutdown. We then show how this contraction in foreign sales also lowered average firm exports, total revenues, investment, and hiring.

5.1 Average Effects on Exports

We begin by estimating equation (10) 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 to capture the effect of EXIM's shutdown on aggregate exports by product.[26]

[26] 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. We address this issue by winsorizing the extreme values of

Table 2 reports the results. Columns 1–3 illustrate the aggregation property of the disaggregation invariance method developed in Beaumont, Matray, Tu and Xu (2026) and show that the estimated β recovers exactly the same point estimate and standard errors whether we work at the origin $\times$ (HS-4) product level, the origin $\times$ (HS-6) product level, or at the origin $\times$ (HS-6) product $\times$ destination level, as long as we include the same set of fixed effects and weight the regressions appropriately.[27] The coefficient of -4.49 means that a $1 change in EXIM trade financing generates a change of -$4.49 in total US exports at the product level.

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 finely classified product to the same destination 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). The stability in the point estimates implies that the exposure to EXIM is uncorrelated with product-by-destination specific demand and risk shifters. Column 6 estimates a binary specification, where $\text{EXIM}_{po} \geq 0.45\%$ is an indicator for top-quartile exposure, expected to carry a negative coefficient if EXIM's shutdown reduced exports of highly exposed products. The coefficient 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 a linear effect of the dosage treatment is a reasonable approximation that, if biased, understates the true effect of EXIM's shutdown on total exports.

In Figure 4, we plot the yearly point estimates and the 95% confidence intervals of the annual event study from equation (9). No differential pre-trends appear prior to the shock, and exports then decline progressively 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. Following standard event-study practice (e.g., Autor, 2003; Marcus and Sant'Anna, 2021), we formally test the plausibility of the parallel-trends assumption by estimating whether the pre-treatment event-time coefficients are jointly equal to zero. The joint F-statistic is 0.24 (p-value = 0.915), implying we cannot reject the null that the pre-treatment coefficients are jointly zero, consistent with parallel pre-trends.

The primary threat to identification is that demand shocks are exporter-by-product specific (i.e., at the level of $\zeta_{p,o,t}$). However, such a demand shock is unlikely to explain our results for several reasons. First, the "trade war" between China and the US did not begin until 2018, well after the

the weights at 5%, and we report the robustness of the results when we equal weight the data, winsorize at 1%, or use time-invariant weights in Appendix Table A.3.

[27] The number of observations reflects the increasing granularity of the data. Weights 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: $A_{o,hs6,t} \Big/ \left(\sum_{hs6 \in [o,hs4,t]} A_{o,hs6,t} \right)$, which 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 β as measuring the effect of EXIM on aggregate exports.

Table 2: EXIM's Shutdown Reduces 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 (HS-4)×Year	✓	✓	✓	—	—	—
Product (HS-6)×Year	—	—	—	✓	—	—
Product (HS-6)×Destination×Year	—	—	—	—	✓	✓
Observations	109,208	8,541,850	24,143,761	24,143,761	24,143,761	24,143,761

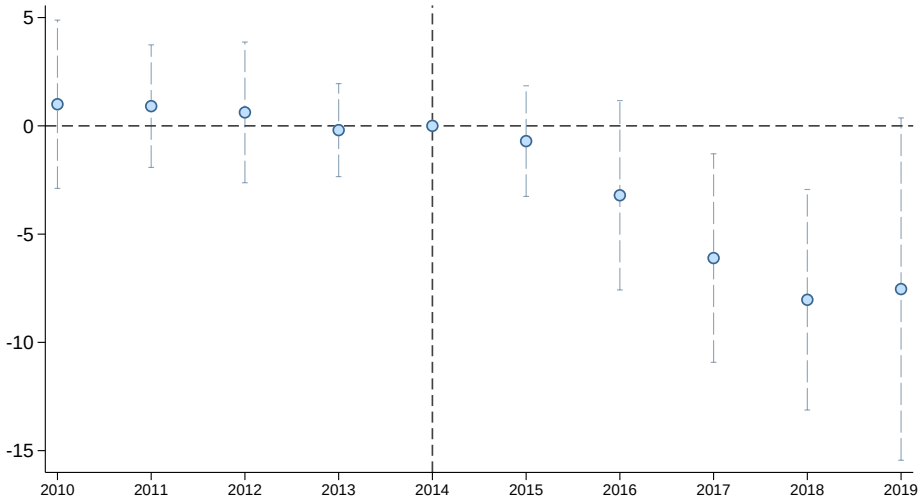
Notes: This table reports estimates on the effect of EXIM's shutdown on aggregate exports at the product-by-destination level taken from BACI. The dependent variable is the exports growth rate of origin country o (exporter) to destination country d (importer) of product p at time t relative to 2014 (the 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 to the US. EXIM intensity (EXIM_{po}) in columns 1-5 is defined as the total amount of EXIM (in \$) over total exports (in \$) over the period 2007–2010. In column 6, $\text{EXIM}_{po} \geq 0.45\%$ is an indicator variable for a product being in the top quartile of treatment value. Products are defined by the standard trade classification Harmonized System (HS) code. In columns 1–3, the coefficients and standard errors are identical by construction of the midpoint growth estimator (Beaumont, Matray, Tu and Xu, 2026). Standard errors are clustered at the HS-4 level and are reported in the line below the point estimate in parentheses, and p-values are reported in brackets below them. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

exports of EXIM-dependent products began to decline (Figure 4). Second, Appendix Figure B.1 Panels A and B report leave-one-out distributions of point estimates and t-statistics, sequentially excluding each 3-digit product or destination. The estimates remain tightly centered around the baseline effect in Table 2, indicating that the results are not driven by a small number of products or destinations exposed to contemporaneous shocks.

Third, we further address concerns about demand-side confounders using firm-level evidence from Datamyne bills-of-lading data, which records maritime exports at the firm-by-product-by-destination level. Because the comparison is between US exporters shipping the same HS-6 product to the same destination, country-specific tariff shocks (e.g., the 2018–19 China tariffs on certain US products) and other unobserved product-destination demand shocks are absorbed by fixed effects, so the analysis does not rely on the industry-level identifying assumption. Appendix Table A.4 reports the results. The point estimate of -0.18 implies an average impact of -5.0 on export sales, similar in magnitude to the aggregate product-level estimate.

Interpretation of magnitudes. Because $EXIM_{p,o}$ and $\Delta^{2014} Export_{p,o,d,t}$ are both normalized by pre-shutdown export values, β is the *dollar pass-through* of EXIM financing to US exports. The coefficients estimated in Table 2 are between 4 and 5, implying that a \$1 contraction of financing reduces export revenues by \$4–5. This is an *export revenue* elasticity, not a *return* elasticity, so the

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 product (HS-6)-by-destination level from the event study defined in equation (9) with product-destination-year and origin-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 to the US. EXIM intensity (EXIM_{po}) is defined as the total amount of EXIM (in \$) over total exports (in \$) over the period 2007–2010. Standard errors are clustered at the HS-4 product level. The F-statistic estimating whether the pre-treatment event-time coefficients are jointly equal to zero (e.g., Autor, 2003; Marcus and Sant'Anna, 2021) is 0.24 (p-value = 0.915).

magnitude of 4.49 should not be read as a return on EXIM lending.[28]

The magnitude is consistent with the working-capital intensity of exporting. Producing and shipping foreign sales requires roughly \$0.20–0.25 of working capital per dollar of revenue, reflecting the inputs, inventories, and payment delays standard in international trade.[29] Relaxing \$1 of a binding financing constraint can therefore support approximately \$4–5 of additional export sales. Because EXIM support can complement internal liquidity, private credit, and trade credit, the coefficient captures the reduced-form effect of relaxing the overall financing constraint on exporting.

Possible SUTVA violation. By construction, our baseline specification accounts for all types of business stealing that could happen across firms or across destinations within the same HS-4. To test for higher level of possible spillovers (positive or negative), we follow the strategy recommended in Beaumont, Matray, Tu and Xu (2026) and re-estimate our specification across different levels of aggregation, from HS-6 to HS-2. As we use coarser aggregation levels, more of the across-firm reallocation within a product category is netted out. Across all levels, we find that the coefficient remains virtually unchanged (Appendix Table A.1), suggesting that EXIM was mostly creating net additional trade for the US.

[28] Calculating the return would require observing the profit of each new marginal export project.

[29] For exporters in Compustat, the ratio of working capital (receivables plus inventories) to total revenues averages 27%; the BIS estimates a similar 30% (Committee on the Global Financial System, 2014).

5.2 Average Effects on Firm Outcomes

The results above reject two hypotheses about EXIM support: (a) that such support is just infra-marginal, and thus has no effect on exports, and (b) that it merely reallocates market share across US firms, and thus does not affect overall product-level exports. Nonetheless, the shutdown may have had limited effects on firm investment and employment if EXIM-backed firms were able to compensate for the loss of their exports by increasing domestic sales.

5.2.1 Effect on Total Revenues

Baseline effect. To test whether the shutdown and contraction in exports affect firms' total revenues, we begin by estimating the β coefficient in equation (12) 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.[30] Table 3 reports our results. Column 1 is estimated with the sparsest set of controls: only year fixed effects. Column 2 includes industry-by-year fixed effects to account for the potential correlation between the treatment exposure and unobserved industry shocks (e.g., differential demand shocks). Column 3 is our preferred specification that includes both industry-by-year and exporter-by-year fixed effects, with the latter controlling for the correlation between the treatment and other trade-related shocks.

The estimated effect on total revenues is stable across the different sets 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 conduct additional robustness exercises. Column 4 includes a battery of additional firm-level controls: the fiscal month of firms' reporting of their annual accounts, firm size (terciles of total assets), firm leverage and profitability, and firm lobbying expenditure (measured using 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 and remains quantitatively similar whether we exclude: non-exporting firms (column 5), the ten firms with the highest pre-period reliance on EXIM support including Boeing (column 6),[31] or all industries that are in the top tercile of dependence on government spending (column 7). That the point estimate remains unaffected indicates the effect is not driven by a broader shock to government spending that would affect firms more dependent on such spending, but instead is specific to EXIM's shutdown.

[30] For the firm-level D-i-D analyses in this section, we weight the regressions by firm revenue, measured as the average of firm revenue in 2014 and in year t and winsorized at 5%, following 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.

[31] EXIM authorizations are skewed in dollar value because of differences in firm size and transaction scale: the top 10 recipients account for 64.7% of total authorized amounts by dollar value, with Boeing alone accounting for 34.0%. The list of top 10 recipients also includes: Cytosorbents Corp, Energy Recovery Inc, Everspin Technologies Inc, Full Spectrum Inc, Impinj Inc, Mycelx Technologies Corp, Optical Cable Corp, Stereotaxis Inc, and Xtera Communications Inc. Importantly, this skewness does not mechanically drive our firm-level treatment because $EXIM_i$ is an indicator for whether a firm received any pre-shutdown EXIM support rather than a dollar-weighted measure of authorizations.

Finally, in column 8, we estimate a triple difference where we interact the D-i-D variable with an indicator variable that takes the value of one if the firm received a large loan from EXIM prior to its shutdown, which acts as a proxy for firms' likelihood of depending on large loan financing. We define large loans as those in the top tercile of the loan distribution, and we interact all the fixed effects with an indicator variable for the firm receiving any EXIM loan prior to the shutdown.

In this exercise, the coefficient of interest is estimated *within* EXIM-dependent firms as the EXIM-by-year fixed effect controls for any time-varying unobserved shocks specific to all EXIM-dependent firms.[32] The coefficient and standard error remain nearly identical to the baseline effect that we estimate in column 3, indicating that our results are unlikely to be driven by endogenous selection of firms receiving EXIM financing.

Table 3: EXIM-Dependent Firms Experience Revenue Declines After Shutdown

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]	[0.0054]	
$\text{EXIM (Large loans)}_i \times \text{Post}_t$								-0.096**
								(0.045)
								[0.032]
Fixed Effects								
Year	✓	—	—	—	—	—	—	—
Exporter×Year	—	—	✓	✓	✓	✓	✓	—
Industry×Year	—	✓	✓	✓	✓	✓	✓	—
Fiscal month×Year	—	—	—	✓	—	—	—	—
Size×Year	—	—	—	✓	—	—	—	—
Balance sheet controls×Year	—	—	—	✓	—	—	—	—
Lobbying×Year	—	—	—	✓	—	—	—	—
EXIM×Industry×Year	—	—	—	—	—	—	—	✓
EXIM×Exporter×Year	—	—	—	—	—	—	—	✓
Observations	25,174	25,174	25,174	24,511	18,438	25,109	20,207	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 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, international activity in its 10-Ks, exports in Datamyne, or taxable foreign income before 2014. Industries are SIC-2. Column 5 excludes firms that are not exporting prior to the shutdown, and column 6 removes the top ten recipients of EXIM support in the pre-period. Column 7 removes industries that are most dependent on government policies, which we construct 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). Finally, in column 8 we interact $EXIM \times Post$ with an indicator variable *Large loans* that takes the value one if the support was in the top tercile of EXIM's financing distribution prior to its shutdown, as these firms were particularly affected by the loss of the bank's board quorum. We interact $EXIM$ with exporter-by-year and industry-by-year, in which case $EXIM \times Post$ is no longer identified. Standard errors are clustered at the firm level and are reported in the line below the point estimate in parentheses, and p-values are reported in brackets below them. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

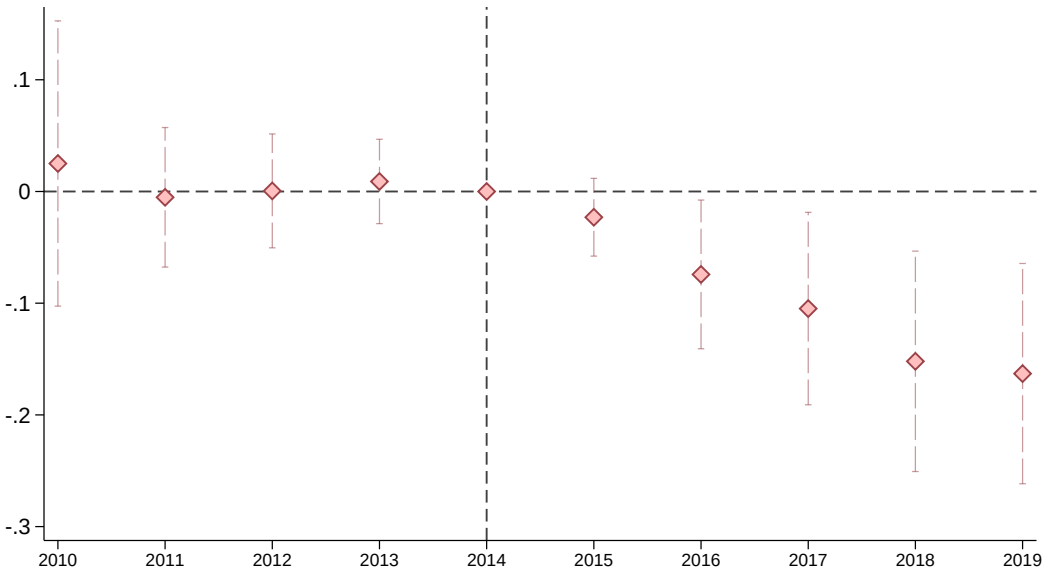
Figure 5 plots the yearly coefficients of β_k and 95% confidence intervals of the growth of total revenues relative to 2014 for the dynamic event study in equation (11), controlling for the full set of firm characteristics (industry, exporter status, size, leverage, profitability). The F-statistic

[32]The primary D-i-D coefficient $EXIM \times Post$ is no longer identified, as it is now collinear with the fixed effects.

for joint significance of the coefficients in the pre-period is 0.22 (p-value = 0.926), supporting our assumption of parallel trends. Appendix Figure B.3 Panel A 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. Appendix Figure B.3 Panel B shows the event study in the quarterly data, which allows us to define the shock *within* 2015. As in our baseline specification, there are no differential pre-trends and the divergence between treated and control firms begins in the first observable time period after the shutdown, in this case the third quarter of 2015.

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

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 (11) with industry-by-year and exporter-by-year fixed effects. The dependent variable is the growth rate relative to 2014 defined as $\Delta Y_{i,t} = (Y_{i,t} - Y_{i,2014})/Y_{i,2014}$. Standard errors are clustered at the firm level. The F-statistic estimating whether the pre-treatment event-time coefficients are jointly equal to zero (e.g., Autor, 2003; Marcus and Sant'Anna, 2021) is 0.22 (p-value = 0.926).

Interpretation of magnitudes. The coefficient of -0.12 (column 3) implies that shutting down EXIM lowered total firm revenue by 12%. On average, EXIM financing amounted to 2.4% of total revenues for treated firms, so a one dollar reduction in EXIM financing lowered treated firms' total revenues by \$4.9 (12%/2.4% = 4.9). Since the dollar pass-through on foreign sales is about \$4.5 (Table 2 and Appendix Table A.4) and using the accounting identity that $\Delta TotalRevenues = \Delta Exports + \Delta Domestic$, we can deduce that the EXIM-driven reduction in foreign sales had if anything a *negative* effect on domestic sales by approximately \$0.40. Appendix D.1 shows that we can estimate this positive elasticity between foreign and domestic sales to be between 2.3% and

6.0%.

Implication for firm production functions and comparison with the literature. 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. These results are instead consistent with models of intra-firm spillovers, which can emerge from knowledge transfers (e.g., Ding, 2024), vertical supply linkages (e.g., Desai, Foley and Hines, 2009; Boehm, Flaaen and Pandalai-Nayar, 2019), or financing frictions and internal capital markets (e.g., Lamont, 1997; Giroud and Mueller, 2019).

Our findings are particularly likely to reflect the role of internal capital markets because EXIM designs its program to service financially constrained firms (Table D.4 and Appendix C.3). When firms face financing constraints and use internal capital markets to finance projects across different markets, theory predicts positive spillovers between markets (Stein, 1997). In our context, the reduction in exports acts as a negative cash flow shock for treated firms, tightening their financing constraints and affecting their domestic sales.

Additional robustness. We conduct several additional robustness checks showing results are not driven by specific firms or industries. Appendix Figure B.2 reports coefficients and t-statistics from 336 regressions excluding each 4-digit industry individually, which cluster tightly around the average values in Table 3 and Figure 5, showing that no single industry drives the results.

Discussion. Because trade relationships involve substantial sunk costs and exhibit considerable stickiness (e.g., Eaton, Kortum and Kramarz, 2011), our estimates during the curtailment period likely underestimate the full long-run impact of EXIM. Existing buyer-seller matches may survive for some time even after financing support is withdrawn, and the gradual growth of the estimated effects over the post-period is consistent with the progressive erosion of established trade relationships. Moreover, because our treatment variable is based on pre-period EXIM exposure rather than the actual change in financing during the curtailment, our estimates are intent-to-treat effects; any residual EXIM activity during the curtailment further attenuates the estimated difference between treated and control units. Our estimates should therefore be interpreted as conservative lower bounds on the long-run effects of ECA support.

5.2.2 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 specification in equation (12) and replace firm revenue growth with firms' change in capital, labor, and operating profit margins (EBIT over revenues).

Table 4 shows that EXIM's shutdown reduced both investment and hiring. Intangible capital shrinks slightly more than tangible capital (-19% vs -14%), in line with intangible capital being more sensitive to financing frictions and therefore fluctuating more with firm revenues (e.g., Hombert and

Table 4: 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). Tangible capital is "property, plants, and equipment." Profit margin is measured as net income over revenues. The dependent variable is the growth rate relative to 2014 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, international activity in its 10-Ks, 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 parentheses, and p-values are reported in brackets below them. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

Matray, 2017). Column 4 reports the effect on employment. Profit margins, in contrast, remain unaffected: the economically small and statistically insignificant estimate (column 5) indicates EXIM financing did not artificially inflate profit rates before the shutdown. Appendix Figure B.4 presents event studies for each outcome.

6 Impact on Capital Allocation

Section 5 shows that EXIM financing was not inframarginal on average: when support was withdrawn, treated firms and exposed export markets contracted. We now ask whether the shutdown also changed the allocation of capital across firms.

The model gives two conditions under which a policy that raises firms' effective financing capacity, $\theta_x a_i$, improves capital allocation among exporters. First, constrained firms must respond more to a unit change in the policy dose IP_i than less constrained firms (Proposition 1). Second, the policy dose must not be tilted so strongly toward unconstrained firms that this targeting offsets the larger response by constrained firms (Lemma 2 and Proposition 2). The empirical analysis assesses each condition in turn.

6.1 Estimating Changes in Misallocation in the Data

Measuring MRPK. To bring the model to the data, we assume firms have Cobb-Douglas revenue production functions,

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

where i, j, and t index firm, industry, and year. In this case $\text{MRPK}_{it} = \alpha_j^k Revenue_{it}/K_{it}$, so $Revenue_{it}/K_{it}$ provides a within-industry measure of MRPK under the assumption that all firms in an industry share the same capital share α_j^k.[33]

A classic empirical challenge in the misallocation literature is that the cross-sectional distribution of MRPK does not necessarily recover the distribution of financing wedges. In the model,

$$\text{MRPK}_{i,x} = \bar{r}_x(1+\tau_{i,x}), \qquad \tau_{i,x} = \phi_x \lambda_i,$$

where $\bar{r}_x$ is the risk-adjusted export user cost common within an export-market cell and λ_i is the shadow price of firm i's export-financing constraint. In richer settings, measured MRPK may also reflect markups, capital shares, or measurement error. A pure cross-sectional exercise that reads the level distribution of wedges off the level distribution of MRPK would be contaminated by these non-wedge components.

Our design relies on much milder assumptions because we focus on the *change* in misallocation induced by the policy. As such, it is sufficient to identify whether ex-ante more distorted firms (i.e., ex-ante high-MRPK firms) become relatively larger or smaller due to the policy and for our empirical classification of high-MRPK to be only weakly correlated with firm structural wedges. By focusing on the within-firm change in capital in this way, we only need to classify a firm as being high-MRPK, which we define as having above-median MRPK within a specific group of firms. We define groups within which firms are likely to share the same production functions.

Triple-difference design. To base identification on the change in capital rather than the cross-sectional level of MRPK, we estimate the differential within-firm response of high- and low-MRPK firms using the Bau and Matray (2023) triple-difference specification:

$$\begin{aligned}\Delta^{2014} K_{i,j,t} = {} & \beta_1 \; EXIM_i \times Post_{t\geq 2015} \times H_i^{MRPK} \\ & + \beta_2 \; EXIM_i \times Post_{t\geq 2015} \\ & + \Gamma_{i,j,t} + H_i^{MRPK} \otimes \Gamma_{i,j,t} + \varepsilon_{i,j,t},\end{aligned} \tag{13}$$

where $\Delta^{2014} K_{i,j,t}$ is capital growth relative to 2014, H_i^{MRPK} is an indicator equal to one if firm i is above the median MRPK in its pre-period sorting cell, and $\Gamma_{i,j,t}$ collects the baseline fixed effects and controls: industry-by-year, exporter-by-year, and pre-period firm characteristics interacted with year. The operator $\otimes$ denotes the full interaction with the high-MRPK indicator, which allows high- and low-MRPK firms to follow different trends along these baseline dimensions.

This design identifies β_1 as the differential effect of the shutdown on investment of high-MRPK firms relative to low-MRPK firms, among EXIM-dependent versus non-dependent ones.

Proposition 1 predicts $\beta_1 < 0$: when EXIM financing is withdrawn, initially tighter high-MRPK

[33] This assumption is for simplicity; the methodology accommodates other production functions. Appendix Table D.2 reports similar results when we estimate the production function using Olley and Pakes (1996), use a user-cost measure similar to Baqaee and Farhi (2020), or assume a more general CES production function.

firms contract more than low-MRPK firms. The coefficient β_2 is the capital response of low-MRPK exporters to the shutdown, so $\beta_1 + \beta_2$ is the total response of high-MRPK exporters.

Identifying assumptions. Since β_1 is *not* identified from cross-sectional MRPK levels, components of MRPK that are time-invariant but unrelated to the wedge, such as a firm's cell-level user cost $\bar{r}_x$ and classical measurement error, do not bias β_1. The only extent to which they impact the estimation is to weaken the alignment between the rank and the wedge and therefore attenuate β_1 toward zero. More generally, equation (13) is identified under the triple-difference assumption that, absent the shutdown, the high-minus-low MRPK difference would have evolved similarly for EXIM-dependent and non-dependent firms within the relevant cells.

This assumption is weaker than the difference-in-difference requirement that either high- and low-MRPK firms follow the same trend or that EXIM-dependent and non-dependent firms follow the same trend. The interaction $H_i^{MRPK} \otimes \Gamma_{i,j,t}$ allows high- and low-MRPK firms to have different trends along the baseline controls, and the specification absorbs the average EXIM-dependent trend through the lower-order treatment term or EXIM-by-year fixed effects in the pooled columns.

Threats to identification are unobserved shocks to treated high-MRPK firms that occur exactly when EXIM is withdrawn. However, our empirical strategy allows us to include increasingly demanding sets of fixed effects that absorb shocks along different dimensions of firm characteristics. For example, we can address concerns that there are potentially shocks to riskier firms by comparing high and low-MRPK firms within increasingly smaller buckets for industries and firm risk. We then interact the vector that identifies each unique cell with all the other time varying fixed effects such that we absorb all time-varying shocks that load on those characteristics.[34]

Empirically, we define high- and low-MRPK firms based on four increasingly finer levels: SIC-4 industries; SIC-4 × pre-period size quartiles, where size is measured by firm employment; SIC-4 × size × risk quartiles, where risk is the CAPM beta computed from monthly returns before 2015; and SIC-4 × size × destination cells.[35]

6.2 EXIM Shutdown Increases Capital Misallocation

Figure 6 provides graphical evidence by estimating the effect of EXIM's shutdown separately for high- and low-MRPK firms. The figure shows no differential pre-trends for either group, consistent with the identifying assumption. After the shutdown, high-MRPK firms contract investment

[34] To see why such narrow sorting addresses possible biases coming from unobserved shocks to treated high-MRPK firms that occur exactly when EXIM is withdrawn, let $m_i \equiv \log \text{MRPK}_{i,0}$ denote the pre-period sorting variable. We then have:

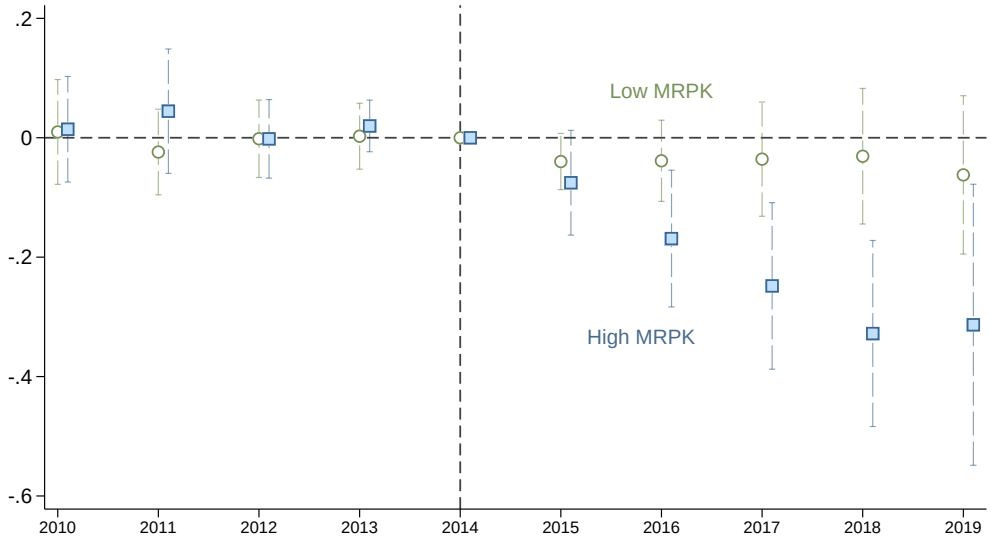
$$m_i = \log \bar{r}_{c(i),0} + \log(1 + \tau_{i,0}) + \eta_i,$$

where $c(i)$ is the sorting cell for firm i in market x, $\bar{r}_{c(i),0}$ is common within that cell, $\tau_{i,0}$ is the firm-specific export-finance wedge, and η_i captures measurement error and other idiosyncratic components. Sorting firms within $c(i)$ removes the common component $\bar{r}_{c(i),0}$, such that the remaining high-versus-low comparison of MRPK loads on the firm-specific wedge in the model, and interacting $\bar{r}_{c(i),0}$ with the year fixed-effect ensures we allow for unobserved time-varying shocks along the $\bar{r}_{c(i),0}$ dimension.

[35] Using employment rather than assets for the size split avoids a mechanical correlation between MRPK and capital from measurement error. The results by destination are in Appendix Table D.3.

significantly more than low-MRPK firms, indicating that capital moves away from firms with high ex-ante marginal returns.

Figure 6: EXIM's Shutdown Amplifies Capital Misallocation



Notes: This figure plots the effect of EXIM's shutdown on investment, estimated separately for firms with high and low MRPK, along with 95% confidence intervals. We include 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 defined as $\Delta Y_{i,t} = (Y_{i,t} - Y_{i,2014})/Y_{i,2014}$. Standard errors are clustered at the firm level.

This heterogeneity shows that EXIM's impact stems from its ability to relax financing frictions facing constrained exporters. When exporters are less constrained, and hence have lower MRPK, EXIM's shutdown has limited effect. This muted response among lower-MRPK firms is consistent with the concern that ECA financing can be inframarginal when recipients have access to alternative sources of funding.

Table 5 shows the results from estimating equation (13). We report the outcomes when we estimate separate regressions for a sample split by MRPK (columns 1, 2, 4, 5, 7, and 8) or estimate a regression in the full sample with a triple interaction (columns 3, 6, and 9). In the triple-difference regression, we directly control for EXIM × year fixed effects such that the difference-in-differences coefficient $EXIM_i \times Post_t$ is not estimated.

In columns 1–3, we replicate Figure 6 by estimating the change in capital across the MRPK distribution computed within the same industry. The coefficients indicate that low-MRPK firms are barely affected by the shock (5%, not statistically significant), high-MRPK firms reduce investment by 19%, and the gap between the two groups widens by 14% (Table 5, columns 1–3).[36]

Columns 4–6 report the results when we adjust the MRPK sorting for differences in size, and

[36]This asymmetric response is also why we focus on differential input changes rather than changes in the variance of TFPR. As shown by Bau and Matray (2022), a change in industry-level TFPR dispersion identifies a change in misallocation only under assumptions such as joint log-normality of TFPR and TFPQ, which imply approximately symmetric responses by high- and low-MRPK firms. Our estimates show the kind of asymmetric response that violates this restriction.

columns 7–9 when we adjust for differences in risk using CAPM betas. In all cases, we find similar point estimates, and if anything larger magnitudes for high-MRPK firms, while low-MRPK firms remain largely unaffected (Table 5, columns 4–9). The stability of the estimates when controlling for risk does not imply that EXIM failed to reduce export risk; rather, any risk-reduction benefits appear to have been distributed uniformly across high- and low-MRPK firms.

Table 5: EXIM's Shutdown Increases Capital Misallocation

Dependent variable	Investment								
MRPK sorting	SIC-4			SIC-4×Size quartile			SIC-4×Risk quartile		
Sample	Low	High	All	Low	High	All	Low	High	All
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
$EXIM_i \times Post_t$	-0.054	-0.19***		-0.054	-0.21***		-0.018	-0.17***	
	(0.041)	(0.053)		(0.035)	(0.070)		(0.046)	(0.061)	
	[0.19]	[0.00044]		[0.12]	[0.0031]		[0.69]	[0.0060]	
$EXIM_i \times Post_t \times I_i^{\text{High MRPK}}$			-0.14**			-0.16**			-0.15**
			(0.067)			(0.078)			(0.076)
			[0.042]			[0.045]			[0.050]
Fixed Effects									
Exporter×Year	✓	✓	—	—	—	—	—	—	—
Industry×Year	✓	✓	—	—	—	—	—	—	—
Exporter×Size×Year	—	—	—	✓	✓	—	—	—	—
Industry×Size×Year	—	—	—	✓	✓	—	—	—	—
Exporter×Risk×Year	—	—	—	—	—	—	✓	✓	—
Industry×Risk×Year	—	—	—	—	—	—	✓	✓	—
EXIM×Year	—	—	✓	—	—	✓	—	—	✓
Fixed Effects (interacted)									
Exporter×Year	—	—	✓	—	—	—	—	—	—
Industry×Year	—	—	✓	—	—	—	—	—	—
Exporter×Size×Year	—	—	—	—	—	✓	—	—	—
Industry×Size×Year	—	—	—	—	—	✓	—	—	—
Exporter×Risk×Year	—	—	—	—	—	—	—	—	✓
Industry×Risk×Year	—	—	—	—	—	—	—	—	✓
Observations	13,615	11,020	24,635	15,033	8,763	23,796	13,105	7,163	20,268

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 employment distribution. $I_i^{\text{High MRPK}}$ is an indicator that takes the value one if the firm is above the median. In columns 7–9, risk is defined as the firm returns' "equity beta" (i.e., the comovement between the firm stock price return and the market return). The dependent variable is the growth rate relative to 2014 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, international activity in its 10-Ks, exports in Datamyne, or taxable foreign income before 2014. Industries are SIC-2. In columns 3 and 6, all the baseline fixed effects are interacted with $I_i^{\text{High MRPK}}$. Standard errors are clustered at the firm level and are reported in the line below the point estimate in parentheses, and p-values are reported in brackets below them. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

Robustness. The misallocation result is robust to how we measure and sort on MRPK. Appendix Table D.2 re-estimates the triple-difference using alternative measures of the capital wedge: MRPK from an Olley and Pakes (1996) production-function estimate, the user-cost measure of Baqaee and Farhi (2020), total-input TFPR, and CES-based input-cost ratios. The differential

contraction of high-MRPK firms is similar throughout. Appendix Table D.3 instead ranks firms on MRPK within industry × size and within destination region separately, keeping only the firms that fall on the same side of both rankings, which absorbs destination-specific sources of MRPK dispersion such as destination risk or returns; destination regions come from the Hoberg and Moon (2017) offshoring data, and the result holds whether they are measured from mentions of sales activity alone or from sales and sourcing activity together.

6.2.1 Policy targeting

The reallocation effect depends not only on the per-unit response estimated above but also on how EXIM support was distributed across firms (Lemma 2). We therefore assess the incidence of EXIM support directly by regressing firms' pre-period MRPK on pre-shutdown EXIM exposure, adding increasingly saturated fixed effects for industry, exporter status, size, risk, and lobbying expenditures. Across four specifications, the coefficient on EXIM exposure ranges from 0.05 to 0.20, with p-values between 0.55 and 0.88 (Appendix Table A.8). Thus, we find no evidence that EXIM support was tilted toward low-MRPK firms. In the language of the model, the targeting covariance is approximately zero, $\rho \approx 0$, so the differential response documented in Table 5 is not offset by adverse policy targeting.

The absence of adverse targeting is consistent with EXIM's institutional design (Section 2.2.1). Firms must first demonstrate that private financing is unavailable to them, which selects toward firms facing binding financing constraints. At the same time, EXIM is required to maintain a portfolio default rate below 2%, which limits support to firms that are plausibly solvent. These eligibility and governance constraints make it unlikely that EXIM support is systematically directed toward firms with slack financing constraints and low marginal returns to capital.

6.2.2 Aggregate TFP loss

Using the methodology of Bau and Matray (2023) to quantify the effect of a policy shock on the economy's Solow residual, we estimate that the increase in capital misallocation caused by the EXIM shutdown changed aggregate TFP by -1.22 to -1.56 percentage points. Appendix D.3 presents the full computation and an intensity-weighted version that accounts for heterogeneity in firms' pre-shock reliance on EXIM financing.

6.3 Interpreting the Differential Response

6.3.1 Evidence on the source of the wedge

The misallocation result above identifies high-MRPK firms as those for which capital is undersupplied, but it does not directly identify the source of the wedge. We now provide evidence that the wedges correspond to two specific frictions predicted by the institutional context of Section 2.2.1: firm-level financing constraints and destination-market contractual frictions. The convergence of

the two pieces of evidence supports the interpretation that the input-cost wedge $\tau_{i,x}$ in our framework reflects financing-related frictions in cross-border trade rather than unmeasured sources of MRPK dispersion such as differences in capital shares or risk-adjusted real returns.

Firm financing frictions. We use four standard proxies for ex-ante financing constraints: firm age, industry leverage, the text-based Hoberg and Maksimovic (2015) measure on private debt delays, and the industry coverage ratio. For each, we sort firms into terciles and estimate a triple-difference that interacts EXIM exposure with the proxy. The shutdown's effect on investment is consistently concentrated in the most-constrained tercile, where it is roughly twice as large as in the least-constrained tercile (Appendix D.5). The effect is also larger for firms with above-median pre-shock reliance on EXIM financing (Appendix D.2), consistent with the effects being driven by firms for which EXIM support was economically meaningful.

Destination-market frictions. Using proxies that capture distinct dimensions of the cross-border environment such as rule of law (Kaufmann, Kraay and Mastruzzi, 2011), financial development, US bank presence, and the share of state-owned banking assets (Panizza, 2024), we examine whether EXIM's effect is concentrated in destinations with weaker contractual or financial environments. Firm-level shipments (using Datamyne bill-of-lading data) show effects that are 30 to 55% more negative in high-friction destinations than in low-friction destinations (Appendix D.6), consistent with EXIM's institutional mandate.[37]

6.3.2 Input wedges and output markups

Dispersion in MRPK captures distortions that drive a wedge between the observed and efficient allocation of inputs. In the model, the relevant distortion is the export-financing wedge $\tau_{i,x}$; in richer environments, MRPK may also reflect heterogeneous markups. The distinction between financing wedges and markups is not central for the allocative-efficiency result. In either case, firms with high MRPK are too small relative to the efficient allocation, and a shock that disproportionately reduces their capital increases misallocation and lowers aggregate TFP (Restuccia and Rogerson, 2008; Hsieh and Klenow, 2009; Baqaee and Farhi, 2020; Edmond, Midrigan and Xu, 2023).[38]

6.3.3 Form of the policy: Risk-adjusted user costs versus financing wedges

The concentration of the response in high-MRPK firms, with low-MRPK firms barely responding, is informative about the form of the policy intervention. A shock to effective financing capacity

[37] We discuss two alternative non-financing channels in Appendix D.5. First, EXIM does not run marketing or export-promotion programs, so promotional channels cannot explain our results. Second, a private-sector "wait-and-see" response is hard to reconcile with the duration of the shutdown and with the firm- and destination-level heterogeneity we document.

[38] The pattern is nevertheless more naturally aligned with a financing-wedge interpretation. In variable-markup models, firms with greater market power tend to absorb shocks through markup adjustment and exhibit smaller quantity responses, whereas Table 5 shows larger real responses among high-MRPK firms. See Berman, Martin and Mayer (2012); Amiti, Itskhoki and Konings (2014).

implies a sign-identifying moment: more constrained, high-MRPK firms respond more strongly to a change in the policy dose IP_i than less constrained firms. By contrast, a common change in the risk-adjusted export user cost $\bar{r}_x$ generates no differential response across the MRPK distribution for a given product-destination market (Corollary 1). The observed asymmetry in Table 5 implies that EXIM most likely takes the form of a relaxation in the firm financing friction rather than a subsidy to the risk-adjusted cost of capital.[39]

7 Discussion

7.1 Additional Channels for Welfare

The model's welfare decomposition in equation (8) identifies three margins through which the partial-equilibrium gains we estimate could be attenuated at the aggregate level: terms-of-trade effects, capital market crowding-out of domestic production, and the net resource cost of the program. We test each directly and find that they are small in our setting.

7.1.1 Terms-of-Trade Effects

The model's terms-of-trade offset $\frac{1-w_x}{1-\alpha w_x}$ (Proposition 3) implies that part of the export-revenue gain from an ECA expansion is absorbed by a decline in the price index of Home varieties. We test this directly using BACI unit values, computed as the ratio of export value to quantity at the HS-6 product-by-destination-by-year level, and apply our baseline difference-in-differences specification with the same control group of OECD exporters as in the main analysis. Across six specifications spanning two outcome definitions (log levels and log growth rates) and three fixed-effect saturations, the coefficient on EXIM exposure is statistically insignificant and switches signs across columns (Appendix D.7.1). The absence of a price response implies that terms-of-trade considerations are not first-order in our setting, consistent with recent estimates of small US terms-of-trade elasticities (e.g., Amiti, Redding and Weinstein, 2019; Fajgelbaum, Goldberg, Kennedy and Khandelwal, 2020; Cavallo, Gopinath, Neiman and Tang, 2021).

7.1.2 Crowding Out Domestic Producer Capital

The model also predicts that an ECA expansion raises the equilibrium rental rate of capital, which could draw inputs away from domestic production. We test this directly by examining whether revenues of non-EXIM firms expanded during the shutdown, since a contraction of EXIM-backed firms lowers the domestic interest rate and could lead domestic firms to expand (Proposition 4).

[39] Whether high-MRPK firms should react at all depends on the microfoundation of the financing friction. If the friction produces quantity rationing, as in our model and in most macro-finance models, high-MRPK firms' capital is pinned at a borrowing ceiling set by effective financing capacity $\theta_x a_i$, not by the return to capital. If the friction instead operates through the price of capital, such as a smooth external-finance premium that rises with leverage, even constrained firms stay on an interior margin and expand by paying a higher premium, so high-MRPK firms can react, though by less than frictionless firms.

We use two samples (a broad sample of all non-EXIM firms, and a stricter sample restricted to firms with zero foreign sales in the pre-period), two exposure measures (the continuous EXIM intensity of the firm's NAICS-4 industry, and the share of treated firm sales within the industry or state), and two aggregation levels (industry and state). The estimated coefficients are small and statistically insignificant throughout (Appendix D.7.2). Three explanations are each individually sufficient to explain this absence of spillovers: EXIM is small relative to the US economy (~1.8% of US exports, ~0.16% of GDP); relaxing financing frictions unlocks rather than reallocates capital between domestic producers and exporters, so non-EXIM firms face no crowding-out pressure; and the misallocation channel raises aggregate output by raising aggregate TFP rather than by drawing new inputs into the export sector.

7.1.3 The Net Resource Cost of EXIM

The final term in equation (8) is the net resource cost of the program, dT/I. The model defines this object narrowly: $T = A_g + L_g^F$, the resources absorbed in running the agency plus credit losses to foreign counterparties net of recoveries (Appendix E.4.1). Payments between EXIM and the Treasury are transfers within Home and cancel in the national resource constraint, so neither EXIM's remittances to the budget nor the interest it pays on its Treasury borrowing is a component of T. We therefore use EXIM's accounts not to compute a budgetary surplus but to bound each of the two resource terms in turn. We also set $Y_g^F = 0$, discarding the fee and interest income EXIM collects from foreign borrowers, which makes the resulting bound conservative.

Operating resources (A_g). EXIM's administrative expenses were $107.1 million in FY2015, against $102.2 billion of exposure, or approximately 0.1 percent (Export-Import Bank of the United States, 2015). The welfare-relevant scaling is against Home income, making the term negligible: administrative expenses are 0.0006 percent of US GDP. Measured against the gains, EXIM authorized $27.3 billion a year over 2010–2014, which at the estimated pass-through of $4.49 per dollar corresponds to roughly $123 billion of annual export revenue. The operating-resource cost is 0.09 percent of that figure, three orders of magnitude below the export revenue term against which it is netted.

Foreign credit losses (L_g^F). Two components enter L_g^F: realized defaults net of recoveries, and any fair-value subsidy from lending to foreign borrowers below a risk-adjusted rate. On the first, EXIM's default rate was 0.175 percent in FY2014 (Export-Import Bank of the United States, 2015), an order of magnitude inside the 2% statutory cap whose breach freezes the agency's operations (Section 2.2.1), and fee and interest income covered its reported reserves for expected credit losses. The second component is harder to observe, because budget accounting under the Federal Credit Reform Act discounts at Treasury rates and so does not price the market risk EXIM bears; a fair-value adjustment would raise the measured cost. Two features of the setting bound how far. EXIM was not itself funded on subsidized terms: over 2006–2014 its implied borrowing rate on Treasury

debt was 4.8 percent against 4.0 percent on the 30-year Treasury bond, a difference of 0.8 percentage points (Appendix C.3.5), so its margins were earned while paying above the government's own long-term cost of funds. In addition, the default-rate cap constrains risk-taking ex ante, which helps to limit exposure to the states of the world in which a fair-value adjustment would matter most.

Bound on dT/I. Both components are therefore small relative to the export revenue and allocative gains estimated in Section 5 and Section 6. We do not use the $3.1 billion EXIM remitted to the Treasury between FY2009 and FY2015, recorded in the budget as "negative subsidy receipts" (Export-Import Bank of the United States, 2016), to claim $T < 0$: this is a domestic transfer and does not enter the resource constraint. However, this surplus indicates that fees and interest exceeded operating expenses, loss reserves, and funding costs, which bounds dT/I well below the gains and makes the net resource cost unlikely to overturn the overall welfare gains.

EXIM's capacity to cover these costs while serving constrained borrowers is consistent with its institutional advantages relative to private banks: lower marginal costs from enforcement and recovery technologies and from exemption from layers of banking regulation (Section 2.2.1 and Appendix C.3.3), and lower markups consistent with its dual objective of profitability and export promotion, mirroring government-owned banks in other development contexts (e.g., Assuncao, Mityakov and Townsend, 2022; Fonseca and Matray, 2024).

7.2 EXIM as an Industrial Policy Tool

7.2.1 Interactions with broader objectives

Industrial policy is traditionally motivated by social wedges that drive private investment away from the social optimum: external economies of scale, learning spillovers, environmental externalities, or geopolitical objectives. While we highlight a separate rationale stemming from frictions in the private market for financing, it is still the case that export credit can effectively target these broader objectives when social and financing wedges align. If the firms, sectors, or destinations that carry large social benefits also face binding export financing constraints, a transaction-level credit policy addresses both; export credit for green-energy producers or strategically important supply chains, for instance, may relax financing constraints while supporting activities with broader social value.

7.2.2 Optimal design

Uniform policy vs. picking winners. A policy that relaxes export financing constraints does not require the government to know more than the private sector about firms' risks or productivity. Because more constrained firms respond more to a given relaxation, even a uniform program that does not condition on which exporters are most constrained improves allocative efficiency; allocation worsens only if support is tilted toward unconstrained firms by enough to outweigh this stronger response by the constrained. ECAs therefore need not identify winners: by relaxing an observable

financing constraint on specific transactions, they improve allocation without forecasting which sectors will ultimately succeed.

Pledgeability versus pledgeable resources. ECAs can relax an exporter's financing constraint by improving the pledgeability parameter (θ_x) or by increasing the firm's pledgeable net worth (a_i). Corollary 2 shows that firm responses, and hence the allocative and aggregate effects, depend only on their product $\theta_x a_i$. The model is therefore agnostic about which channel a given program operates on.

One reading is that EXIM raises pledgeability θ_x: by improving recovery in default or enforcing repayment more effectively than a private lender, the government makes a larger share of a given project pledgeable. An alternative channel is that EXIM augments pledgeable resources a_i by posting a backstop or bearing the default risk itself. Therefore, just as a financing-constraint policy needs no informational advantage over private lenders, it also needs no technological advantage.

While either type of implementation has the same impact on firms, they may differ in their net resource cost. This resource cost is therefore an important component of the welfare evaluation alongside the allocative gains (Section 7.1.3).

8 Conclusion

Can governments raise exporting activity and welfare by providing trade financing? This paper's findings, based on a theory of financing-based industrial policy and the natural experiment of the US EXIM Bank's temporary shutdown, indicate the answer is yes.

The effects that we identify are inconsistent with the view that EXIM primarily transfers taxpayer funds to unconstrained firms that reap windfall profits without expanding production. Instead, the contraction of EXIM-dependent firms was more pronounced among those with higher marginal returns to capital, indicating that EXIM financing improves rather than worsens the allocation of resources in the economy, and is an effective tool of industrial policy.

Some caution is warranted in generalizing our results. First, we estimate the effects of EXIM at its current operational scale, so our results speak neither to the optimal size of ECAs nor to their effectiveness at substantially larger scales. Because EXIM's impact works through relaxing binding financing constraints in the private market, its effectiveness depends on those constraints being present: where other policies already ease the same frictions for the same firms, or where funding expands to firms that are no longer constrained, the marginal effect of ECA support would be smaller and could even exacerbate capital misallocation. Second, as discussed in Section 2.2.1, EXIM operates under specific governance constraints, including Congressional oversight, a strict default rate cap, and the Federal Credit Reform Act requirement of subsidy neutrality, that may be central to its effectiveness. Because the governance of export credit agencies varies substantially across countries, generalizing our findings to other ECAs should also be done with caution.

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Online Appendix for
"Industrial Policy and Capital Misallocation in Exporting"

Adrien Matray Karsten Müller Chenzi Xu Poorya Kabir

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A Additional Tables

Table A.1: Effect on Total Exports Across Product Aggregation Levels

Product aggregation level	HS-2 (1)	HS-3 (2)	HS-4 (3)	HS-5 (4)	HS-6 (5)
EXIM Exposure×Post	−5.79**	−5.28**	−4.49***	−4.74***	−4.20**
	(2.70)	(2.24)	(1.60)	(1.75)	(1.73)
	[0.034]	[0.020]	[0.005]	[0.007]	[0.015]
Fixed Effects					
Exporter×Year	✓	✓	✓	✓	✓
Product×Year	✓	✓	✓	✓	✓
Observations	1,150,362	1,978,251	8,541,850	18,961,838	24,143,761

Notes: The dependent variable is the midpoint growth rate of total exports. The treatment variable is the continuous EXIM exposure measure at the HS-4 level. Fixed effects are exporter×year and product×year, where the product classification matches the column header (HS-2 through HS-6). All regressions use midpoint trade weights and cluster standard errors at the HS-4 level. Standard errors in parentheses, p-values in brackets.

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

Dependent variable	Exports					
Level of aggregation	HS-4	HS-6	HS-6×Destination	HS-6×Destination		
	(1)	(2)	(3)	(4)	(5)	(6)
$\text{EXIM}_{p,o}\times\text{Post}_t$	-4.57***	-4.57***	-4.57***	-4.55***	-4.22**	
	(1.52)	(1.52)	(1.52)	(1.45)	(1.81)	
	[0.0028]	[0.0027]	[0.0027]	[0.0017]	[0.020]	
$\text{EXIM}_{p,o}\geq 0.45\%\times\text{Post}_t$						-0.056***
						(0.016)
						[0.00058]
Fixed Effects						
Origin×Year	✓	✓	✓	✓	✓	✓
Product (HS-4)×Year	✓	✓	✓	—	—	—
Product (HS-6)×Year	—	—	—	✓	—	—
Product (HS-6)×Destination×Year	—	—	—	—	✓	✓
Observations	174,795	13,909,467	39,610,152	39,610,152	39,610,152	39,610,152

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 to the US. Regressions are weighted as in the baseline specification (Section 5.1). The control group is defined as the fifteen OECD countries with the highest overlap with the US in their vector of export market shares across products and destinations. EXIM intensity (EXIM_{po}) in columns 1-5 is defined as the total amount of EXIM (in \$) over total exports (in \$) over the period 2007–2010. In column 6, $\text{EXIM}_{po} \geq 0.45\%$ is an indicator variable for a product being in the top quartile of treatment value. In columns 1–3, the coefficients and standard errors are identical by construction of the midpoint growth estimator Beaumont, Matray, Tu and Xu (2026). Standard errors are clustered at the HS-4 level and are reported in the line below the point estimate in parentheses, and p-values are reported in brackets below them. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

Table A.3: 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 (HS-6)×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 to 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 parentheses, and p-values are reported in brackets below them. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

Table A.4: Impact on Firm Maritime Exports

Dependent variable	Maritime Exports				
Sample	All 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 using firm-by-product-by-destination data from bills of lading data collected by Datamyne. Regressions are weighted following the same strategy as the baseline (Section 5.1), applied to shipment volume in TEUs. Data are collapsed as an average pre (up to 2014) and post period (2015–2019). The dependent variable is calculated as a midpoint growth rate based on the Beaumont, Matray, Tu and Xu (2026) 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 parentheses, and p-values are reported in brackets below them. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

Table A.5: Impact on Firm Revenues by Separate EXIM Programs

Dependent variable	Total revenues			
	(1)	(2)	(3)	(4)
EXIM (working cap)$_i$×Post$_t$	-0.15***		-0.12	
	(0.053)		(0.074)	
	[0.0058]		[0.10]	
EXIM (insurance)$_i$×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 defined as $\Delta Y_{i,t} = (Y_{i,t} - Y_{i,2014})/Y_{i,2014}$. *EXIM* (working cap)$_i$ and *EXIM* (insurance)$_i$ equal one if the firm received EXIM financing under the lending or insurance program, respectively; regressions are unweighted in columns 1 and 2 and use the same firm revenue weights as our baseline specification in columns 3 and 4. $Post_t$ equals one for 2015 to 2019, and $EXIM_i$ equals one if the firm received EXIM financing over the pre-shutdown period. The Exporter fixed effect equals one if the firm reports positive EXIM financing, foreign sales in Compustat Segment, exports in Datamyne, or taxable foreign income before 2014. Industries are SIC-4. Standard errors are clustered at the firm level and reported in parentheses below the point estimate, with p-values in brackets below them. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

Table A.6: 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%		
EXIM$_i$×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		
EXIM$_i$×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		
EXIM$_i$×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	28,468	28,011	28,311	26,626	25,174

Notes: This table reports the estimated effects of EXIM's shutdown on various firm outcomes. Intangible capital follows Peters and Taylor (2017); net profit margin is net income over revenues. Regressions are weighted as in the baseline firm-level specification (Section 5.2.1). The dependent variable is the growth rate relative to 2014 defined as $\Delta Y_{i,t} = (Y_{i,t} - Y_{i,2014})/Y_{i,2014}$. $Post_t$ equals one for 2015 to 2019, and $EXIM_i$ equals one if the firm received EXIM financing over the pre-shutdown period. The Exporter fixed effect equals one if the firm reports positive EXIM financing, foreign sales in Compustat Segment, international activity in its 10-Ks, exports in Datamyne, or taxable foreign income before 2014. Industries are SIC-2. Standard errors are clustered at the firm level and reported in parentheses below the point estimate, with p-values in brackets below them. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

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		
$EXIM_i \times Post_t$	-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: 2013 revenue, winsor 5%		
$EXIM_i \times Post_t$	-0.073**	-0.11***	-0.15***	-0.072**	0.0031
	(0.031)	(0.040)	(0.045)	(0.030)	(0.0067)
	[0.017]	[0.0068]	[0.00058]	[0.016]	[0.64]
Observations	24,430	23,949	24,275	22,552	24,430
			Value weight: winsor 1%		
$EXIM_i \times Post_t$	-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. The 2013 revenue weight is each firm's revenue in 2013, winsorized at the 5th and 95th percentiles across firms. 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 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, international activity in its 10-Ks, 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 parentheses, and p-values are reported in brackets below them. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

Table A.8: EXIM Exposure and Ex-Ante MRPK

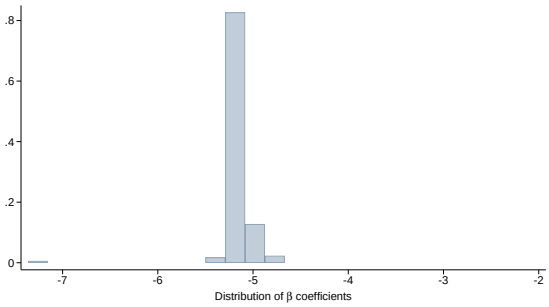
Dependent variable	Pre-period MRPK			
	(1)	(2)	(3)	(4)
$EXIM_i$	0.050	0.20	0.14	0.19
	(0.33)	(0.33)	(0.33)	(0.33)
	[0.88]	[0.55]	[0.67]	[0.56]
Fixed Effects				
Industry×Year	✓	✓	✓	✓
Exporter×Year	✓	✓	✓	✓
Lobbying×Year	—	—	—	✓
Size×Year	—	✓	✓	✓
Risk×Year	—	—	✓	✓
Observations	11,035	10,863	9,545	9,545

Notes: This table reports cross-sectional regressions of firms' average pre-period (2010–2014) MRPK on $EXIM_i$, an indicator equal to one if the firm received EXIM trade financing over the pre-shutdown period, across increasing fixed-effect saturations. MRPK is average revenues over physical capital. Standard errors clustered at the firm level are reported in parentheses and p-values in brackets. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

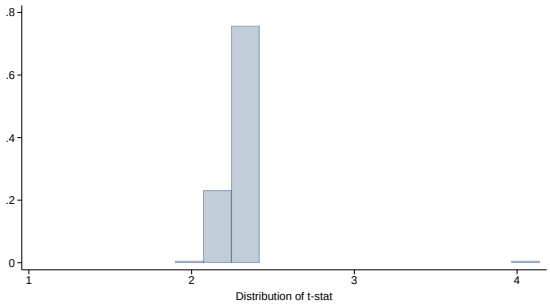
B Additional Figures

Figure B.1: US Export Effects Excluding Products and Destinations Individually

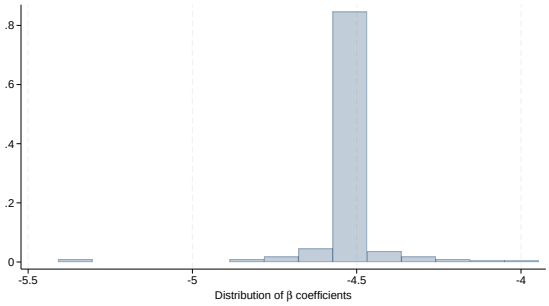
(a) Excluding products: β



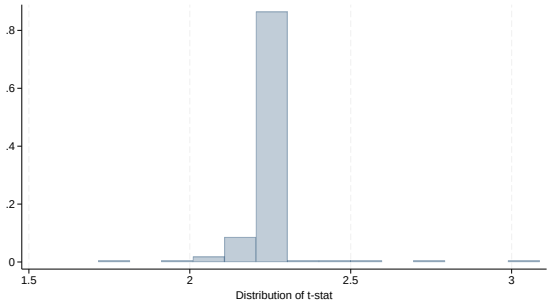
(b) Excluding products: t-stat



(c) Excluding destinations: β



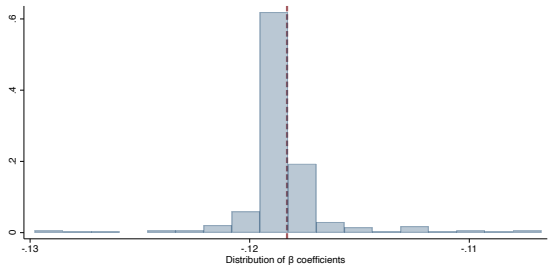
(d) Excluding destinations: t-stat



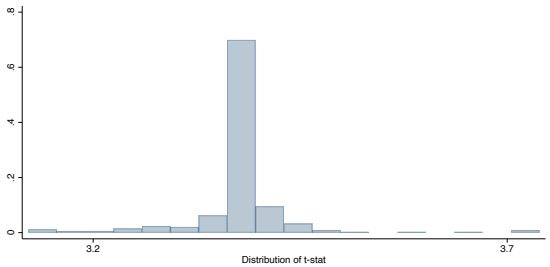
Notes: This figure reports the distribution of β coefficients and t-statistics for the average effect of EXIM's shutdown on aggregate exports at the product-by-destination level in BACI, estimated as in Table 2. Panels (a)–(b) exclude HS-4 products one at a time; panels (c)–(d) exclude destinations one at a time. 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 to the US. Standard errors are clustered at the HS-4 level.

Figure B.2: Firm-level Effects Excluding Industries Individually: Distribution of β and t-stats

(a) β



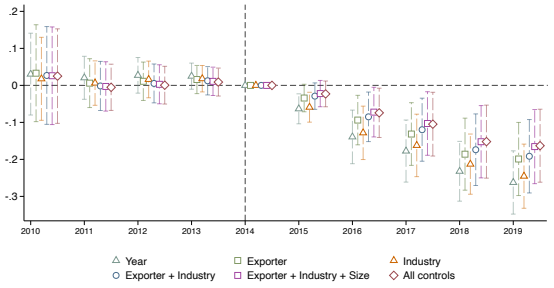
(b) t-stat



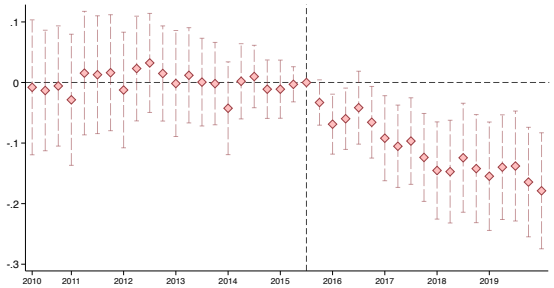
Notes: This figure reports the distribution of β and t-stat for the average effect of EXIM's shutdown on firm revenue, as estimated in Table 3, when we exclude industries (SIC-4) one-by-one. Panel (a) plots the $\hat{\beta}$ reported in Table 3 column 5 in the vertical red dotted line. The dependent variable is the growth rate relative to 2014 defined as $\Delta Y_{i,t} = (Y_{i,t} - Y_{i,2014})/Y_{i,2014}$. Standard errors are clustered by firm.

Figure B.3: Impact of EXIM's Shutdown on Total Firm Revenues: Robustness and Quarterly Dynamics

(a) Robustness to Multiple Specifications

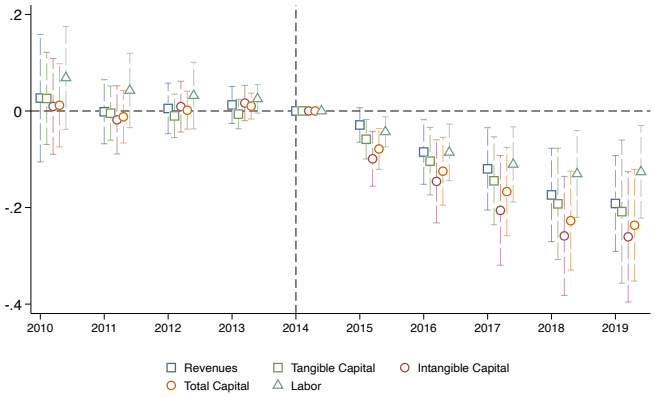


(b) Quarterly Firm Revenues



Notes: Both panels plot the point estimates and 95% confidence intervals when estimating equation (11). Panel (a) progressively includes more stringent sets of fixed effects. Panel (b) uses 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 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 (11) 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 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 and Institutional Context

C.1 Data cleaning

Compustat. Starting from the universe of Compustat, we remove financials (sic = 6), utilities (sic= 49), "foreign government entities" (sic= 8888), and "international affairs and non operating establishments" (sic= 9); observations with missing fiscal year, fiscal periods shorter than 12 months ($pddur \neq 12$), foreign incorporation or headquarters ($fic \neq$ "USA" or $loc \neq$ "USA"), and negative or missing revenues ($sale$) or assets (at); and rare duplicate gvkey-years, keeping the first observation after sorting by gvkey and date. We restrict the sample to 2010–2019, drop firms entering after the 2014 shock, require observations in 2014, and winsorize baseline firm-level ratios

and growth rates at 5%.

BACI. BACI is already cleaned and harmonized from raw Comtrade data, so we only drop undefined importers (ISO code "NA") and cells where the US never exports. The latter restriction matches our preferred aggregate-export specification, where destination-by-product (HS6)-by-year fixed effects ($\gamma_{p,d,t}$) restrict identifying variation to destination-product-year cells with US exports; including all cells yields quantitatively similar results.

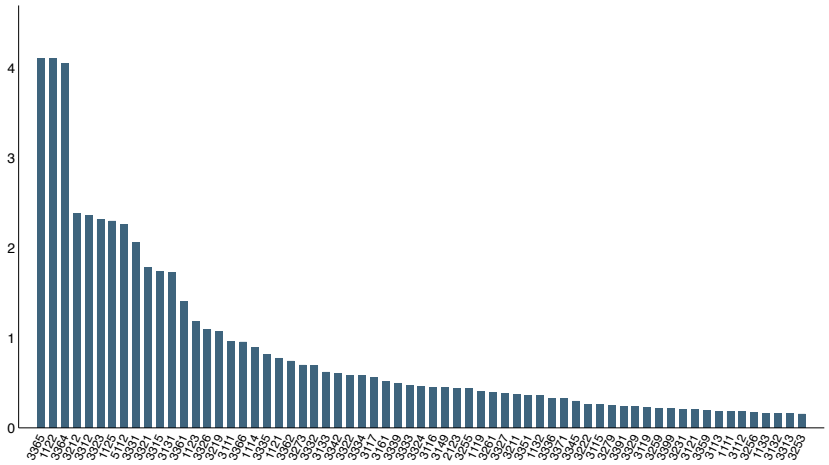
EXIM loan database. This database reports the financing instrument (loan, guarantee, etc.), US exporting firm, export-product NAICS code, and support value. We include all instruments and, for exposition, refer to them as "loans." Observations without export-product information are excluded from the product-level exposure measure ($EXIM_{p,o}$), accounting for 3% of pre-shutdown observations and 13% of loan value. Observations without a specific firm, typically because multiple firms are funded, are excluded from the firm-level exposure measure ($EXIM_i$), accounting for 4% of observations and 16% of value. Overall, 1.6% of observations and 12% of value enter neither measure because both the firm and product are unspecified.

Each EXIM authorization corresponds to a single export transaction backed by one primary product, identified by a 4- or 6-digit NAICS/SIC code, so a multi-product exporter that receives several authorizations in a year generates several distinct transactions, each with its own product as underlying collateral. In the pre-2014 sample, 1,140 out of 28,396 authorizations (4.0% by count, 15.2% by approved dollar amount) bundle multiple products and carry no primary code; we exclude these when building $EXIM_{p,o}$, so the industry-level aggregation is free of double counting. We confirm that the sum of transaction-level authorizations in our micro data matches the aggregate totals EXIM reports publicly.

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).

Datamyne Datamyne records individual shipments, including product codes, destinations, and shipment weight. Because it is less reliable before 2013, we use 2013–2019.

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.1.1 Matching between EXIM, Compustat, and Datamyne

Algorithmic match. All datasets are collapsed at the unique level of firm name, city, and state. Compustat lacks city names but contains zipcodes, from which we recover the city. We harmonize company names by removing punctuation, incorporation status ("Inc," "LLC," etc.), and obvious typos, using the STATA command **strclean** (Matray and Xu, 2024).

We match EXIM to Compustat and to Datamyne separately, in three steps using reclink2 (Wasi and Flaaen, 2015). Steps one and two require exact state and city matches and use a fuzzy name merge iteratively at 99% and then 95% similarity thresholds. Step three drops the state-city requirement to accommodate noisy geographic reporting, imposing a 99% fuzzy name threshold to limit false positives.

Manual verification. We manually inspect every algorithmically generated match from steps 1–3 and leave a case unmatched whenever we cannot confirm it: names that differ only in company ending but refer to distinct firms, generic names shared by many firms, and holding or group names spanning several entities.

C.2 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 $dlc/ebitda$

For a comparative overview of export credit agencies' mandates, operational constraints, and product tools across countries, see Matray, Mueller, Xu and Shen (2026). We focus here on the institutional features of the US EXIM that are most directly relevant to our identification strategy.

C.3 EXIM Institutional Details

C.3.1 EXIM tools

EXIM supports US exporters through four main products: loan guarantees, insurance against customer credit losses, direct loans, and working capital loans.

The four products differ in coverage and term. Loan guarantees cover up to 100% of principal and interest and can be applied to short- and long-term loans. Export credit insurance covers less than 100% and is designed to encourage US exporters to extend short-term trade credit to overseas customers, with insured foreign receivables eligible as collateral for short-term borrowing. Direct loans are long-term and carry fixed interest rates, suitable for capital-intensive projects. Working capital loans are short-term at fixed or floating rates, designed for exporters' operational needs.

EXIM offers financing across a range of terms: medium-term (up to 7 years, transactions under $10M), long-term (up to 10 years, extendable to 12 for civil aircraft and non-nuclear power plants and to 18 for nuclear power and renewable-energy projects), and short-term (up to 360 days, primarily through Financial Institution Buyer Credit and Single Buyer Export Credit policies).

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 in 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 US-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.

C.3.2 US Federal government operational constraints

There are three main federal operational constraints EXIM faces.

First, the WTO Agreement on Subsidies and Countervailing Measures requires EXIM to remain self-financing: premium rates must be adequate to cover long-term operating costs and losses, and loans must reflect the cost and risk of the underlying programs.[1]

Second, the Federal Credit Reform Act of 1990 (Section 9) requires each EXIM transaction to be subsidy-neutral or generate negative subsidy, with costs justified if they exceed revenues or savings.

Third, EXIM is subject to congressional oversight (administered through the Office of Congressional and Intergovernmental Affairs), independent annual audits, and a 2% default-rate cap; breaching the cap triggers an immediate operational freeze by Congress.[2]

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.

C.3.3 Institutional Advantages

As a US government agency, EXIM has access to risk-assessment and loss-recovery capabilities that the private sector does not. These institutional advantages are not required for the welfare argument developed in our model (a uniform expansion of pledgeability raises export capital regardless of whether the lender has superior information or enforcement technologies), but they help to explain why EXIM operates in markets where private financiers do not.

Information and risk assessment. EXIM benefits from access to government information networks unavailable to private lenders: it consults statutorily with the Departments of State and Treasury on transactions involving significant country risk and exchanges information with 19 federal agencies through the Trade Promotion Coordinating Committee.[3]

Enforcement and recovery. As a US government agency, EXIM has loss-recovery capabilities private lenders lack. Defaulting on an EXIM loan is equivalent to defaulting on the US government itself: EXIM can convert commercial claims into sovereign obligations, participate in Paris Club restructuring negotiations, and pursue claims in international courts with authority to seize debtor assets in foreign jurisdictions.

[1] See Annex I, clause (j) of the Agreement.

[2] Authority for EXIM comes from the Government Corporation Control Act of 1945 and the Legislative Reorganization Act of 1946. During the Covid pandemic, the default-rate cap was temporarily raised to 4%, but this is outside our sample period.

[3] Since its 2019 reauthorization, EXIM has also increased its coordination with national security agencies on transactions with geopolitical implications. EXIM can also draw on country-specific assessments from US embassies, where Foreign Commercial Service officers monitor local business conditions and contract enforcement.

C.3.4 EXIM Activity During the Shutdown

Figure 1 shows the total amount of EXIM authorizations by year. During the shutdown period (2015–2019), EXIM activity dropped dramatically but did not fall to zero. The composition of residual activity changed substantially. During the pre-shutdown period (2010–2014), guarantees accounted for $64.3 billion across 1,048 authorizations, working-capital programs for $13.7 billion across 2,886 authorizations, and direct loans for $28.6 billion across 258 authorizations. During the shutdown, these fell to $6.8 billion (362 authorizations), $4.2 billion (1,110 authorizations), and $5.1 billion across only 12 authorizations, respectively. By contrast, export credit insurance (which consists of small-ticket items below the $10 million board-approval threshold) continued at a reduced pace ($13.4 billion across 11,271 authorizations during the shutdown, compared to $27.9 billion across 15,699 authorizations in the pre-shutdown period). This shows that residual EXIM activity shifted toward the insurance and working capital programs, while direct loans and guarantees contracted sharply.

C.3.5 EXIM Expense

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

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

Figure C.2 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%).

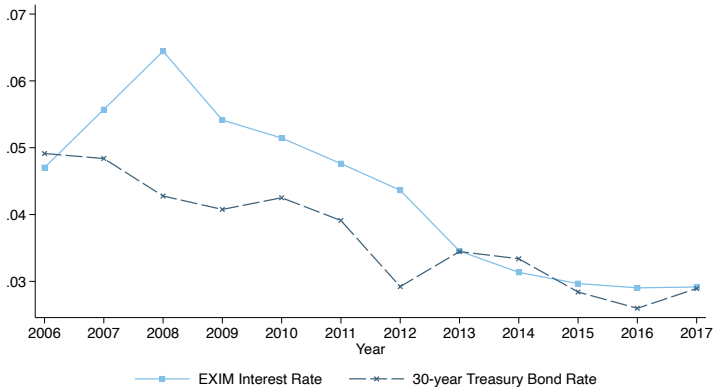
D Additional Results

D.1 Derivation of Foreign to Domestic Sales Pass-Through

To calculate the pass-through from export to domestic sales, we compute the ratio of sales elasticities: $\frac{\epsilon^{Domestic}}{\epsilon^{Exports}} = \frac{\Delta Domestic}{\Delta Exports} \times \frac{Exports}{Domestic}$, where Δ denotes the dollar change in sales in response to EXIM and "$Exports$" and "$Domestic$" denote initial sales. Using $\Delta TotalRevenues = \Delta Exports + \Delta Domestic$, $\frac{\partial \text{Total revenues}}{\partial \text{EXIM}} = 4.9$, and $\frac{\partial \text{Exports}}{\partial \text{EXIM}} = 4.49$, we obtain $\frac{\partial \text{Dom}}{\partial \text{EXIM}} = 0.41$. Thus, $\frac{\partial \text{Dom}}{\partial \text{EXIM}} \times \frac{\partial \text{EXIM}}{\partial \text{Exports}} = \frac{\partial \text{Dom}}{\partial \text{Exports}} \approx \frac{\Delta \text{Dom}}{\Delta \text{Exports}} = \frac{0.41}{4.49}$.

To calculate $\frac{Exports}{Domestic}$, we follow Bernard, Jensen, Redding and Schott (2018), who find that exports account for approximately 20% of sales among firms with positive exports. Because Compustat firms are larger and exporting is concentrated among larger firms, we use the Compustat

Figure C.2: 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 was no longer sufficiently disaggregated to conduct this calculation.

segment-data foreign-revenue share of 40% as an upper bound.

Taking these two values as bounds, we calculate that $\frac{Exports}{Domestic} \in [0.25 - 0.66]$.[4] Together, these magnitudes imply a pass-through of foreign to domestic sales of 2.3% to 6.0%.

D.2 EXIM Share Intensity

Our baseline firm-level specification treats EXIM exposure as binary: a firm is treated if it received any EXIM financing prior to the shutdown. In this section, we explore whether the effects vary with the intensity of EXIM support. We construct two continuous measures of treatment intensity for each treated firm: (i) average annual EXIM financing divided by average annual total revenue, and (ii) average annual EXIM financing divided by average annual foreign sales, both computed over 2007–2014. We then split treated firms into "Low" and "High" intensity groups based on the within-SIC-4 industry median of each measure. Each regression compares treated firms in a given intensity group against all untreated firms, so that the control group remains identical across columns. Appendix Table D.1 reports the results for revenue growth and tangible capital growth.

D.3 Translating Misallocation Results into Aggregate TFP Losses

To quantify the aggregate productivity consequences of the EXIM shutdown, we adapt the Solow residual decomposition of Bau and Matray (2023). The key equation expresses the change in the Solow residual as a sum of firm-level contributions:

$$\Delta \text{Solow} = \sum_i \varpi_i \sum_{q \in \{K,L\}} \alpha_i^q \frac{\tau_i^q}{1+\tau_i^q} \Delta \log X_i^q, \tag{D.1}$$

where ϖ_i is firm i's revenue share within its industry, α_i^q is the output elasticity with respect to input q, τ_i^q is the pre-shock input wedge, and $\Delta \log X_i^q$ is the change in factor usage caused by the

[4] If exports is 20% 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 $\frac{Exports}{Domestic} = \frac{0.40}{(1-0.40)} = 0.66$.

Table D.1: Impact on Revenue and Capital by EXIM Intensity (Within SIC-4)

EXIM Intensity	Revenue				Capital			
	EXIM/Revenue		EXIM/For. sales		EXIM/Revenue		EXIM/For. sales	
	Low (1)	High (2)	Low (3)	High (4)	Low (5)	High (6)	Low (7)	High (8)
$\text{EXIM}_i \times \text{Post}_t$	-0.10***	-0.19***	-0.087**	-0.26***	-0.13***	-0.21***	-0.11**	-0.27***
	(0.037)	(0.061)	(0.036)	(0.064)	(0.047)	(0.069)	(0.048)	(0.064)
	[0.0057]	[0.0018]	[0.017]	[0.000056]	[0.0069]	[0.0030]	[0.020]	[0.000032]
Fixed Effects								
Exporter×Year	✓	✓	✓	✓	✓	✓	✓	✓
Industry×Year	✓	✓	✓	✓	✓	✓	✓	✓
Observations	24,850	24,179	24,835	24,194	24,317	23,643	24,296	23,664

Notes: This table reports the estimated effects of EXIM's shutdown on firm revenue growth (columns 1–4) and tangible capital growth (columns 5–8), split by EXIM intensity. Intensity is measured among treated firms and split at the within-SIC-4 industry median. "Low" includes treated firms below the within-industry median plus all untreated firms; "High" includes treated firms above the within-industry median plus all untreated firms. EXIM/Revenue and EXIM/Foreign sales are computed as average annual EXIM financing divided by average annual revenue (or foreign sales) over 2007–2014. The dependent variables are growth rates relative to 2014 (winsorized at the 5th and 95th percentiles). All specifications include exporter×year and industry×year fixed effects and are weighted by firm sales (winsorized at the 5th percentile). Standard errors are clustered at the firm level. Significance levels: * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

policy.

We implement this as follows. We split treated firms into high- and low-MRPK groups (above/below the within-SIC-4 median) and estimate the shutdown's effect on capital and labor growth separately for each group with our baseline difference-in-differences specification, yielding predicted $\Delta \log K_i$ and $\Delta \log L_i$ for each treated firm (untreated firms contribute zero). Capital wedges are $\tau_i^K = \alpha_K \cdot \text{MRPK}_i / r - 1$, and labor wedges analogously, using pre-period values and $r = 10\%$ following Hsieh and Klenow (2009). The weight $\tau_i^q/(1+\tau_i^q)$ measures how distorted the firm is on input q, so undistorted firms contribute nothing even when their inputs change.

We consider two versions. In a one-factor model ($\alpha_K = 1$), only capital reallocation matters and the estimated change in TFP is -1.56 percentage points (SE = 0.55). In a two-factor model ($\alpha_K = 1/3$, $\alpha_L = 2/3$), the total change in TFP is -1.22 percentage points (SE = 0.37), of which -0.47 pp comes from capital and -0.76 pp from labor misallocation.

These estimates assign the same predicted factor change to all treated firms in a group, yet firms differ substantially in their reliance on EXIM financing. We therefore rescale each firm's predicted effect by its pre-shock EXIM intensity (EXIM amount over foreign sales), normalized by the group mean so the average treated firm still receives the regression-estimated effect, analogous to a shift-share design in which the D-i-D identifies the average per-unit effect and firm-specific "shares" reflect actual EXIM reliance. This yields a change in TFP of -0.56 percentage points in the one-factor model (SE = 0.19) and -0.43 percentage points in the two-factor model (SE = 0.12). These intensity-weighted estimates are smaller in magnitude because large firms, which dominate the revenue-weighted aggregate, have low EXIM reliance relative to their size. Overall, the EXIM shutdown changed aggregate TFP by -1.22 to -1.56 percentage points.

D.4 Industry Misallocation: Alternative Measures of Capital Cost Wedge

This section reports alternative measures of the dispersion in firms' capital input cost wedge in Table D.2. Columns 1–2 estimate the production function and compute firm MRPK directly with the Olley and Pakes (1996) control approach. Columns 3–4 follow the Baqaee and Farhi (2020) user-cost approach in which the rental price of capital is computed as in Hall and Jorgenson (1967) from the risk-free rate, industry-specific depreciation, and industry-level risk premia. Columns 5–6 examine the dispersion in TFPR, again estimated as in Olley and Pakes (1996), which following Hsieh and Klenow (2009) reflects the dispersion in cost wedges across all inputs.

Under a more general CES production function (Cobb-Douglas being the special case where the elasticity of substitution equals one), the capital cost wedge is no longer identified on its own, but its value relative to other inputs still is as in Whited and Zhao (2021). Assume firm i in sector s produces revenue Y from capital and labor:

$$Y_{si} = A_{si}\left(\alpha_s K_{si}^{\frac{\gamma-1}{\gamma}} + (1-\alpha_s)L_{si}^{\frac{\gamma-1}{\gamma}}\right)^{\frac{\gamma}{\gamma-1}}, \tag{D.2}$$

where α_s is the capital weight, γ the elasticity of substitution, and A_{si} firm efficiency. As is standard in the misallocation literature, each input carries a wedge above its price (r for capital, w for labor), so nominal profit is:

$$\pi_{si} = Y_{si} - \left[(1+\tau_{si}^K)rK_{si} + (1+\tau_{si}^L)wL_{si}\right], \tag{D.3}$$

where τ_{si}^X is the wedge on input X. Minimizing cost for a fixed output $\bar{Y_{si}}$ yields the optimal input ratio:

$$\frac{K_{si}}{L_{si}} = \left(\frac{\alpha_s}{1-\alpha_s} \times \frac{(1+\tau_{si}^L)w}{(1+\tau_{si}^K)r}\right)^{\gamma}. \tag{D.4}$$

As long as α_s and γ are constant within a sector or sector-by-size cell, firms in the same cell share the same input ratio up to their relative wedges, so within-cell dispersion in the labor-to-capital ratio identifies the capital cost wedge relative to labor.

Columns 7–10 implement this using two proxies for the relative wedge: the ratio of COGS to capital (columns 7–8) and of labor to capital (columns 9–10), where COGS captures variable input costs less prone to the measurement error in reported labor costs. Across all measures of ex-ante wedge distortions, EXIM's shutdown produces larger contractions for firms that are ex-ante more constrained, confirming that it increased capital misallocation.

D.5 Firm Financing Frictions: Full Results

This section reports the full results referenced in Section 6.3.1 on whether the EXIM shutdown's effect on investment is concentrated among firms identified as more ex-ante financially constrained.

Specification. We use four standard proxies to capture financial constraints. For each, we sort firms into terciles and define an indicator variable, *Constrained*, equal to one for the tercile that the literature associates with tighter financing. We estimate heterogeneous effects of EXIM's shutdown

Table D.2: Impact on Capital Misallocation: Alternative Measures of MRPK

Dependent variable	Investment									
Measure of wedge distortion	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 (2020) and adopt the user cost approach. In columns 5–6, we 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 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, international activity in its 10-Ks, 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 parentheses, and p-values are reported in brackets below them. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

Table D.3: Impact on Capital Misallocation: Sorting MRPK Within Industry, Size, and Destination

Dependent variable	Investment					
MRPK sorting	Industry×Size and Business region			Industry×Size and Output region		
Sample	Low	High	All	Low	High	All
	(1)	(2)	(3)	(4)	(5)	(6)
$\text{EXIM}_i \times \text{Post}_t$	-0.015	-0.198***		-0.029	-0.194***	
	(0.060)	(0.056)		(0.064)	(0.057)	
	[0.810]	[0.000]		[0.654]	[0.001]	
$\text{EXIM}_i \times \text{Post}_t \times \text{I}_i^{\text{High MRPK}}$			-0.185**			-0.167*
			(0.083)			(0.086)
			[0.026]			[0.052]
Fixed Effects						
Exporter×Size×Year	✓	✓		✓	✓	
Industry×Size×Year	✓	✓		✓	✓	
EXIM×Year			✓			✓
Fixed Effects (interacted)						
Exporter×Size×Year			✓			✓
Industry×Size×Year			✓			✓
Observations	7,584	7,919	15,503	7,270	7,603	14,873

Notes: This table re-estimates the misallocation triple-difference of Table 5 holding industry, size, and destination fixed. Firms are ranked on pre-period MRPK along two margins separately: within SIC-2 industry × pre-period size quartile, and within destination region. High-MRPK firms are those above the median on both margins and low-MRPK firms those below the median on both; firms that fall on opposite sides of the two margins are excluded. A firm's destination region is the region it mentions most often in its pre-period filings, measured from the Hoberg and Moon (2017) offshoring database: columns 1–3 use mentions of sales and sourcing activity together and columns 4–6 use mentions of sales activity only. The dependent variable is the growth rate of capital relative to 2014. Standard errors clustered at the firm level are reported in parentheses and p-values in brackets. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

using triple-difference regressions that interact $EXIM \times Post$ with each constraint proxy:

$$\Delta Y_{i,j,t} = \beta_1 EXIM_{i,j} \times Post_t \times I_i^{Constrained} + \beta_2 EXIM_{i,j} \times \delta_t$$

$$+ \quad I_i^{Constrained} \otimes \left[\gamma_{j,t} + Exporter_{i,t_0} \times \delta_t + X_{i,t_0} \times \delta_t + \varepsilon_{i,j,t}\right] \tag{D.5}$$

$\Delta Y_{i,j,t}$ denotes the growth rate of an outcome between t and 2014, $I_i^{Constrained}$ is an indicator variable that takes the value one if firm i is constrained in the pre-period, and $\otimes$ is the outer product so that we include all possible combinations of the different terms, including EXIM $\times$ Year, which absorbs systematic differences between treated and control units. Standard errors are clustered at the firm level.

Proxies. Column 2 of Table D.4 sorts on firm age, measured as years since the firm's first appearance in Compustat as of 2014; the indicator equals one for firms in the bottom tercile of age, since young firms typically lack the reputation and banking relationships that mature firms accumulate (e.g., Hadlock and Pierce, 2010). Column 3 sorts on industry leverage (e.g., Giroud and Mueller, 2017; Friedrich and Zator, 2023), measured as the SIC4 median of pre-period total debt over total tangible-plus-intangible capital. Column 4 sorts on the Hoberg and Maksimovic (2015) private-debt delay measure, computed firm by firm from the textual analysis of each firm's 10-K filing in its first pre-period year. Column 5 sorts on the industry coverage ratio (SIC4 median of pre-period short-term debt over cash flow), motivated by EXIM's trade financing being a source of short-term working capital. In columns 3 and 5, the SIC4-median aggregation isolates industry-level variation in financing-friction exposure and absorbs idiosyncratic firm-level noise.

Within the group of EXIM-dependent firms, those that are most constrained experience larger investment cuts. This heterogeneity indicates that export financing is particularly important for firms with limited alternative funding sources, highlighting EXIM's role as a complement to private-sector financing.

Alternative non-financing channels. We considered two alternative mechanisms for the firm-level heterogeneity. First, 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, since EXIM does not provide any direct "marketing-related programs," these promotional channels play at most a minor role in explaining our results. Second, 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. However, given that the shutdown lasted for many years, it is implausible that uncertainty was the primary driver of limited private sector entry. Moreover, EXIM is institutionally designed to operate only in market segments in which private lenders are unable or unwilling to participate, so 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 that we document.

D.6 Destination Market Frictions: Full Results

This section reports the results referenced in Section 6.3.1 on the role of destination-market frictions.

Table D.4: Role of Financing Frictions

Dependent variable	Investment				
Financing frictions proxy:		Age	Leverage	Hoberg and Maskimovic (2015)	Coverage ratio
	(1)	(2)	(3)	(4)	(5)
$\text{EXIM}_i \times \text{Post}_t$	-0.14***				
	(0.044)				
	[0.0014]				
$\text{EXIM}_i \times \text{Post}_t \times \text{I}_i^{\text{Constrained}}$		-0.29**	-0.36***	-0.19**	-0.24***
		(0.12)	(0.12)	(0.086)	(0.083)
		[0.015]	[0.0022]	[0.027]	[0.0043]
Fixed Effects					
Exporter×Year	✓	—	—	—	—
Industry×Year	✓	—	—	—	—
Fixed Effects (interacted with constrained dummy)					
Exporter×Year	—	✓	✓	✓	✓
Industry×Year	—	✓	✓	✓	✓
EXIM×Year	—	✓	✓	✓	✓
Observations	24,635	24,635	20,662	24,630	24,606

Notes: This table reports the estimated effects of EXIM's shutdown on firms' investment. The dependent variable is the growth rate relative to 2014 defined as $\Delta Y_{i,t} = (Y_{i,t} - Y_{i,2014})/Y_{i,2014}$. The four financing-friction proxies (columns 2 to 5) are defined in the text. $I_i^{\text{Constrained}}$ equals one for the constrained tercile of each proxy: the *bottom* tercile for age (column 2) and the *top* tercile for columns 3 to 5. Tercile splits are revenue-weighted (pre-period winsorized revenue) and unconditional. Regressions are weighted as in the baseline firm-level specification (Section 5.2.1). $Post_t$ 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, international activity in its 10-Ks, exports in Datamyne, or taxable foreign income before 2014. Industries are SIC-2. In columns 2 to 5, Exporter×Year and Industry×Year fixed effects are also interacted with the three-level tercile of the sorting variable, and EXIM×Year fixed effects are included. Standard errors are clustered at the firm level and are reported in the line below the point estimate in parentheses, and p-values are reported in brackets below them. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

We use firm-level estimates from Datamyne, exploiting variation across firms within a product-destination market. We restrict to the manufacturing subsample (HS2 28–97) and use four proxies for the banking and institutional environment of the destination country. Columns 1 and 2 measure international banking depth: total US bank claims on the destination from the FFIEC Country Exposure Report (E.16), with no-claim countries set to zero (highest friction), and the share of state-owned bank assets from the Panizza (2024) Bank Ownership Database, since state-dominated banking sectors leave foreign exporters fewer commercial counterparts for trade finance. Columns 3 and 4 capture the broader institutional and financial environment: the rule of law index from the Worldwide Governance Indicators (Kaufmann, Kraay and Mastruzzi, 2011), measuring contract enforcement and property rights, and private credit to GDP from the World Bank's World Development Indicators, a standard measure of financial development.

For each proxy, we sort destinations into terciles on pre-period (2010–2014) averages and estimate a triple-difference specification interacting the EXIM treatment with an indicator for high-friction (top-tercile) destinations, including HS-4×destination×period fixed effects and firm-equal weights (within-firm weights normalized to sum to one). Table D.5 reports the results. Across all four proxies, the EXIM shutdown effect is more negative in high-friction destinations: the differential is significant at the 5% level for three proxies and at the 10% level for private credit to GDP, with top-tercile destinations experiencing an effect 30 to 55 percent larger than the bottom two terciles.

Table D.5: Destination Market Frictions: Banking and Institutional Environment

Dependent variable	Exports (TEUs)			
Destination friction proxy:	US bank presence	State-owned banks	Rule of law	Financial development
	(1)	(2)	(3)	(4)
$\text{EXIM}_{f,p,d} \times \text{Post}_t \times \text{I}_d^{\text{Constrained}}$	-0.155**	-0.188***	-0.152**	-0.115*
	(0.068)	(0.072)	(0.070)	(0.069)
	[0.024]	[0.009]	[0.030]	[0.097]
Fixed Effects				
HS-4×Destination×Post_t	✓	✓	✓	✓
$\text{EXIM}_{f,p,d} \times \text{Post}_t$	✓	✓	✓	✓
Observations	1,058,036	1,050,590	1,050,216	1,020,744

Notes: This table reports triple-difference estimates of EXIM's shutdown on firm-level exports using Datamyne bill-of-lading data, restricted to manufacturing products (HS2 28–97). Data are collapsed as an average pre (up to 2014) and post period (2015–2019). The dependent variable is calculated as a midpoint growth rate based on the Beaumont, Matray, Tu and Xu (2026) 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 ($\text{EXIM}_{f,p,d}$) is defined at the firm-by-product-by-destination level. $I_d^{\text{Constrained}}$ is an indicator variable that takes the value one if the destination country is in the top tercile of the friction proxy, measured as the pre-period (2010–2014) average. "US bank presence" is total US bank claims on the destination country from the FFIEC Country Exposure Report (E.16); countries with no reported claims are assigned zero. "State-owned banks" is the share of state-owned bank assets from Panizza (2024). "Rule of law" is the indicator from the Worldwide Governance Indicators (Kaufmann, Kraay and Mastruzzi, 2011). "Financial development" is private credit to GDP from the World Bank. All regressions are weighted by firm-equal weights (within-firm weight normalized to sum to one per firm) and include HS-4×destination×period fixed effects, which absorb $\text{EXIM}_{f,p,d} \times \text{Post}_t$. Standard errors are clustered at the HS-4 level, and are reported in the line below the point estimate in parentheses, and p-values are reported in brackets below them. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

D.7 Welfare Accounting: Full Results

This section reports the full results for the two welfare offsets discussed in Section 7.1: terms-of-trade effects and crowding out of domestic producer capital.

D.7.1 Terms-of-Trade Effects

We test for terms-of-trade effects directly using BACI unit values, computed as the ratio of export value to quantity at the HS-6 product-by-destination-by-year level. We apply our baseline difference-in-differences specification using the same synthetic control group of OECD exporters as in the main analysis.

We present two complementary specifications in Table D.6. In columns (1)–(3), the dependent variable is the log level of the unit value, with unit fixed effects (exporter × product or exporter × product × destination) absorbing time-invariant price differences across trade flows. In columns (4)–(6), the dependent variable is the log growth rate of unit values relative to 2014 (trimmed at 5× the interquartile range by year to remove outliers driven by compositional changes in quantities). Within each panel we progressively saturate the fixed effects: column (1)/(4) includes product (HS-4) × year and origin × year fixed effects; column (2)/(5) adds product × destination × year; and column (3)/(6) uses HS-6 × destination × year fixed effects. Standard errors are clustered at the HS-4 level.

Across all six specifications, the coefficient on EXIM exposure is statistically insignificant and switches signs across models, indicating that the EXIM curtailment did not lead to significant

changes in the prices of US exports in EXIM-backed products. Since terms-of-trade effects require export prices to move, the absence of a unit-value response implies that terms-of-trade considerations are not first-order in our setting.

Table D.6: Effect of EXIM Curtailment on Unit Values

	Log level			Log growth		
	(1)	(2)	(3)	(4)	(5)	(6)
$\text{EXIM}_{p,o} \times \text{Post}_t$	-3.09	1.98	0.46	-2.21	2.34	0.41
	(2.18)	(1.22)	(0.99)	(1.81)	(1.46)	(1.07)
	[0.16]	[0.11]	[0.64]	[0.22]	[0.11]	[0.70]
Fixed Effects						
Unit	✓	✓	✓	✓	✓	✓
Product (HS-4)×Year	✓	—	—	✓	—	—
Origin×Year	✓	✓	✓	✓	✓	✓
Product (HS-4)×Destination×Year	—	✓	—	—	✓	—
Product (HS-6)×Destination×Year	—	—	✓	—	—	✓
Observations	121,055	8,614,340	23,579,371	105,944	6,456,288	16,737,602

Notes: Unit values are computed as the ratio of export value to quantity from BACI data. In columns (1)–(3), the dependent variable is the log level of the unit value; in columns (4)–(6), it is the log growth rate relative to 2014, trimmed at 5× the interquartile range by year. All specifications include unit fixed effects (exporter × product in columns (1) and (4); exporter × product × destination in columns (2)–(3) and (5)–(6)). Column (1)/(4): HS-4 × year and origin × year FE. Column (2)/(5): HS-4 × destination × year and origin × year FE. Column (3)/(6): HS-6 × destination × year and origin × year FE. Standard errors in parentheses, p-values in brackets, clustered at the HS-4 level.

D.7.2 Domestic Crowding-Out Effects

We test whether EXIM-backed firms expand by drawing inputs away from other US firms, which would impose costs on non-backed firms and cut against the gains for EXIM-financed firms. We define two samples of non-EXIM firms. The first, broader sample includes all non-EXIM-financed firms, which encompasses both EXIM-eligible exporters that did not receive EXIM and pure domestic producers; this gives the largest sample of firms that could absorb input reallocation. The second, stricter sample restricts to firms that sold only domestically in the pre-period. The stricter sample provides the cleanest crowding-out test, since these firms' growth cannot reflect reallocation of export market share and must instead reflect reallocation of inputs from EXIM-backed firms.

For each sample, we assign non-treated firms an exposure measure based on pre-period EXIM intensity in their NAICS-4 industry, defined as EXIM-backed transactions divided by total industry sales. At the state level, this measure is the sales-weighted average of NAICS-4 exposure across manufacturing firms located in the state, with weights computed from pre-period (2010–2014) sales. Both exposure variables are pre-determined and assigned to non-treated firms through their industry or state.

Table D.7 reports the results: Panel A uses the broader non-EXIM sample, and Panel B the stricter sample restricted to firms with zero foreign sales in the pre-period. Both panels report industry-level exposure in columns (1)–(3) and state-level exposure in columns (4)–(6), with progressively richer fixed effects. The estimated coefficients are small and statistically insignificant in every cell.

Table D.7: Effect on Non-Treated and Purely Domestic Firm Revenue

Dependent variable	Total Revenue					
EXIM exposure	Industry			State		
	(1)	(2)	(3)	(4)	(5)	(6)
Panel A: All non-EXIM firms						
EXIM Exposure×Post	-0.82	-0.34	-0.50	2.79	-0.14	0.44
	(2.01)	(2.08)	(2.01)	(1.99)	(1.91)	(1.84)
	[0.68]	[0.87]	[0.81]	[0.17]	[0.94]	[0.81]
Observations	23,855	23,429	22,811	23,855	23,855	23,214
Panel B: Purely domestic firms						
EXIM Exposure×Post	-8.60	9.24	10.9	2.96	-0.86	2.99
	(8.07)	(7.48)	(7.74)	(3.72)	(4.56)	(4.74)
	[0.29]	[0.22]	[0.16]	[0.43]	[0.85]	[0.53]
Observations	6,736	6,620	6,355	6,736	6,736	6,469
Fixed Effects						
Year	✓	—	—	✓	—	—
(2-digit) industry×Year	—	✓	✓	—	✓	✓
Balance sheet controls×Year	—	—	✓	—	—	✓

Notes: This table reports the estimated effects of EXIM exposure on the revenue growth of non-treated Compustat firms. Panel A uses the broader sample of all non-EXIM-financed firms; Panel B restricts to purely domestic firms (firms that did not export in the pre-period and did not receive EXIM financing). Columns (1)–(3) use industry-level EXIM exposure (continuous, at the NAICS-4 level); standard errors are clustered at the firm level. Columns (4)–(6) use state-level EXIM exposure (sales-weighted average across manufacturing firms in each state); standard errors are clustered at the state level. Columns (1) and (4) include year fixed effects only. Columns (2)–(3) and (5)–(6) include (2-digit) industry × year fixed effects: NAICS-2 in columns (2)–(3) and SIC-2 in columns (5)–(6). Columns (3) and (6) add firm-level balance sheet controls (leverage and ROA) interacted with year. Regressions are weighted as in the baseline firm-level specification (Section 5.2.1). Significance levels: * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

E Model of Export Financing: Equilibrium System and Proofs

E.1 Notation and Full Equilibrium System

Notation. Home and Foreign identify the country of production. A Home firm produces in Home; Foreign producers are located in the RoW. Destination markets are indexed by $m \in \{d, x\}$, with d the Home market and x the export market. For Home firm-level objects, subscripts are ordered firm first and destination market second: $R_{i,m}$, $k_{i,m}$, $z_{i,m}$, and $\mathcal{Z}_{i,m}$. Home aggregates carry only the market subscript, for example $\mathcal{R}_m$ and k_m. Foreign objects carry an F subscript and the relevant destination market, for example $\mathcal{R}_{F,m}$ and $\bar{p}_{F,m}$.

The primitive objects are

$$(\sigma, \{\phi_x, \zeta_x, \theta_x, F_x\}, \{a_i, z_{i,d}, z_{i,x}\}_{i=1,2}, D_x, \bar{p}_{F,d}, \bar{p}_{F,x}, K_s(\cdot), T)\,, \tag{E.1}$$

where σ governs substitution, $(\phi_x, \zeta_x, \theta_x, F_x)$ govern export finance, $(a_i, z_{i,d}, z_{i,x})$ are firm-level net worth and productivities, D_x is export-market expenditure, $\bar{p}_{F,d}$ and $\bar{p}_{F,x}$ are fixed Foreign prices, $K_s(\cdot)$ is aggregate capital supply, and T is the net resource cost of the intervention defined in Appendix E.4.1. Aggregate capital supply $K_s(r_f)$ is continuously differentiable with $K_s'(r_f) \geq 0$; the limiting cases of perfectly elastic ($K_s' \to \infty$) and perfectly inelastic ($K_s' = 0$) supply are recovered as bounds. Let $\bar{r}_x \equiv r_f + \zeta_x$ denote the common export user cost.

The endogenous objects are

$$\{k_{i,d}, k_{i,x}\}_{i=1,2}, \qquad \{\lambda_i\}_{i=1,2}, \qquad r_f, \qquad D_d, \qquad (P_d, P_x).$$

For $m \in \{d, x\}$, write

$$R_{i,m}(k_{i,m}; D_m, P_m) \equiv D_m^{1/\sigma} P_m^{(\sigma-1)/\sigma} z_{i,m}^{(\sigma-1)/\sigma} k_{i,m}^{(\sigma-1)/\sigma}.$$

Definition 1 (Equilibrium)**.** *Given primitives* (E.1)*, an equilibrium is a vector*

$$(\{k_{i,d}, k_{i,x}, \lambda_i\}_{i=1,2},\, r_f,\, D_d,\, P_d,\, P_x)$$

satisfying the firm optimality conditions (E.2)–(E.3)*, complementarity* (E.4)*, capital-market clearing* (E.5)*, the Home-income identity* (E.6)*, and the CES price-index consistency conditions* (E.7)–(E.8)*. Existence and local uniqueness in a neighbourhood of the constrained benchmark follow from monotonicity of the CES price-index system and continuity of $K_s(\cdot)$.*

The equilibrium conditions are

$$\frac{\partial R_{i,d}(k_{i,d}; D_d, P_d)}{\partial k_{i,d}} = r_f, \qquad i = 1, 2, \tag{E.2}$$

$$\frac{\partial R_{i,x}(k_{i,x}; D_x, P_x)}{\partial k_{i,x}} = \bar{r}_x(1 + \phi_x \lambda_i), \qquad i = 1, 2, \tag{E.3}$$

$$0 \le \lambda_i \;\perp\; \theta_x a_i - F_x - \phi_x k_{i,x} \ge 0, \qquad i = 1, 2, \tag{E.4}$$

$$\sum_{i=1}^{2} (k_{i,d} + k_{i,x}) = K_s(r_f), \tag{E.5}$$

$$D_d = I = \mathcal{R}_d + \mathcal{R}_x - T, \tag{E.6}$$

where

$$\mathcal{R}_m \equiv \sum_{i=1}^{2} R_{i,m}(k_{i,m}; D_m, P_m), \qquad K \equiv \sum_{i=1}^{2} (k_{i,d} + k_{i,x}).$$

The CES price indices satisfy

$$P_d = \left[\sum_{i=1}^{2} \left(\frac{D_d P_d^{\sigma-1}}{z_{i,d} k_{i,d}} \right)^{(1-\sigma)/\sigma} + \bar{p}_{F,d}^{1-\sigma} \right]^{1/(1-\sigma)}, \tag{E.7}$$

$$P_x = \left[\sum_{i=1}^{2} \left(\frac{D_x P_x^{\sigma-1}}{z_{i,x} k_{i,x}} \right)^{(1-\sigma)/\sigma} + \bar{p}_{F,x}^{1-\sigma} \right]^{1/(1-\sigma)}. \tag{E.8}$$

The first two lines are firm optimality conditions. The complementarity condition is the export-financing constraint and its multiplier; $a \perp b$ means $a \ge 0$, $b \ge 0$, and $ab = 0$. The remaining equations close the equilibrium through capital-market clearing, the Home income identity, and CES price-index consistency.

E.2 CES Demand, Revenue, and Export-Revenue Decomposition

Production. Home has two firms, indexed by $i \in \{1, 2\}$. Each produces a unique variety. Home firm i produces for destination m with the linear technology

$$y_{i,m} = z_{i,m} k_{i,m}.$$

where $z_{i,m}$ is the productivity shifter and $k_{i,m}$ is the capital invested in production for the variety supplied to destination m. Firms compete monopolistically in each destination.

CES demand. Each destination $m \in \{d, x\}$ has a representative consumer with CES preferences over varieties (o, i), where $o \in \{H, F\}$ denotes the origin country of the firm. The utility of the representative consumer in destination m follows:

$$u_m(c_m) = \left(\sum_{o,i} c_{m,o,i}^{(\sigma-1)/\sigma} \right)^{\sigma/(\sigma-1)}, \qquad \sigma > 1. \tag{E.9}$$

Firm revenue. The CES expenditure problem implies demand for Home variety i:

$$c_{m,H,i} = D_m P_m^{\sigma-1} p_{i,m}^{-\sigma}.$$

Equating demand to supply, $c_{m,H,i} = z_{i,m} k_{i,m}$, gives the inverse demand curve

$$p_{i,m} = \left(\frac{D_m P_m^{\sigma-1}}{z_{i,m} k_{i,m}} \right)^{1/\sigma}.$$

Thus firm revenue can be written in reduced form as

$$R_{i,m} = p_{i,m} z_{i,m} k_{i,m} = D_m^{1/\sigma} P_m^{(\sigma-1)/\sigma} z_{i,m}^{(\sigma-1)/\sigma} k_{i,m}^{(\sigma-1)/\sigma} \equiv \mathcal{Z}_{i,m} k_{i,m}^{\alpha},$$

where

$$\mathcal{Z}_{i,m} \equiv D_m^{1/\sigma} P_m^{(\sigma-1)/\sigma} z_{i,m}^{(\sigma-1)/\sigma}, \qquad \alpha \equiv \frac{\sigma - 1}{\sigma}.$$

Aggregates and price indices. For the aggregation results below, recall Home revenue $\mathcal{R}_m \equiv \sum_i R_{i,m}$ from Appendix E.1, and define Home effective output, its log-change, and the Home expenditure share in destination m by

$$G_m \equiv \sum_{i=1}^{2} (z_{i,m} k_{i,m})^{\alpha}, \qquad E_m \equiv d \log G_m, \qquad w_m \equiv \frac{\mathcal{R}_m}{D_m}.$$

Let $P_{H,m}$ denote the Home price bundle, $P_{H,m}^{1-\sigma} \equiv \sum_{i=1}^{2} p_{i,m}^{1-\sigma}$. Because these Home varieties enter the destination price index P_m, that index is not fixed when Home output moves; Lemma 3 resolves the resulting feedback and returns the revenue elasticity.

For the export decomposition, maintain the common export-shifter condition $\mathcal{Z}_{1,x} = \mathcal{Z}_{2,x} \equiv \mathcal{Z}_x$ and define the capital allocation indices

$$\Phi_x \equiv s_{1,x}^{\alpha} + s_{2,x}^{\alpha}.$$

where $k_x \equiv k_{1,x} + k_{2,x}$, $s_{i,x} \equiv \frac{k_{i,x}}{k_x}$. Then, the effective-output change $E_x \equiv d \log G_x$ can be expressed as

$$E_x = \alpha \, d \log k_x + d \log \Phi_x,$$

To see this, note that the common-shifter condition $z_{1,x} = z_{2,x}$ makes effective output factor as $G_x = z_x^{\alpha} k_x^{\alpha} \Phi_x$; log-differentiating while holding z_x fixed then delivers the two terms above.

Lemma 3 (CES revenue with destination price-index feedback)**.** *For each destination $m \in \{d, x\}$, holding*

firm productivities and trade costs fixed,

$$d\log\mathcal{R}_m = \frac{1-\alpha}{1-\alpha w_m}\, d\log D_m + \frac{1-w_m}{1-\alpha w_m}\, E_m. \tag{E.10}$$

Proof. Split the destination price index into its Home and Foreign components, $P_m^{1-\sigma} = P_{H,m}^{1-\sigma} + \bar{p}_{F,m}^{1-\sigma}$. Substituting the inverse demand curve into the definition of $P_{H,m}$ gives $P_{H,m}^{1-\sigma} = D_m^{-\alpha} P_m^{-\alpha(\sigma-1)} G_m$, and the Home expenditure share satisfies $w_m = P_{H,m}^{1-\sigma}/P_m^{1-\sigma}$. Log-differentiating these relations gives $d\log P_m = w_m\, d\log P_{H,m}$ and, solving the resulting fixed point,

$$d\log P_{H,m} = \frac{\alpha\, d\log D_m - E_m}{(\sigma-1)(1-\alpha w_m)}.$$

Substituting into $d\log\mathcal{R}_m = \dfrac{1}{\sigma}\, d\log D_m + \alpha\, d\log P_m + E_m$ and using $\alpha/(\sigma-1) = 1/\sigma = 1-\alpha$ collects to (E.10). □

Because Foreign export expenditure is exogenous ($d\log D_x = 0$), (E.10) specializes to

$$d\log\mathcal{R}_x = \frac{1-w_x}{1-\alpha w_x}\left[\alpha\, d\log k_x + d\log\Phi_x\right] = \frac{1-w_x}{1-\alpha w_x} E_x. \tag{E.11}$$

This is the exact CES pass-through.

E.2.1 Targeting decomposition with N exporters

In the baseline model with only 2 exporters in Home, the allocation-index term can be written as

$$d\log\Phi_x = \alpha(\varpi_{1,x} - s_{1,x})\left(d\log k_{1,x} - d\log k_{2,x}\right), \tag{E.12}$$

where $s_{i,x} \equiv k_{i,x}/k_x$ and $\varpi_{i,x} \equiv R_{i,x}/\mathcal{R}_x$.

With N active constrained exporters, the allocation index is $\Phi_x = \sum_{i=1}^N s_{i,x}^{\alpha}$, and (E.12) generalizes to

$$d\log\Phi_x = \alpha\sum_{i=1}^{N}(\varpi_{i,x} - s_{i,x})\, d\log k_{i,x}, \qquad \sum_{i=1}^{N}\varpi_{i,x} = \sum_{i=1}^{N} s_{i,x} = 1. \tag{E.13}$$

Lemma 4 (Targeting with N exporters)**.** *Write each firm's realized response as $d\log k_{i,x} = \varepsilon_i IP_i$, with cross-firm means $\bar{\varepsilon} \equiv \dfrac{1}{N}\sum_i \varepsilon_i$ and $\overline{IP}_x \equiv \dfrac{1}{N}\sum_i IP_i$ and deviations $\tilde{\varepsilon}_i \equiv \varepsilon_i - \bar{\varepsilon}$, $\widetilde{IP}_i \equiv IP_i - \overline{IP}_x$. Then*

$$d\log\Phi_x = \alpha\Big[\underbrace{\bar{\varepsilon}\sum_i(\varpi_{i,x} - s_{i,x})\, IP_i}_{\textit{policy targeting}} + \underbrace{\overline{IP}_x\sum_i(\varpi_{i,x} - s_{i,x})\,\varepsilon_i}_{\textit{per-unit response}} + \underbrace{\sum_i(\varpi_{i,x} - s_{i,x})\,\tilde{\varepsilon}_i\,\widetilde{IP}_i}_{\textit{interaction}}\Big]. \tag{E.14}$$

The policy-targeting term equals $\alpha\,\bar{\varepsilon}\,N\,\mathrm{Cov}_i(\varpi_{i,x} - s_{i,x},\, IP_i)$ and is weakly positive when $\rho \equiv \mathrm{Cov}_i(IP_i, \lambda_i) \geq 0$, because $\varpi_{i,x} - s_{i,x}$ is increasing in λ_i under Assumption 1. For $N = 2$ the interaction term is identically zero and (E.14) reduces to the two-term decomposition of Lemma 2 applied to (E.12).

Proof. Since $\sum_i(\varpi_{i,x} - s_{i,x}) = 0$, the constant $\bar{\varepsilon}\,\overline{IP}_x$ contributes nothing to (E.13); substituting $d\log k_{i,x} = (\bar{\varepsilon} + \tilde{\varepsilon}_i)(\overline{IP}_x + \widetilde{IP}_i)$ and expanding yields the three terms in (E.14). The targeting term equals $N\,\mathrm{Cov}_i(\varpi_{i,x} - s_{i,x},\, IP_i)$ because $\sum_i(\varpi_{i,x} - s_{i,x}) = 0$. For $N = 2$, $\varpi_{2,x} - s_{2,x} = -(\varpi_{1,x} - s_{1,x})$ and the deviations are equal and opposite, so the interaction term vanishes. □

E.3 Firm Problem and Proofs

E.3.1 Active-exporter choice and MRPK wedge

For an active exporter, the Lagrangian for the export-market choice is

$$\mathcal{L}_i = R_{i,x}(k_{i,x}) - \bar{r}_x k_{i,x} - \bar{r}_x F_x + \bar{r}_x \lambda_i \left[\theta_x a_i - F_x - \phi_x k_{i,x}\right].$$

The first-order condition is

$$\frac{\partial \mathcal{L}_i}{\partial k_{i,x}} = \frac{\partial R_{i,x}}{\partial k_{i,x}} - \bar{r}_x - \bar{r}_x \lambda_i \phi_x = 0.$$

Collecting terms yields

$$\frac{\partial R_{i,x}}{\partial k_{i,x}} = \bar{r}_x(1 + \phi_x \lambda_i),$$

and therefore

$$\text{MRPK}_{i,x} = \bar{r}_x(1 + \phi_x \lambda_i) = \bar{r}_x(1 + \tau_{i,x}).$$

The fixed financing cost $\bar{r}_x F_x$ affects participation but not the conditional capital choice. If the financing constraint is slack, then $\lambda_i = 0$ and

$$k^u_{i,x} = \left(\frac{\alpha \mathcal{Z}_{i,x}}{\bar{r}_x}\right)^{1/(1-\alpha)}.$$

If it binds, then

$$\bar{k}_{i,x} = \frac{\theta_x a_i - F_x}{\phi_x}.$$

Strict concavity implies the active exporter chooses

$$k^*_{i,x} = \min\{k^u_{i,x}, \bar{k}_{i,x}\}.$$

Ordering under the benchmark. Under Assumption 1 both exporters are constrained, so $\bar{k}_{i,x} = (\theta_x a_i - F_x)/\phi_x$ is increasing in a_i; hence $a_1 < a_2$ implies $k_{1,x} < k_{2,x}$. Since $\text{MRPK}_{i,x} = \alpha \mathcal{Z}_x k_{i,x}^{\alpha-1}$ is decreasing in $k_{i,x}$ for $\alpha \in (0,1)$, it follows that $\text{MRPK}_{1,x} > \text{MRPK}_{2,x}$.

E.3.2 User-cost versus financing-capacity shocks

The model distinguishes a shock to the common export user cost, ζ_x, from a shock to effective financing capacity, $\theta_x a_i$. For an unconstrained active exporter, $\lambda_i = 0$ and

$$k^u_{i,x} = \left(\frac{\alpha \mathcal{Z}_{i,x}}{\bar{r}_x}\right)^{1/(1-\alpha)}.$$

Holding common price index and rental rate feedbacks fixed, a change in the common export user cost implies

$$\frac{d \log k^u_{i,x}}{d\zeta_x} = -\frac{1}{(1-\alpha)\bar{r}_x},$$

which is common across firms within a narrow cell. By contrast, for a constrained exporter the binding financing-capacity constraint gives

$$\bar{k}_{i,x} = \frac{\theta_x a_i - F_x}{\phi_x},$$

so

$$\frac{d \log \bar{k}_{i,x}}{d\zeta_x} = 0$$

holding effective financing capacity fixed. Any price index or rental rate feedback is common across Home exporters in the same narrow cell and therefore differences out. Hence, for two constrained exporters in the same cell,

$$\frac{d\log \bar{k}_{1,x}}{d\zeta_x} - \frac{d\log \bar{k}_{2,x}}{d\zeta_x} = 0,$$

the result of no differential response in Corollary 1. By contrast, a financing-capacity shock generates a strictly larger proportional response for the initially tighter, higher-MRPK exporter, as derived in the Proof of Proposition 1 below.

E.3.3 Proof of Proposition 1

Proof. For any constrained firm i,

$$k_{i,x} = \frac{\theta_x a_i - F_x}{\phi_x}.$$

Log-differentiating with respect to effective financing capacity gives

$$\frac{\partial \log k_{i,x}}{\partial \log(\theta_x a_i)} = \frac{\theta_x a_i}{\theta_x a_i - F_x}.$$

Differencing across firms gives

$$\frac{\partial \log k_{1,x}}{\partial \log(\theta_x a_1)} - \frac{\partial \log k_{2,x}}{\partial \log(\theta_x a_2)} = \frac{\theta_x a_1}{\theta_x a_1 - F_x} - \frac{\theta_x a_2}{\theta_x a_2 - F_x} > 0,$$

because the function $a \mapsto a/(a-c)$ has derivative $-c/(a-c)^2 < 0$ for $a > c > 0$, and the constrained-active assumption implies $\theta_x a_i > F_x$ for both firms. □

E.3.4 Proof of Corollary 2

Proof. Let $IP_i \equiv d\log(\theta_x a_i)$ and let $\varepsilon_i \equiv \partial \log k_{i,x}/\partial \log(\theta_x a_i)$. For any active constrained exporter,

$$k_{i,x} = \frac{\theta_x a_i - F_x}{\phi_x}.$$

The constrained capital choice implies

$$d\log k_{i,x} = \frac{\theta_x a_i}{\theta_x a_i - F_x} d\log(\theta_x a_i) = \varepsilon_i IP_i.$$

Therefore, if two implementations, one through θ_x and one through a_i, induce the same IP_i for every active constrained exporter, they induce the same vector $\{d\log k_{i,x}\}_i$. Since $d\log k_x$, $d\log \Phi_x$, and $E_x = \alpha d\log k_x + d\log \Phi_x$ depend only on that response vector, the two implementations have the same effect on E_x. □

E.3.5 Proof of Proposition 2

Proof. Because $\mathcal{Z}_{1,x} = \mathcal{Z}_{2,x}$, $k_{1,x} < k_{2,x}$ implies $\varpi_{1,x} > s_{1,x}$ because $\alpha \in (0,1)$. Under the conditions of Proposition 2, Lemma 2 and Proposition 1 imply $d\log k_{1,x} - d\log k_{2,x} > 0$. Equation (E.12) then gives $d\log \Phi_x > 0$. □

E.3.6 Proof of Proposition 3

Proof. For constrained exporters,

$$d\log k_{i,x} = \frac{\theta_x a_i}{\theta_x a_i - F_x} IP_i.$$

Thus any positive dose IP_i raises the recipient's export capital, so aggregate export capital rises whenever at least one active constrained exporter is treated. Lemma 3, specialized to exports in (E.11), gives

$$d\log \mathcal{R}_x = \frac{1 - w_x}{1 - \alpha w_x} E_x.$$

Under Proposition 2, the policy raises the allocation index, and the positive capital response raises aggregate export capital. Hence $E_x > 0$ and, since $0 < \alpha w_x < 1$, $d\log \mathcal{R}_x > 0$. □

E.3.7 Proof of Corollary 3

Proof. For a given $E_x > 0$, Proposition 3 gives

$$d\log \mathcal{R}_x = \frac{1 - w_x}{1 - \alpha w_x} E_x.$$

Differentiating with respect to w_x yields

$$\frac{\partial}{\partial w_x}\left[\frac{1 - w_x}{1 - \alpha w_x} E_x\right] = -\frac{1 - \alpha}{(1 - \alpha w_x)^2} E_x < 0.$$

The pass-through $\dfrac{1 - w_x}{1 - \alpha w_x}$ comes from the CES price-index feedback in the export market: as Home export supply expands, the Home export-bundle price falls, $d\log P_{H,x} = -\dfrac{1}{(\sigma - 1)(1 - \alpha w_x)} E_x < 0$. With the Foreign import price $\bar{p}_{F,d}$ fixed, this decline is one for one the deterioration in Home's terms of trade, $d\log TOT_x = d\log P_{H,x} < 0$. The larger Home's initial export-market share w_x, the larger the price-index offset and the smaller the revenue gain from a given E_x. □

E.4 Welfare and Capital-Market Crowd-Out

This appendix derives the welfare expression and proves Proposition 4.

E.4.1 Government Budget and the Resource Cost of the Intervention

Let τ denote the net lump-sum levy on Home residents and let S denote the net financial transfer from the government to Home exporters and lenders. Thus, $S > 0$ when the government makes a net transfer to Home agents and $S < 0$ when the agency collects net fees, interest, or markups from them.

The net resource cost of the intervention is

$$T = \underbrace{A_g}_{\text{operating resources}} + \underbrace{L_g^F}_{\text{foreign credit losses}} - \underbrace{Y_g^F}_{\text{foreign financial income}}, \tag{E.15}$$

where:

1. A_g includes the agency wage bill, underwriting and monitoring costs, enforcement and recovery resources, legal and IT expenses, and other administrative inputs;

2. L_g^F includes expected foreign defaults net of recoveries, the fair-value subsidy from lending to foreign borrowers below a risk-adjusted rate, and insurance or guarantee losses ultimately caused by foreign nonpayment;

3. Y_g^F includes interest spreads, fees, and recoveries received from foreign borrowers or other foreign counterparties that are not already included in $\mathcal{R}_x$.

The government budget constraint is

$$\tau = S + T. \tag{E.16}$$

Home disposable income before consolidation is

$$I = \mathcal{R}_d + \mathcal{R}_x + S - \tau. \tag{E.17}$$

Substituting equation (E.16) yields

$$I = \mathcal{R}_d + \mathcal{R}_x - T. \tag{E.18}$$

The model assumes that the agency receives no financial income from Foreign, so $Y_g^F = 0$, while allowing for foreign credit losses through L_g^F. Accordingly,

$$T = A_g + L_g^F.$$

Financial transfers between the government and Home agents enter through S and cancel after consolidation. This includes payments to Home exporters or lenders and agency profits generated by fees or markups charged to Home exporters. Gross loan authorizations, fairly valued loan principal, and guarantee face values are financial positions rather than resource costs and therefore do not enter T.

The definition of T also excludes lump-sum taxes, interest paid by the agency to the Home treasury, financing benefits already captured by $\mathcal{R}_x$ and $d\log\Phi_x$, and capital-market effects already captured by the domestic crowd-out terms.

Under CES preferences, indirect utility equals real income $W = I/P_d$, so $d\log W = d\log I - d\log P_d$, where

$$I = \mathcal{R}_d + \mathcal{R}_x - T.$$

Capital and working capital lenders are Home residents, so rental income $r_f K$ and working capital payments $\bar{r}_x(\phi_x k_x + 2F_x)$ are intra-Home transfers and net to zero in the aggregate income identity. Welfare therefore equals real Home gross output net of the resource cost of the intervention. Let

$$E_x \equiv \alpha\, d\log k_x + d\log\Phi_x, \qquad E_d \equiv \alpha\, d\log k_d + d\log\Phi_d,$$

where $d\log\Phi_d = 0$ in the Home market because firms face no firm-specific Home-market wedge. Let $\chi_m \equiv \mathcal{R}_m/I$; the closure $D_d = I$ implies the equilibrium identity $\chi_d = w_d$, where w_d is the Home producer share of Home market expenditure.

Apply Lemma 3 to each market. Exports have $d\log D_x = 0$, while the Home market has $d\log D_d = d\log I$:

$$d\log\mathcal{R}_x = \frac{1-w_x}{1-\alpha w_x}E_x, \qquad d\log\mathcal{R}_d = \frac{1-\alpha}{1-\alpha w_d}\,d\log I + \frac{1-w_d}{1-\alpha w_d}E_d.$$

Differentiating the income identity, $d\log I = \chi_d\, d\log\mathcal{R}_d + \chi_x\, d\log\mathcal{R}_x - dT/I$, and using $\chi_d = w_d$ to simplify

$1 - \dfrac{\chi_d(1-\alpha)}{1-\alpha w_d} = \dfrac{1-w_d}{1-\alpha w_d}$, gives

$$d\log I = \frac{1-\alpha w_d}{1-w_d}\left[\chi_x \frac{1-w_x}{1-\alpha w_x} E_x + w_d \frac{1-w_d}{1-\alpha w_d} E_d - \frac{dT}{I}\right].$$

The deflator follows from the price index step of Lemma 3,

$$d\log P_d = \frac{(1-\alpha)w_d}{1-\alpha w_d}\, d\log I - \frac{w_d}{(\sigma-1)(1-\alpha w_d)} E_d,$$

so $d\log W = \dfrac{1-w_d}{1-\alpha w_d}\, d\log I + \dfrac{w_d}{(\sigma-1)(1-\alpha w_d)} E_d$. Substituting $d\log I$, the factor $\dfrac{1-w_d}{1-\alpha w_d}$ cancels its inverse, leaving

$$d\log W = \underbrace{\chi_x \frac{1-w_x}{1-\alpha w_x} E_x}_{\text{export revenue}} + \underbrace{\chi_d \frac{1-w_d}{1-\alpha w_d} E_d}_{\text{Home-market revenue}} + \underbrace{\frac{w_d}{(\sigma-1)(1-\alpha w_d)} E_d}_{\text{Home price index}} - \underbrace{\frac{dT}{I}}_{\text{net resource cost}}. \tag{E.19}$$

Under the closure $D_d = I$ (hence $\chi_d = w_d$), the nominal income multiplier $1/(1-\chi_d)$ cancels against the domestic price index response: a fall in Home demand lowers nominal income and the Home deflator by the same share w_d, so real income carries no net income multiplier.

E.4.2 Proof of Proposition 4

Proof. After imposing the CES price-index equations and the fixed point $D_d = I$, aggregate capital demand $\tilde{k}_d(r_f;\cdot) + \tilde{k}_x(r_f;\cdot) = K_s(r_f)$ depends on the rental rate and on the policy. Set $dT = 0$. At a fixed rental rate the policy raises aggregate capital demand by $d^{\text{dir}}K > 0$: it directly relaxes export financing, expanding export-capital demand by $\sum_i (\partial k_{i,x}/\partial\Theta_i)\, d\Theta_i > 0$, and the accompanying rise in Home income shifts domestic capital demand outward. Writing $\tilde{k}_{m,r} \equiv \partial\tilde{k}_m/\partial r_f$, capital market clearing under the stability condition $K_s'(r_f) - \tilde{k}_{d,r} - \tilde{k}_{x,r} > 0$ gives

$$dr_f = \frac{d^{\text{dir}}K}{K_s'(r_f) - \tilde{k}_{d,r} - \tilde{k}_{x,r}} > 0, \qquad \text{hence } d\log r_f > 0. \tag{E.20}$$

For domestic capital, the first-order condition $\alpha\mathcal{Z}_{i,d}k_{i,d}^{\alpha-1} = r_f$ gives $d\log k_{i,d} = \dfrac{1}{1-\alpha}(d\log\mathcal{Z}_{i,d} - d\log r_f)$. Domestic Home firms set a constant markup over the rental rate, $p_{i,d} = \dfrac{\sigma}{\sigma-1}\, r_f/z_{i,d}$, so $d\log P_{H,d} = d\log r_f$ and hence $d\log P_d = w_d\, d\log r_f$. With $D_d = I$, the domestic shifter is $d\log\mathcal{Z}_{i,d} = \dfrac{1}{\sigma}\, d\log I + \alpha w_d\, d\log r_f$. Substituting and using $1-\alpha = 1/\sigma$,

$$d\log k_{i,d} = d\log I - \sigma(1-\alpha w_d)\, d\log r_f.$$

Home-market capital is crowded out, $d\log k_{i,d} < 0$, if and only if $\sigma(1-\alpha w_d)\, d\log r_f > d\log I$. The rental-rate response (E.20) is decreasing in the capital-supply elasticity $K_s'(r_f)$, so the crowding-out effect is weaker the more elastic is capital supply. □

E.4.3 Untreated exporters

An untreated exporter $j \in \mathcal{U}$ receives no direct dose, $IP_j = d\log\Theta_j = 0$, and chooses capital $k_{j,x} = \min\{\bar{k}_{j,x}, k^u_{j,x}\}$, where

$$\bar{k}_{j,x} = \frac{\Theta_j - F_x}{\phi_x}, \qquad k^u_{j,x} = \left(\frac{\alpha \mathcal{Z}_{j,x}}{\bar{r}_x}\right)^{1/(1-\alpha)}.$$

If j is constrained, $k_{j,x} = \bar{k}_{j,x}$ and $d\log\Theta_j = 0$ give $d\log k_{j,x} = 0$, so $d\log R_{j,x} = d\log \mathcal{Z}_{j,x}$. If j is unconstrained, $k_{j,x} = k^u_{j,x}$ gives

$$d\log k_{j,x} = \frac{1}{1-\alpha}\left(d\log \mathcal{Z}_{j,x} - d\log \bar{r}_x\right), \qquad d\log R_{j,x} = \frac{1}{1-\alpha} d\log \mathcal{Z}_{j,x} - \frac{\alpha}{1-\alpha} d\log \bar{r}_x.$$

By Proposition 4, $d\log \bar{r}_x > 0$ whenever $dr_f > 0$ and ζ_x is fixed. In both cases the shifter response is $d\log \mathcal{Z}_{j,x} = \alpha\, d\log P_x = -\dfrac{(1-\alpha)w_x}{1-\alpha w_x} E_x$ from Lemma 3.

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