The University of Nottingham

research paper series

Political Economy of Globalisation

Research Paper 2016/12

Does the US EXIM Bank Really Promote US Exports?

By

Natasha Agarwal and Zheng Wang

GEP

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Natasha Agarwal [a] and Zheng Wang [b,c]

[a] World Education Foundation, Norway

[b] Hull University Business School, Hull, HU6 7RX, United Kingdom

[c] GEP, University of Nottingham, Nottingham, NG7 2RD, United Kingdom

July 27, 2016

Abstract

This paper investigates the impact of US Export-Import Bank (EXIM) on US exports particularly in the wake of international competition from foreign national export credit agencies (ECAs). We employ a gravity framework on a country-industry-year-level panel dataset that matches EXIM authorizations with US bilateral exports. Our results depict the general ineffectiveness of the Bank in promoting exports within and across industries. Some heterogeneities behind the general finding are also uncovered: industries other than aerospace parts and products are more likely to benefit from EXIM authorizations, and that EXIM authorizations to larger businesses seem to be more effective in encouraging exports. Furthermore, we find no evidence that explains the role of EXIM in encouraging US exports by offsetting foreign ECA competition. These results are neither affected by competing countries' membership to the OECD Arrangement nor by the size of American firms that received EXIM support. Our results cast doubt on the ubiquitously positive claims made by the Bank and its supporters, yet also provide policy lessons for countries that are either in the inception stages of establishing their own ECAs or are now placing greater importance on ECA financing in encouraging domestic exports.

Key Words: Trade credits; EXIM; export competition; value chain

JEL Classifications: F13, F14, F55

*We thank seminar participants at Fudan University, Shanghai University of Finance and Economics, and the University of Dundee for their helpful comments, and Magnus Lodefalk and Abishek Choutagunta for their help with some of the data. We also thank Louis Dupuy for his invaluable suggestions. All remaining errors are our own. Responsibility of the views, opinions, suggestions and analysis in this article lies solely with the authors and does not reflect the institutions they belong to. Agarwal: World Education Foundation; Email: agarwana3@gmail.com. Wang: Hull University Business School, Hull, HU6 7RX, United Kingdom; Email: ralwang@gmail.com.

1 Introduction

The positive role of trade financing in facilitating international trade is ubiquitously agreed and confirmed by researchers (e.g. Chor and Manova, 2012; Manova, 2013). However, the impact of trade financing provided by national export credit agencies (ECAs) is much less in the clear. While one camp advocates ECA financing and endorses its positive effect on a country's exports and jobs, the other camp doubts the efficiency of this non-market intervention and raises concern about the unintended distortions brought about by such government interventions.[1] In the US, this debate reached its climax when its Export-Import Bank (EXIM), the official export credit agency (ECA) of the country, closed to new business after June 30, 2015.[2] Despite the sharp controversy around the functions of the EXIM Bank, surprisingly no systematic evidence exists in the academic literature regarding the effectiveness of the US EXIM Bank in promoting trade.

In this paper, we take on this question by investigating whether and how, if any, support (in the form of authorizations) provided by the US EXIM Bank affects US exports. We try to uncover the heterogeneity under this potential export-promoting effect of EXIM authorization across various dimensions including industries, regions and size of American companies that received EXIM support.[3] We then move on to examining whether the potential export-promoting effect of EXIM authorization is affected by competition from other countries' ECA-financed exporting activities particularly in the wake of international institutional arrangements like the OECD Arrangement on Officially Supported Export Credits (Arrangement hereafter).

Using panel data on US export flows disaggregated by receiving country, industry, and year, our first set of results provides no detectable evidence on the export-promoting effects of EXIM authorization. However, further inspection reveals that this insignificant effect masks heterogeneities: EXIM authorizations to all sectors except for aerospace products and parts (NAICS 3364) has a significantly positive effect on US exports, and that this effect is observable for American companies that are not classified as small by the Bank. Furthermore, we find that positive average export-promoting effect of EXIM authorization is not affected by competition from foreign government ECA-financed exporting activities, and that this effect is neither affected by foreign governments' accession to the Arrangement nor by the size of American companies that received EXIM assistance. We continue to find that the general ineffectiveness of EXIM authorization is robust when when taking into account the heterogeneity associated with an industry's position in the value chain, and when accounting for the possibility of influences that may spill over across sectors.

The above results have important policy implications for policymakers from both the US and other countries across the world, in general. It brings to attention the importance of going beyond evaluating a general export-promoting effect of ECA financing, and exploring the heterogeneity behind this general effect across various country-relevant dimensions. It calls attention to the significance of ECAs in offsetting competition from other countries ECA-financed exporting activities. Consequently, it revives the political debate on whether resorting to domestic institutions is the an-

[1] See James (2011) for a review of the viewpoints of both camps.

[2] On December 4, 2015, the Bank was reauthorized by the Congress for business as usual.

[3] We look at these dimensions because of its explicit focus in the US EXIM Bank Charter.

swer to improving trade competitiveness or does it not lead to protectionism through subsidizes, and further aggravate market distortions, domestically and internationally. It also rekindles the debate on countries binding constraints under various international institutional arrangements, and the countering effect on countries international commitments from accession to these arrangements.

Our analysis extends the existing studies that establish a positive and significant impact of trade credit insurance on trade. In a pioneering study, Egger and Url (2006) analyze Austrian export flows disaggregated by receiving country and industry, and show that export credit guarantees extended by Austria's ECA, Oesterreichische Kontrollbank (OeKB), indeed fosters economic activity, resulting in a multiplier effect of 2.8. Furthermore, ECA financing not only results in the broadening of trade partners towards high-risk regions but also leaves the goods structure of foreign trade almost unchanged. Moser *et al*. (2008) analyze German export flows, disaggregated by receiving country and year, and show that export credit guarantees extended by Germany's official ECA, Euler Hermes (Hermes), does lead to higher German exports with a multiplier effect of about 1.7. More so, the effectiveness of ECA financing crucially hinges on both the sample of countries and the time period considered. Both studies above show a more than proportional effect of export credit guarantees on export volumes with short-run effects of ECA financing on export volumes being smaller than long-run effects largely because of the lag between the day when a guarantee is provided and the actual shipment of the good.

In a similar vein, Felbermayr and Yalcin (2013) study German export flows disaggregated by receiving country and industry, and document that a 1% increase in export credit guarantees extended by Hermes, boost exports on average by about 0.012%. Moreover, they show that the effectiveness of Hermes in increasing exports varies across sectors, regions and income groups. In particular, Hermes effect is large in a small number of sectors which are aviation, shipbuilding and transportations sector. Characterized by high time-to-build lags and large external financial dependence, these sectors indicate that Hermes' guarantees alleviate sectoral financial frictions. Lastly, they show that Hermes does not play a strong role in reducing the impact of financial frictions in importing countries on German exports. Likewise, the less vulnerable sectors are with respect to credit constraints, the smaller the positive Hermes effect becomes. Additionally, they show that Hermes have helped contain export collapse during the recent financial crisis of 2008, particularly in sectors with higher credit constraints. At a more disaggregated level, Badinger and Url (2013) analyze a cross-section of 178 firms for the year 2008, and show that export credit guarantees extended by OeKB increases firm-exports from some 80% to 100%. More so, the effect of export credit guarantees is larger for exports to countries with higher credit risk. The generally positive pro-trade impact of trade credits is confirmed in some other studies with data collected either from Berne Union or individual export credit insurer (van der Veer, 2015; Korinek *et al*., 2010; Auboin and Engemann, 2014).

Our analysis is also broadly related to the literature which shows that negative shocks to bank-intermediated trade finance, particularly at times of financial distress at the banks, reduce the volume of exports for firms that continue exporting to a given product-destination market (i.e. intensive margin), and has no impact on the probability that a firm exists or enters new product and destination markets (i.e. extensive margin) (Amiti and Weinstein, 2011; Paravisini *et al*., 2014; Prete and Fed-

erico, 2014). They argue that shortages in bank-intermediated trade finance reduce exports through raising the variable cost of production rather than the cost of financing sunk entry investments.

Last, our research is linked to an increasing body of literature on the impact of trade finance on a country' level and pattern of international trade, both at the macro- and micro- level (e.g. Chor and Manova, 2012; Manova, 2013; Manova *et al.*, 2015). This line of research argues that financial comparative advantage alleviates the substantial sunk, fixed and variable costs of trade such that financially developed economies export more, especially in financially vulnerable sectors, through entering more markets, shipping more products to each destination, and selling more of each product.

While our empirical approach is closed related to Egger and Url (2006), Moser *et al.* (2008), and Felbermayr and Yalcin (2013), we make several important extensions and contributions to this growing body of literature. First, to the best of our knowledge about the academic literature, we provide the first rigorous evaluation of the effectiveness of US EXIM Bank, a dominant player in the world EXIM financing. Second, this is the first paper that provides evidence on whether EXIM authorization enables domestic exporters to overcome the competition emanating from foreign government ECA financing, particularly in cases where foreign government ECAs are acceded to the OECD Arrangement. Finally, we investigate whether and how EXIM financing enables exporters to move up the industrial chain and evolve itself in the global value chain, offering the first evidence of its kind in the context of global production networks.

The rest of the paper is structured as follows. In Section 2 we propose an empirical gravity framework for the estimation of the effect of EXIM support. Section 3 provides a background on the US EXIM Bank. Section 4 describes the data and offers some descriptive evidence. Section 5 presents our results and analysis of the possible influencing channels. Section 6 concludes this paper with a discussion on the limitations and possibilities of future research.

2 Estimation Framework

Based on the theoretical underpinning of the gravity model of trade (e.g. Anderson and van Wincoop, 2003), market clearance and general equilibrium imply that bilateral trade between countries can be expressed as

$$X_{ijkt} = e^{f(S_{jkt})} E_{jkt} \left(\frac{Y_{ikt}}{Y_{kt}} \right) \left(\frac{\tau_{ijkt}}{P_{ikt} P_{jkt}} \right)^{1-\sigma_k}, \tag{1}$$

where exports of good k from country i to country j in year t, X_{ijkt}, depend on a range of factors: country j's expenditure on k in t, E_{jkt}; an adjustment factor $e^{f(\cdot)}$ which is a function of US EXIM support S_{jkt}; the share of country i in the world production of k in t, $\frac{Y_{ikt}}{Y_{kt}}$; bilateral trade costs τ_{ijkt}; and multilateral resistance terms $P_{ikt}P_{jkt}$. The parameter σ_k, which is assumed to be greater than one, is the elasticity of substitution specific to good k and common across countries.

Taking natural logarithms of the both sides of (1) and setting $i = US$ gives

$$\ln X_{jkt}^{US} = f(S_{jkt}) + \ln E_{jkt} + \ln \left(\frac{Y_{kt}^{US}}{Y_{kt}} \right) + (1 - \sigma_k)[\ln \tau_{jkt}^{US} - (\ln P_{kt}^{US} + \ln P_{jkt})]. \tag{2}$$

A challenge in practice with the estimation of the above specification is that it is difficult to find data for the variables E_{jkt}, $\frac{Y_{kt}^{US}}{Y_{kt}}$, τ_{jkt}^{US}, P_{kt}^{US}, and P_{jkt} that are time variant for disaggregated industries. To overcome this difficulty, we make assumptions that the values of E_{jkt} and $\frac{Y_{kt}^{US}}{Y_{kt}}$ are time functions of their base-year values, and the variables τ_{jkt}^{US}, P_{kt}^{US}, and P_{jkt} are proportional to their country-level counterparts with the proportions remaining stable over time:

$$\begin{aligned} E_{jkt} &\equiv e^{\delta_t} E_{jk}, \\ Y_{kt}^{US}/Y_{kt} &\equiv e^{\theta_t} Y_k^{US}/Y_k, \\ \tau_{jkt}^{US} &\equiv e^{\lambda_k} \tau_{jt}^{US}, \\ P_{kt}^{US} &\equiv e^{\gamma_k} P_t^{US}, \\ P_{jkt} &\equiv e^{\mu_k} P_{jt}. \end{aligned} \tag{3}$$

Now inserting (3) into (2) and further assuming the linearity of $f(\cdot)$ (i.e. $f(S_{jkt}) = \alpha S_{jkt}$) and the constancy of the elasticity of substitution between all goods (i.e. $\sigma_k = \sigma$), we have

$$\begin{aligned} \ln X_{jkt}^{US} &= \alpha S_{jkt} + \ln E_{jk} + \ln\left(\frac{Y_k^{US}}{Y_k}\right) + (1-\sigma)[\ln \tau_{jt}^{US} - (\ln P_t^{US} + \ln P_{jt})] \\ &\quad + \delta_t + \theta_t + (1-\sigma)(\lambda_{jk} - \gamma_k - \mu_k). \end{aligned} \tag{4}$$

Merging overlapping parameters, we have the following equation for empirical estimation:

$$\begin{aligned} \ln X_{jkt}^{US} &= \alpha S_{jkt} + (1-\sigma)[\ln \tau_{jt}^{US} - (\ln P_t^{US} + \ln P_{jt})] \\ &\quad + \phi_t + \eta_{jk} + \mathbf{X}_{jkt}\mathbf{\Gamma} + \epsilon_{jkt} \end{aligned} \tag{5}$$

where the vector $\mathbf{X}_{jkt}$ contains additional controls, ϕ_t captures all unobserved time-specific factors, η_{jk} absorbs all country-industry-specific factors including the time-invariant variable E_{jk}, and the error term ϵ_{jkt} represents the white noise of the model.

As the standard practice in the empirical gravity literature, we assume bilateral trade costs $\tau_{j,t}^{US}$ to be a function of a number of geographical, cultural, and institutional factors:

$$\begin{aligned} \tau_{jt}^{US} &\equiv \exp(\rho_1 dist_j^{US} + \rho_2 lang_j^{US} + \rho_3 contig_j^{US} + \rho_4 leg_j^{US} + \rho_5 curr_j^{US} + \rho_6 col_j^{US} \\ &\quad + \rho_7 wto_{jt}^{US} + \rho_8 rta_{jt}^{US}), \end{aligned} \tag{6}$$

where $dist_j^{US}$ is the logged geographical distance between country j and the US weighted by the population of countries, $lang_j^{US}$ is a dummy which takes on the value of one if country j has the same official language (i.e. English) as the US and zero otherwise, $contig_j^{US}$ is a dummy for sharing the border with the US, leg_j^{US} is a dummy for having the same legal origin as the US, $curr_j^{US}$ is a dummy for sharing the same official currency (i.e. the US dollar) as the US, wto_{jt}^{US} the dummy for the partner country being a member of GATT/WTO as is the US, and rta_{jt}^{US} the dummy for being in a common regional free trade agreement with the US.

Following Baier and Bergstrand (2009) and Berger *et al*. (2013), the multilateral resistance terms are approximated by a first-order log-linear Taylor-series expansion of the system of price equations in Anderson and van Wincoop (2003). Specifically, it is shown that under the assumption of symmetry of bilateral trade costs, the multilateral resistance terms can be expressed as GDP-weighted average trade costs:

$$\ln P_t^{US} + \ln P_{jt} = \sum_{l=1}^{N} \omega_{l,t} \ln \tau_{j,l,t} + \sum_{l=1}^{N} \omega_{lt} \ln \tau_{lt}^{US} + \sum_{l=1}^{N} \sum_{m=1}^{N} \omega_{lt}\omega_{mt} \ln \tau_{kmt}, \tag{7}$$

where $\omega_{lt} \equiv Y_{lt}/Y_t$ is the share of country l in world GDP.

Plugging (6) into (7) gives a function of the multilateral resistance terms as a linear combination of observable components of trade costs as in (6):

$$\begin{aligned} \ln P_t^{US} + \ln P_{j,t} &= \rho_1 Q_j^{dist} + \rho_2 Q_j^{lang} + \rho_3 Q_j^{contig} + \rho_4 Q_j^{leg} + \rho_6 Q_j^{curr} + \rho_7 Q_j^{col} \\ &\quad + \rho_8 Q_{jt}^{wto} + \rho_9 Q_{jt}^{rta}, \end{aligned} \tag{8}$$

where

$$\begin{aligned} Q_j^s &\equiv \sum_{l=1}^{N} \omega_{lt} s_{jl} + \sum_{l=1}^{N} \omega_{lt} s_l^{US} + \sum_{l=1}^{N} \sum_{m=1}^{N} \omega_{lt}\omega_{mt} s_{km}, \\ &\quad for\ s = dist, lang, contig, leg, curr, col \\ Q_{jt}^s &\equiv \sum_{l=1}^{N} \omega_{lt} s_{jlt} + \sum_{l=1}^{N} \omega_{lt} s_{lt}^{US} + \sum_{l=1}^{N} \sum_{m=1}^{N} \omega_{l,t}\omega_{mt} s_{kmt},\ for\ s = wto, rta. \end{aligned}$$

Therefore we can now control for trade costs and multilateral resistance terms jointly using the same set of observable variables:

$$\begin{aligned} \ln \tau_{j,t}^{US} - (\ln P_t^{US} + \ln P_{j,t}) &= \rho_1 (dist_j^{US} - Q_j^{dist}) + \rho_2 (lang_j^{US} - Q_j^{lang}) \\ &\quad + \rho_3 (contig_j^{US} - Q_j^{contig}) + \rho_4 (leg_j^{US} - Q_j^{leg}) \\ &\quad + \rho_5 (curr_j^{US} - Q_j^{curr}) + \rho_6 (col_j^{US} - Q_j^{col}) \\ &\quad + \rho_7 (wto_{jt}^{US} - Q_{jt}^{wto}) + \rho_9 (rta_{jt}^{US} - Q_{jt}^{rta}). \end{aligned} \tag{9}$$

3 Background of the US EXIM Bank

The US EXIM Bank is the official state export credit agency of the United States. Founded in 1934, it is a wholly owned US government corporation with a mission is to contribute to US employment by financing and facilitating US exports of goods and services. In doing so, it seeks to level the playing field for US exporters by financing exports that the private sector is unwilling or unable to undertake alone at terms commercially viable for exporters, and to counter government-backed financing by foreign countries through their state export credit agencies (ECAs). The main

products of the Bank are direct loans, loan guarantees, working capital finance, and export credit insurance.

The Congress has a number of statutory responsibilities with respect to the Bank. Through its statutory charter, the Export Import Bank Act of 1945, Congress provides authority for the Bank's functions for a period of time that it chooses. While the Congress does not set out to approve individual Bank transactions, it sets out statutory requirements for the Bank's activities. For instance, the Bank's Charter requires that all transactions it authorizes demonstrate a reasonable assurance of repayment; supplement, and not compete with private capital; and be provided at terms competitive with foreign ECAs.[4]

In addition, the Congress directs the Bank to support certain type of exports. For example, congressional requirements for the Bank include: make available not less than 25% of its total authority to finance small business exports, promote the export of goods and services related to renewable energy sources, and promote financing to sub-Saharan Africa.[5] The Bank is also subject to various reporting requirements, including a report of its operations, small business exports support, monitoring of default rates, and categorization of loans and long-term guarantee transactions by their stated purpose.[6]

The Bank abides by international disciplines for government-backed ECA activity under the OECD Arrangement on Officially Supported Export Credits (the "Arrangement" hereafter). The Arrangement is a "Gentlemen's Agreement" negotiated by the participants to the Arrangement.[7] Its main purpose is to provide a framework for the orderly use of government-backed export financing (within the participating countries), with the goal of encouraging competition among exporters based on quality and price of goods and services rather than on the most favorable government-backed financing terms and conditions. The financing terms and conditions could be related to minimum interest rates, risk fees, and maximum repayment terms. Rules on minimum interest rates ensure that the US EXIM Bank no longer offers loans with below-cost interest rates and long repayment terms to compete with such practices by other governments. The OECD views the Arrangement as "rules" defining constraints on members' lending activity.

4 Data and Descriptive Statistics

The data used in this study is drawn from the annual accounting reports of the EXIM Bank which is made available under the Open Government Directive. The dataset contains information

[4]Section 2(b)(1)(B), the Charter of the Export-Import Bank of the United States (the Charter hereafter), updated February 29, 2016.

[5]It does not have a quantitative target to promote the exports of goods and services related to renewable energy sources, and to promote financing to sub-Saharan Africa. See in the Charter Section 2(b)(1)(E)(v) for small business, Section 2(b)(1)(K) for renewable energy, and Section 2(b)(9)(A) for Sub-Saharan Africa.

[6]Section 8A, the Charter.

[7]The participants to the OECD Arrangement currently are: Australia, Canada, the EU, Japan, South Korea, New Zealand, Norway, Switzerland and the United States. Brazil is a participant to the Sector Undertaking On Export Credits For Civil Aircraft. This information has been gathered from the Agreement on Officially Supported Export Credits, February 1, 2016, TAD/PG(2016)1. For the purpose of this paper, countries in the EU are taken from https://www.gov.uk/eu-eea.

on the transactions that has been authorized under each program: direct loan, loan guarantees, and export credit insurance. Transaction detail includes the amount of financing approved, the financing approved to small American businesses,[8] country of the foreign buyer, industry classification of the product for which EXIM financing is procured (reported either at 6-digit NAICS or 4-digit SIC code), amongst others.

In order to identify the export-promoting effects of EXIM authorization, we supplement the EXIM data with the US exports data from UN COMTRADE. Using concordances from US Census Bureau and US Bureau of Economic Analysis, we aggregate the industry classification to 4-digit IO/NAICS sectors. After cleaning the data, our sample comprises of 148,708 observations resulting from a three dimensional panel of 226 countries, 94 industries and 7 years spanning from 2007 to 2013. On the one hand, only 11% of the country-industry-year observations records no imports from the US. The remaining 89% have imports from the US at least once across all the 7 years, 62% imported from the US for all 7 years in the dataset. On the other hand, 96% of the country-industry-year observations received no EXIM authorization. The remaining 4% report to having been authorized by the Bank at least once across the 7 years, while only 0.13% report to having been authorized by the Bank for all the years in the sample period.

Figure 1 reveals, at both country and industry levels, a positive correlation between the total value of the Bank's authorization portfolio and US exports, thus backing the Bank's assertion of supporting American exporters by equipping them with financing tools necessary to compete for global sales.

Nevertheless, Tables 1 and 2 reveal the skewed distribution of EXIM authorization across countries and industries where the Bank does not necessarily authorizes its available funds to those countries and industries that dominate US exports. For instance, India received a maximum 10.96% share of the Bank's portfolio followed by Saudi Arabia at 10.55%. Nevertheless, total exports to India and Saudi Arabia accounted for only 1.46% and 1.08% share of total US exports as against the maximum 20.76% share of total US exports to Canada who received only 1.60% share in the Bank's portfolio. In a similar vein, while aerospace products and parts (NAICS 3364) received a maximum 49.09% share of the Bank's portfolio, its exports accounted for only 2.19% of total US exports as opposed to the maximum 6.22% share of petroleum and coal products (NAICS 3240) exports that received only 0.06% share in the Bank's authorization.

Table 3 shows that there is a negative correlation between what the Bank authorizes to a region in total and what it authorizes to small businesses for that particular region. For instance, for the period 2007 through 2013, Asian region received the highest share in the Bank's total authorization portfolio of loans, guarantees and insurance at 34.4%, of which only 2% was authorized to small businesses. On the contrary, for the same period, Caribbean region received the lowest share in the Bank's total authorization portfolio at 1.1%, of which, however, 24.7% was authorized to small businesses. It

[8]The US EXIM Bank adopts the qualifying criteria for "small business" from the U.S. Small Business Administration (SBA) definition. SBA has established a "Table for Small Business Size Standards" for industries in the North American Industry Classification System, where the size standards are based on either annual sales or average employment. The latest table updated on February 26, 2016 can be accessed from the SBA website at https://www.sba.gov/sites/default/files/files/Size_Standards_Table.pdf.

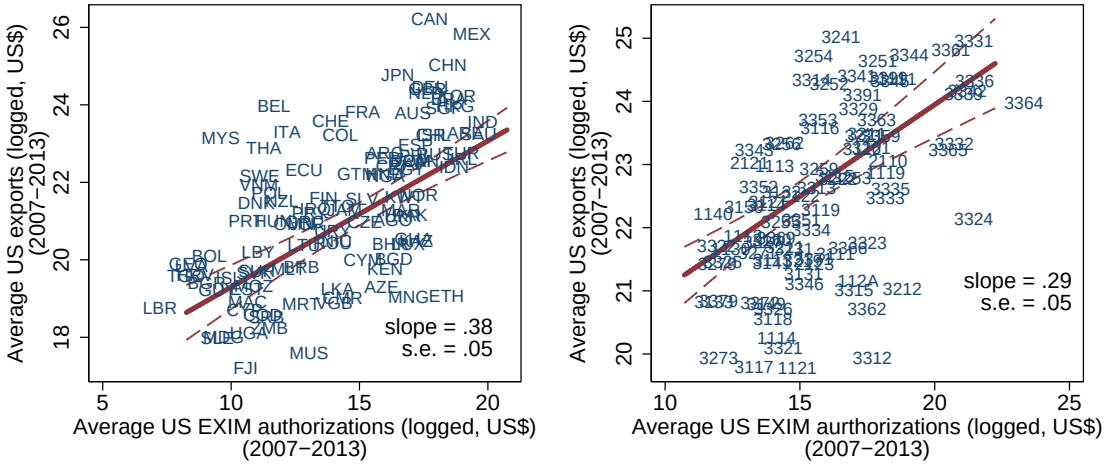

Fig. 1. US EXIM authorization and US exports by country and industry. The left panel shows the correlation between the log values of US exports and US EXIM authorization, both in US$ and taken as averages of the period 2007-2013, for all country destinations. The right panel shows the correlation between the log values of US exports and US EXIM authorization, both in US$ and taken as averages of the period 2007-2013, for all US 4-digit NAICS industries. The solid straight lines are the fitted linear trends, and the surrounding dashed lines give the 95% confidence intervals of the estimated linear trends.

Table 1. Top 20 US EXIM supported destinations and US export markets

(A) US EXIM support recipients		**(B) US export destinations**	
Name	Share (%)	Name	Share (%)
India	10.96	Canada	20.76
Saudi Arabia	10.55	Mexico	14.08
Mexico	8.39	China	6.39
United Arab Emirates	6.25	Japan	4.84
Turkey	5.37	Germany	3.55
Ireland	4.96	United Kingdom	3.44
Rep. of Korea	4.73	Netherlands	3.03
China, Hong Kong SAR	4.40	Rep. of Korea	2.86
Indonesia	3.62	Brazil	2.64
Brazil	3.29	Belgium	2.21
China	3.28	China, Hong Kong SAR	2.21
Ethiopia	2.96	Singapore	2.10
Singapore	2.81	France	1.86
Russian Federation	1.95	Australia	1.81
Chile	1.78	Switzerland	1.48
Germany	1.61	India	1.46
Canada	1.60	Italy	1.12
United Kingdom	1.49	United Arab Emirates	1.10
Israel	1.46	Saudi Arabia	1.08
Netherlands	1.34	Colombia	1.04

Note. This table reports the top 20 markets, ranked by their shares in US total EXIM authorization and exports (2007-2013) respectively.

Table 2. Top 20 US EXIM supported industries and US export industries

(A) US EXIM support industries		(B) US export industries	
Name	Share (%)	Name	Share (%)
Aerospace products	49.09	Petroleum and coal products	6.22
Engines and turbines	7.86	Agriculture and construction mach.	5.84
Agriculture and construction mach.	7.65	Motor vehicles	5.07
Boilers, tanks, and shipping containers	7.62	Electronic components	4.68
Communications equipment	6.02	Pharmaceuticals and medicines	4.64
Other general purpose mach.	5.23	Basic chemicals	4.27
Industrial machinery	3.72	Computer equipment	3.38
Motor vehicles	3.27	Misc, manufactured commodities	3.29
Railroad rolling stock	2.95	Oilseeds and grains	3.21
Electronic components	0.7	Nonferrous metal	3.15
Wood products	0.54	Electronic instruments	3.12
Oilseeds and grains	0.44	Engines and turbines	3.11
Metalworking machinery	0.35	Resin, rubber, and artificial fibers	2.98
Electronic instruments	0.34	Communications equipment	2.64
Misc. manufactured commodities	0.32	Other general purpose mach.	2.52
Oil and gas extraction	0.32	Medical equipment and supplies	2.51
Other agricultural products	0.29	Aerospace products and parts	2.19
Commercial and service mach.	0.29	Other fabricated metal products	2.01
Other electrical equipment	0.24	Electrical equipment	1.69
Basic chemicals	0.22	Motor vehicle parts	1.68

Note. This table reports the top 20 industries (4-digit NAICS), ranked by their shares in US total EXIM authorization and exports (2007-2013) respectively.

should be noted that on a global scale the Bank's authorization to small businesses ranges from 5% to 11% for the period 2007 through 2013, which is well below the mandated authorization to small businesses at 20%.[9]

The definitions and summary statistics of the main variables of this research are contained in Table 4. Not surprisingly, the variables for exports and EXIM authorizations have large standard deviations relative to their means as a result of the highly skewed distributions as seen from above. The gravity variables contain sufficient variations representing a wide spectrum of characteristics of US trade partners in the data. The four standardized foreign ECA competition measures show varying degrees of ECA competition US exporters face in foreign markets (see Section 5.3 for the details about the construction of these measures).

5 Results

5.1 Baseline results

We now turn to our formal regression analysis, looking into the estimated results of eq. (5) in various forms. Note that since our data is rectangularized (i.e. expanded so that all possible country-industry-year combinations exist) to facilitate gravity analysis, a great number of zeros are created.[10] In our baseline regressions, we adopt three approaches to address the issue of the excessive number of zeros. First, we follow the common practice of adding one US dollar to both export and EXIM authorization values before taking logs so that all observations are kept in log transformation. Second,

[9] See Section 635(b)(1)(E)(v) of the US Code Title 12 "Banks and Banking". Note that this threshold was raised to 25% in December 2015; see Section 2(b)(1)(E)(v), the Charter.

[10] Specially, 96% of the country-industry-year observations in the data report zero EXIM authorization.

Table 3. Distribution of EXIM funds across regional markets

Region		2007	2008	2009	2010	2011	2012	2013	Total
Africa	(a):Value (million US$)	138.4	476.5	377.8	970.6	450.3	1480.3	513.7	4407.6
	(b): Share of (a) in total EXIM authorization	3.0%	15.9%	4.5%	12.3%	4.0%	8.7%	4.1%	6.8%
	(c) Proportion of (a) for small businesses	6.0%	29.5%	10.8%	0.9%	1.7%	1.8%	7.8%	6.2%
Asia	(a):Value (million US$)	1839.6	296.6	3364.6	1522.9	5449.7	3218.6	6623.2	22315.2
	(b): Share of (a) in total EXIM authorization	39.7%	9.9%	39.8%	19.3%	48.9%	18.9%	52.3%	34.4%
	(c) Proportion of (a) for small businesses	0.6%	10.2%	1.2%	9.2%	0.3%	0.4%	3.1%	2.0%
Caribbean	(a):Value (million US$)	37.4	41.9	35.5	397.7	54.6	128.5	14.1	709.7
	(b): Share of (a) in total EXIM authorization	0.8%	1.4%	0.4%	5.0%	0.5%	0.8%	0.1%	1.1%
	(c) Proportion of (a) for small businesses	35.5%	38.2%	18.8%	29.6%	10.2%	7.0%	48.3%	24.7%
Europe	(a):Value (million US$)	401.6	890.1	1296.9	1987	3162.1	2089.1	3427.4	13254.2
	(b): Share of (a) in total EXIM authorization	8.7%	29.6%	15.3%	25.2%	28.4%	12.3%	27.1%	20.4%
	(c) Proportion of (a) for small businesses	12.3%	1.5%	1.2%	3.5%	5.1%	1.1%	4.7%	3.7%
Mexico and Central America	(a):Value (million US$)	651	866.5	602.3	1067.1	1067.1	1909.3	596.2	6759.5
	(b): Share of (a) in total EXIM authorization	14.0%	28.9%	7.1%	13.5%	9.6%	11.2%	4.7%	10.4%
	(c) Proportion of (a) for small businesses	34.6%	12.0%	51.0%	12.8%	23.9%	15.5%	47.0%	23.7%
Middle East	(a):Value (million US$)	488	2.9	2346.6	1304.5	411.4	6720.4	1313	12586.8
	(b): Share of (a) in total EXIM authorization	10.5%	0.1%	27.7%	16.5%	3.7%	39.5%	10.4%	19.4%
	(c) Proportion of (a) for small businesses	2.4%	66.3%	0.2%	14.4%	0.3%	5.8%	1.2%	4.9%
North America	(a):Value (million US$)	708.7	33.2	1.2	64.6	52.9	180.8	1.5	1042.9
	(b): Share of (a) in total EXIM authorization	15.3%	1.1%	0.0%	0.8%	0.5%	1.1%	0.0%	1.6%
	(c) Proportion of (a) for small businesses	0.0%	2.1%	100.0%	10.4%	15.4%	3.0%	70.9%	2.2%
Oceania and South Pacific	(a):Value (million US$)	0.4	1.1	3.4	169.5	63	285	14.9	537.3
	(b): Share of (a) in total EXIM authorization	0.0%	0.0%	0.0%	2.1%	0.6%	1.7%	0.1%	0.8%
	(c) Proportion of (a) for small businesses	100.0%	41.7%	15.9%	0.6%	2.2%	0.2%	7.6%	1.0%
South America	(a):Value (million US$)	371.4	394.4	433.6	573.5	503.1	1298.8	164.9	3739.7
	(b): Share of (a) in total EXIM authorization	8.0%	13.1%	5.1%	7.3%	4.5%	7.6%	1.3%	5.8%
	(c) Proportion of (a) for small businesses	8.8%	8.1%	11.5%	7.8%	13.9%	8.8%	33.1%	10.6%
Total	(a):Value (million US$)	4,636.1	3,002.1	8,458.5	7,887.9	11,151.2	17,025.8	12,654.0	64,815.6
	(b): Share of (a) in total EXIM authorization	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
	(c) Proportion of (a) for small businesses	20.8%	22.7%	10.7%	7.2%	4.7%	2.9%	13.7%	9.1%

Note. This table reports the distribution of US EXIM funds across regional markets. For each region, three rows of numbers are displayed: row (a) gives the value of EXIM authorization granted each year, row (b) shows the share of (a) in the total US EXIM authorization granted to all markets in that year, and row (c) reports the percentage of (a) that is granted to small businesses.

Table 4. Definitions and summary statistics of key variables

Variable	Definition	N	Mean	S.D.	Min	Max
Exports ($\ln X_{jkt}^{US}$)	Log value of US exports of product k to country j in year t (unit of unlogged value: US$). Source: UN COMTRADE.	145,700	10.62	6.62	0.00	24.01
EXIM ($\ln EXIM_{jkt}$)	Log value of US EXIM Bank authorizations for exports of product k to country j in year t (unit of unlogged value: US$). Source: US EXIM Bank Open Government Directive.	145,700	0.17	1.56	0.00	22.33
Distance ($\ln dist_j^{US}$)	Log value of geographical distance between country j and the US weighted by city population with countries. Source: CEPII Gravity Database.	136,676	9.06	0.47	7.64	9.71
Common language ($lang_j^{US}$)	Dummy which takes on the value of 1 if country j has the same official language (i.e. English) as the US and zero otherwise. Source: CEPII Gravity Database and authors' compilation.	125,772	0.22	0.41	0.00	1.00
Common border ($contig_j^{US}$)	Dummy which takes on the value of 1 if country j shares border with the US and zero otherwise. Source: CEPII Gravity Database.	125,772	0.01	0.10	0.00	1.00
Common legal origin (leg_j^{US})	Dummy which takes on the value of 1 if country j has the same legal origin as the US and zero otherwise. Source: CEPII Gravity Database.	125,772	0.35	0.48	0.00	1.00
Common currency ($curr_j^{US}$)	Dummy which takes on the value of 1 if country j has the same official currency (i.e. the US dollar) as the US and zero otherwise. Source: CEPII Gravity Database and authors' compilation.	125,772	0.01	0.10	0.00	1.00
Colony (col_j^{US})	Dummy which takes on the value of 1 if country j 1 has ever been in a colonial relationship with the US. Source: CEPII Gravity Database.	125,772	0.03	0.17	0.00	1.00
Members to GATT/WTO (WTO_{jt}^{US})	Dummy which takes on the value of 1 if country j and the US are members to GATT/WTO. Source: CEPII Gravity Database and authors' compilation.	125,772	0.78	0.42	0.00	1.00
Members to RTAs (rta_{jt}^{US})	Dummy which takes on the value of 1 if country j and the US are signatories to the same regional trade agreement and zero otherwise. Source: CEPII Gravity Database and authors' compilation.)	125,772	0.03	0.17	0.00	1.00
Foreign ECA competition measure 1 (G_{jkt}))	Standardized measure of export competition the US faces in sector k, market j and year t; see eq. (10) for details. Source: authors' calculation.	80,460	0.00	1.00	-0.20	59.59
Foreign ECA competition measure 2 (G_{jkt}))	Standardized measure of export competition the US faces in sector k, market j and year t; see eq. (11) for details. Source: authors' calculation.	80,460	0.00	1.00	-0.22	51.58
Foreign ECA competition measure 3 (G_{jkt}))	Standardized measure of export competition the US faces in sector k, market j and year t; see eq. (13) for details. Source: authors' calculation.	108,900	0.00	1.00	-0.18	57.01
Foreign ECA competition measure 4 (G_{jkt}))	Standardized measure of export competition the US faces in sector k, market j and year t; see eq. (14) for details. Source: authors' calculation.	108,900	0.00	1.00	-0.18	55.62

Note. The subscripts j, k, and t index importer-country, 4-digit NAICS industries, and years respectively. Columns with headings "N", "Mean", "S.D.", "Min", and "Max" show the numbers of observations, mean values, standard deviations, and minimum and maximum values of variables, respectively.

we replace the continuous EXIM authorization measure with an EXIM authorization indicator which takes on the value of one if a country-industry-year observation receives positive EXIM authorization and zero otherwise, which allows us to estimate the effect of receiving any positive EXIM authorization as a whole.Third, we use Poisson estimations to avoid adding one to the dependent variable (i.e. exports) (e.g. Silva and Tenreyro, 2006).

The results are reported in Table 5, where a combination of country-, industry-, and time-dummies as well as their dyadic interactions is explored. We find that the coefficient on the contemporaneous EXIM authorization variable, whether continuous or binary, is negative but statistically insignificant from zero when stronger specifications of fixed effects (country-industry fixed effects) are imposed in columns 2-3 and 5-6. This implies that in a given year, EXIM authorizations do not have a sizable impact on US exports with its partner countries. The sign and magnitude of the estimated elasticity of EXIM authorizations with respect to US exports stand in contrast to the positive and significant estimates found by Egger and Url (2006) for Australia, Moser *et al*. (2008) and Felbermayr and Yalcin (2013) for Germany, with magnitude in the range of 0.04-0.66. We also conduct Poisson regressions and experiment on the baseline specifications using the subsample of positive EXIM authorization observations only. Estimates shown in Table A.1, Appendix A, are qualitatively in line with the above findings. For the ease of interpretation of elasticities, our preferred estimates in the rest of the analysis remain to be the continuous EXIM authorization variable.

Note that it is possible that EXIM authorization in a given year translates into exports in the following years for two reasons. First, because we measure EXIM support as total authorization, it often takes more than one year (especially for longer-term loans) for all the authorized funds to be disbursed for trade. Second, there may exist some time gap between the authorization and the actual availability of funds for use (Egger and Url, 2006; Moser *et al*., 2008). Therefore, to test whether EXIM authorization has an effect beyond the year of authorization, in columns 8-10 we introduce lagged EXIM authorization variables which take into account EXIM authorization in both present and past years. We find that the coefficient on the lagged EXIM authorization variable, whether continuous or binary, stay insignificant. This implies that there are no detectable time lag effects of EXIM authorization.

The above analysis consists of all industries which are treated equally in the regression. Nevertheless, given the lion's share of aerospace parts and products (NAICS 3364) in the Bank's authorization portfolio as noted from above (as seen in Table 2, approximately half of the Bank's authorization is granted to exports in this category), it is necessary to separate this particular industry from others in estimation. Consequently, estimates presented in Table 6 show that EXIM authorization to sectors other than aerospace parts and products has a significant but very small positive effect on US export activities: we estimate an elasticity of 0.003 for the present-year effect (column 10), which suggests that an increase in EXIM authorization by 10% creates additional exports by 0.03% in the same year. If lags of EXIM authorization are accounted for, we find an increase in the magnitude of EXIM authorization effect in the range of 0.007 (column 11), suggesting that a 10% expansion in EXIM authorization generates a 0.07% increase in exports. To better grasp the economic meaning of the magnitude, we compute average elasticity. Country-industry average of EXIM authorization is

Table 5. The effect of US EXIM support on US exports: baseline results

Dependent variable: log value of US exports $\ln X_{jkt}^{US}$										
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
1(EXIM>0)	-0.166**	-0.010	-0.010							
	(0.075)	(0.033)	(0.033)							
EXIM support				-0.009*	-0.002	-0.002				
				(0.006)	(0.003)	(0.003)				
1(EXIM>0, past 2 yrs)							0.005			
							(0.044)			
1(EXIM>0, past 3 yrs)								0.011		
								(0.047)		
EXIM support (past 2 yrs)									-0.003	
									(0.005)	
EXIM support (past 3 yrs)										-0.004
										(0.005)
Other controls: trade cost and multilateral resistance terms, destination income per capita, bilateral exchange rate, industry external financial dependence										
Year fixed effects	No	No	Yes	No	No	Yes	Yes	Yes	Yes	Yes
Industry-year fixed effects	Yes	No	No	Yes	No	No	No	No	No	No
Country-year fixed effects	Yes	No	No	Yes	No	No	No	No	No	No
Country-industry fixed effects	No	Yes	Yes	No	Yes	Yes	Yes	Yes	Yes	Yes
N	87,399	87,399	87,399	87,399	87,399	87,399	74,439	61,722	87,399	61,722
Adj. R^2	0.732	0.848	0.848	0.732	0.848	0.848	0.854	0.861	0.848	0.861

Note. This table reports baseline regression results on the effect of EXIM support on US exports. The dependent variable is the log value of US exports $\ln X_{jkt}^{US}$. 1(EXIM>0) is a dummy which takes on the value of one when EXIM authorization is positive and zero otherwise. EXIM support is the log value of US EXIM authorization. The suffixes "past 2 yrs" and "past 3 yrs" indicates variables that take last two or three years' data as a whole. Trade cost and multilateral resistance terms are constructed as a function of observable variables defined at the country pair-year level: distance, dummies for sharing a common official language, a common border, a common legal origin, a colonial relationship historically, and dummies for both being in GATT/WTO and a common regional trade agreement. Destination income per capita is GDP per capita in US$ in 2005 constant prices, and bilateral exchange rate is the exchange rate of the local currency against US$, both obtained from World Development Indicators. Industry external financial dependence measure is from Chor and Manova (2012), and is further multiplied with year dummies so that its effect is allowed to vary across both industries and years. Standard errors in parentheses are clustered at country-industry level. Superscripts *, **, *** indicate significance at 10%, 5%, and 1% levels respectively.

about 20.5 million US$ and the average US exports is about 74.3 million US$.[11] Therefore, a 10% increase in the average annual EXIM authorization, which is $20.5 \times 0.1 = 2.05$ million US$, creates additional exports of $74.3 \times 0.03 = 2.23$ million US$, which amounts to an economically relevant multiplier of $2.23/2.05 = 1.09$. A size of this multiplier means that every 100 US$ of EXIM authorization to sectors other than aerospace products, creates 109 US$ of additional US exports from these sectors as a whole. The size of this estimated multiplier is lower than those found for Germany at 1.7 (Moser *et al*., 2008) and Austria at 2.8 (Egger and Url, 2006).

It should also be noted that: (a) lags of EXIM authorization beyond two years, do not have an impact on US exports (column 12), and (b) the effect of EXIM authorization is greater for model with lags (column 11) when compared to models with contemporaneous effect (column 10). As we do not find evidence of export-promoting benefits arising from EXIM authorization to the aerospace parts and products sector (columns 1-6), the remaining analysis focuses on other sectors.

5.2 EXIM financing to small businesses

We now proceed to disentangle the export-promoting effect of EXIM authorization across American companies of different sizes. This is particularly motivated by the rising debate around the need to provide EXIM support for small exporting businesses and its potential impact on their exports. Proponents, on the one hand, argue that the value of small businesses' exports has grown markedly in recent years because the Bank shoulders some of the risks of international deals and provides private-market alternative financing. For instance, John Murphy, the senior vice president of the US Chamber of Commerce, argues that buyers overseas increasingly expect vendors to offer financing. In such a case, without the Bank, many US small businesses would be unable to extend terms to foreign buyers and would have to ask for cash-in-advance.[12] Moreover, commercial banks often refuse to accept foreign receivables as collateral for a loan without the Bank's guarantee.[13] Opponents, on the other hand, argue that the significant growth of small businesses' exports is unlikely to have been driven by EXIM support as the vast majority of small businesses do not get any EXIM financial assistance. For instance, according to USITC (2010), between 1997 and 2007 the value of exports per small and medium-size business increased by 80%, yet the Bank supported only 0.04% of small business establishments in 2007 (de Rugy, 2014).

Taking these contradictory observations to the data, and estimating eq. (5) for small and non-small businesses groups, the estimates presented in columns 1-3 in Table 7 show that EXIM authorization to small businesses does not have an impact on their exports. On the contrary, it is the businesses that are not classified as small by the Bank that witness a positive impact of EXIM authorization on their exports with an upto two-year lag.

These results suggest that EXIM authorization to small exporting businesses does not serve as a strong engine for US exports. Although transactions for small business exporters increased from 85.6% of the total number of transactions in 2007 to nearly 90% in 2013, representing the high-

[11] The figures used to calculate elasticities in this section are based on the real term values corresponding to the relevant non-zero sub-samples in the dataset.

[12] http://thehill.com/blogs/congress-blog/economy-budget/246347-the-arguments-for-ex-im-no-one-can-rebut.

[13] http://thehill.com/blogs/congress-blog/economy-budget/246347-the-arguments-for-ex-im-no-one-can-rebut.

Table 6. The effect of US EXIM support on US exports: aerospace products vs. other products

Dependent variable: log value of US exports $\ln X_{jkt}^{US}$

	Exports of aerospace products industry						Exports of other products					
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
1(EXIM>0)	0.013						0.039*					
	(0.258)						(0.023)					
1(EXIM>0, past 2 yrs)		-0.087						0.070**				
		(0.416)						(0.033)				
1(EXIM>0, past 3 yrs)			-0.162						0.040			
			(0.492)						(0.045)			
EXIM support				0.005						0.003**		
				(0.014)						(0.002)		
EXIM support (past 2 yrs)					0.010						0.007**	
					(0.028)						(0.003)	
EXIM support (past 3 yrs)						-0.014						-0.001
						(0.030)						(0.005)
Other controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Country fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	No	No	No	No	No	No
Country-industry fixed effects	No	No	No	No	No	No	Yes	Yes	Yes	Yes	Yes	Yes
N	1,079	919	762	1,079	1,079	762	86,320	73,520	60,960	86,320	86,320	60,960
Adj. R^2	0.786	0.788	0.808	0.786	0.786	0.808	0.851	0.856	0.862	0.851	0.851	0.862

Note. This table reports regression results on the effect of EXIM support on US exports, for aerospace industry (NAICS 3364) and other industries separately. Variables are defined as in Table 5. Standard errors in parentheses are clustered at country-industry level. Superscripts *, **, *** indicate significance at 10%, 5%, and 1% levels respectively.

Table 7. The effect of US EXIM financing to small businesses on US exports

Dependent variable: log value of US exports $\ln X_{jkt}^{US}$			
	(1)	(2)	(3)
EXIM_small	-0.000		
	(0.002)		
EXIM_other	0.005**		
	(0.002)		
EXIM_small (past 2 yrs)		0.002	
		(0.003)	
EXIM_other (past 2 yrs)		0.006*	
		(0.004)	
EXIM_small (past 3 yrs)			-0.001
			(0.004)
EXIM_other (past 3 yrs)			0.005
			(0.005)
Other controls	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes
Country-industry fixed effects	Yes	Yes	Yes
N	86,320	73,520	60,960
Adj. R^2	0.851	0.856	0.862

Note. This table reports regression results on the effect of EXIM support extended to small businesses on US exports. EXIM_small is EXIM authorization to small businesses and EXIM_other is EXIM authorization to other businesses. Other variables are defined as in Table 5. Standard errors in parentheses are clustered at country-industry level. Superscripts *, **, *** indicate significance at 10%, 5%, and 1% levels respectively.

est number ever for small businesses (US EXIM Bank, 2007, 2013), our interpretation here is that EXIM authorization to small businesses does not generate dollar value to the export kitty of the US and EXIM support is not a lifeline to small businesses' exports as claimed by the EXIM Bank proponents.[14]

To summarize, while the baseline results (Table 5) show that EXIM authorization does not have a contemporaneous or lagged export-promoting effect, we do find that EXIM authorization to sectors other than aerospace products exerts some positive effect on US exports (Table 6). Moreover, the positive effect is mainly driven by the Bank's authorization to American companies that are not classified as small by the Bank (Table 7) .

5.3 Foreign ECA competition

A common argument around the EXIM Bank is that without its export financing, foreign companies would turn away from American goods and buy products from exporters whose countries offer ample export financing through its state ECAs. In other words, without US EXIM financing, Jet Airways[15] would not buy any Boeing aircrafts but would instead buy Bombardier aircrafts to benefit from export financing provided by the Canadian ECA, Export Development Canada.

In situations where export financing is indeed provided by the US EXIM Bank, foreign compa-

[14]We also provide evidence on the effect of EXIM authorization (for small and non-small businesses separately) across regions in Table A.3, Appendix A, and the results show that the insignificance of the impact applies to most destination regions the US exports to.

[15]Jet Airways is an Indian passenger carrier airline that travels on domestic and international routes.

nies would still not purchase American goods and would instead buy goods from exporters whose countries are not regulated by the OECD Arrangement and hence are not obligated to comply with the OECD limitations on the terms and conditions of export credit activity.[22] If we add another aircraft exporting country, China, into our example above, it would then imply that even if the US EXIM Bank, an ECA whose export credit activity is regulated by the Arrangement, provides export financing to Jet Airways to purchase Boeing aircraft, Jet Airways would probably opt to buy Chinese-made aircrafts as the export credit activities of China are not regulated by the Arrangement and hence are more able to provide lenient export credit terms and conditions to Jet Airways compared to what an Arrangement-regulated-US-EXIM-Bank would have offered.

Anecdotal evidence also suggests that American exporters, without EXIM authorization, could have been at a disadvantage to foreign-ECA-financed-exporters, particularly to the ones that are not regulated by the Arrangement. For instance, John Murphy, the senior vice president of the US Chamber of Commerce, gives the example of a firm that sells US medical equipment in the Chinese market who would not qualify to bid to do business in the Chinese health care system without the US EXIM Bank.[16] In a similar vein, the D.C. District Court found that, without EXIM support "airlines simply will purchase from Airbus instead of Boeing due to presence of foreign [export credit agency financing]".[17]

Even in situations where the US EXIM Bank actually provides export financing to support American exports, it is argued that the sheer volume of unregulated (by the Arrangement) ECA financing could have put American exporters at a financing disadvantage in the global marketplace. This is only evident in the fact that China, a non-Arrangement-compliant country, provided its exporters with at least670 billion US$ in ECA financing over a period of two years, while the US EXIM has equipped American exporters with only about US$590 billion in financing over its entire 81-year history (US EXIM Bank, 2015).[18]

However, anecdotal evidence suggests that export financing provided by the US EXIM Bank may not have necessarily contributed to US exports. This is because a large portion of export financing is drawn from sources other than the EXIM Bank. For instance, for the year 2013 and 2014, we estimate less than one-third of the estimated export value, i.e. 12.2 billion US$ in 2013 and 8.69 billion US$ in 2014, of the Bank's portfolio being directed to counteract competitive disadvantages created by foreign governments' ECA trade financing activities.[19] Besides, in 2013 (2014), only 15 (11)% of total large commercial aircraft delivered by Boeing was 'ECA supported' by the Bank while a whopping 48 (54)% was 'ECA eligible, but not supported' (US EXIM Bank, 2013, 2014). In fact, in a ruling on the Delta versus EXIM Bank case, D.C. District Court asserts that EXIM financing is

[16] http://www.washingtonexaminer.com/the-pros-and-cons-of-reauthorizing-the-export-import-bank/article/2551068

[17] https://www.uschamber.com/above-the-fold/costs-closing-ex-im-mount-house-vote-nears

[18] According to the Office of the U.S. Trade Representative, the OECD Arrangement reportedly has saved US taxpayers about US$800 million annually. The information can be accessed from the website of Office of United States Trade Representative at https://ustr.gov/trade-agreements/wto-multilateral-affairs/oecd.

[19] The requirement to categorize all loans and long-term guarantees in its annual report came through in the reauthorization of the US EXIM Bank in 2012. Therefore, we are able to calculate the estimated export value directed to meet foreign ECA competition for the years 2012 and 2013.

three times more expensive than Enhanced Equipment Trust Certificate (EETCs), which are asset-backed bonds used by domestic airlines to finance plane purchases.[20] Even, between the participants to the OECD Arrangement, ECAs have increasingly turned to tools outside of the Arrangement (e.g. market windows, untied financing, and investment support) to finance projects abroad (US EXIM Bank, 2015).

Given these opposing anecdotal evidence, in this section we investigate this rising debate on whether EXIM authorization enables US exporters to compete with foreign exporters that receive ample financing from their home-country ECAs. To do so, we use a number of measures to capture the effect of the competition the US faces from exports supported by other countries' ECAs. The first measures is constructed as

$$G_{j,k,t} = \sum_{\substack{c=1,\\ c\neq US}}^{N} M_{j,k,c,t-1} I_{c,t-1}, \tag{10}$$

where $M_{j,k,c,t-1}$ is country j's imports of good k from country c in year $t-1$, and $I_{c,t}$ is a dummy that takes on the value of one when country c has a government-backed export credit agencies. Table A.2, Appendix A, provides a list of countries with the names of their respective government-backed export credit agencies.

The second measure takes further into account the similarity of the competing country's export structure to that of the US, based on the assumption that *ceteris paribus* when a country's bundle of exports to a market is more similar to the US exports in the same market, this country poses a stronger competition to the US and thus creates additional inventive for the US EXIM to support its exports to this market. Specifically, this measure takes the following form:

$$G_{j,k,t} = \sum_{\substack{c=1,\\ c\neq US}}^{N} M_{j,k,c,t-1} I_{c,t-1} ESI^{US}_{c,t-1}, \tag{11}$$

where $ESI^{US}_{c,t-1}$ is the export similarity index measuring the overlap of country c's composition of exports with that of the US, defined *a la* Finger and Kreinin (1979) as

$$ESI^{US}_{c,t-1} = \sum_{k\in K} \min(s_{k,c,t-1}, s^{US}_{k,t-1}). \tag{12}$$

Here $ESI^{US}_{c,t-1}$ varies between zero and one, with zero indicating completely different export structure and one representing identical export bundle to the US. Intuitively, (11) measures the competition US product k faces in a foreign market j in year t from competing countries' ECAs, weighted by each country's similarity to the US in export bundle. For the ease of interpretation of the variation,

[20] http://thehill.com/blogs/congress-blog/economy-budget/246347-the-arguments-for-ex-im-no-one-can-rebut.

both (10) and (11) are standardized so that they have a mean of zero and standard deviation of one.

The theoretical underpinning of the above two foreign competition measures is that a country's demand for foreign goods is intrinsic to the funds available to purchase this demand. Therefore, an exporting country that has a government-backed ECA has a greater potential to influence an importing country's demand for US products, especially when the exporting country's export structure is similar to that of the US. In other words, both ECA support and export structure similarity to the US would make an exporting country more of an competitor to US exports in the global market.[21]

A look at the distributions of the two measures, (10) and (11), in Table 8 indicates that US exports to the European region face maximum competition from EXIM-financed exports by other countries, and that the competition is stronger when the export bundles are more similar. On the contrary, it is the Caribbean region where the US exports face the least competition from EXIM-financed exports by other countries. It should be noted that the relative ranking of the regions across the four measures is stable.

For the regression analysis, we introduce the interaction terms between the foreign EXIM Bank competition measures (G as defined in (10) or (11)) and the EXIM authorization variable, and re-estimate eq. (5) on the country-industry-year sub-sample which includes all sectors other than aerospace products. From the results presented in columns 1-6 of Table 9, we see that the estimated coefficient of the interaction terms between EXIM authorization and the measures of foreign ECA competition sway between positive and negative values but remain invariably indifferent from zero in a statistical sense. These results indicate that the export-promoting effect of EXIM authorization is not affected by foreign ECA competition, irrespective of which of the two foreign ECA competition measures we use.

Given the landscape of international commitments under various international institutional arrangements, competition for US exporters in the global marketplace may accentuate. In particular, while ECA-related export credit activities of the participants to the Arrangement have to follow the negotiated financing terms and conditions in the Arrangement, non-participants to the Arrangement are not obligated to do so. We therefore proceed to investigate whether the mediating effect of foreign ECA competition is influenced by competing countries' accession to the OECD Arrangement.[22] In doing so, we further extend the above measures (13) and (14) by adding a multiplicative

[21] To put it simply, consider the following example. Supposing India has demands for aircrafts whose purchase depends largely on the internal and external funds at its disposal. Assume that the demand for external funds is greater than the available internal funds. While Indian buyers of aircraft can obtain the required funds from various private financing sources such as the debt and equity markets, countries of aircraft manufacturers can also provide the required funds to the Indian buyer. Such financing is provided by the countries through their ECAs. Now suppose there are two countries that export aircrafts, the US which has a government backed export credit agency, and Brazil which does not. If the US provides export financing through its ECA, Indian buyers are more likely to make its aircrafts purchase from the US manufacturers than from the Brazilian counterparts, *ceteris paribus*. However, now consider a third country, Canada, who also exports aircraft and has a government-backed ECA. In addition, in terms of the composition of goods, there is more similarity between Canada's exports and US exports to India than that between Brazil's exports and US exports to India. In such a case, Indian buyers are more likely to make their aircraft purchases from the two countries with ECAs, i.e. US and Canada, *ceteras paribus*. Compared to Brazil, Canada is thus more of a competitor to the US in the Indian market.

[22] It should be noted that WTO members are also governed by WTO's "Agreement on Subsidies and Countervailing Measures" (SCM) which lists the conditions under which ECA financing provided by ECAs of WTO members shall be considered as export subsidies. Although the clause in WTO's SCM attempts to safeguard the interest of OECD

Table 8. Averages of foreign ECA competition measures for different regions and years

Year	Foreign ECA competition measure	Africa	Asia	Caribbean	Europe	Mexico and Central America	Middle East	North America	Oceania and South Pacific	South America
2008	G=Σ M*I	-0.176	0.124	-0.192	0.157	-0.144	-0.126	0.028	-0.141	-0.137
	G=Σ M*I*ESI	-0.200	0.109	-0.218	0.224	-0.162	-0.143	0.028	-0.161	-0.160
	G=Σ M*I*OECD	-0.162	0.047	-0.177	0.386	-0.118	-0.094	0.056	-0.135	-0.136
	G=Σ M*I*ESI*OECD	-0.164	0.037	-0.181	0.406	-0.121	-0.096	0.053	-0.140	-0.138
2009	G=Σ M*I	-0.171	0.203	-0.191	0.195	-0.125	-0.151	0.052	-0.129	-0.112
	G=Σ M*I*ESI	-0.195	0.169	-0.218	0.265	-0.141	-0.175	0.050	-0.149	-0.134
	G=Σ M*I*OECD	-0.157	0.083	-0.177	0.450	-0.110	-0.128	0.077	-0.129	-0.119
	G=Σ M*I*ESI*OECD	-0.159	0.065	-0.180	0.468	-0.113	-0.132	0.072	-0.135	-0.121
2010	G=Σ M*I	-0.173	0.115	-0.193	0.091	-0.147	-0.144	0.003	-0.153	-0.132
	G=Σ M*I*ESI	-0.197	0.089	-0.220	0.137	-0.167	-0.166	-0.003	-0.175	-0.155
	G=Σ M*I*OECD	-0.160	0.047	-0.178	0.285	-0.128	-0.137	0.022	-0.138	-0.132
	G=Σ M*I*ESI*OECD	-0.162	0.031	-0.181	0.298	-0.131	-0.140	0.019	-0.143	-0.134
2011	G=Σ M*I	-0.169	0.182	-0.194	0.144	-0.135	-0.135	0.049	-0.145	-0.116
	G=Σ M*I*ESI	-0.192	0.161	-0.220	0.203	-0.154	-0.153	0.048	-0.166	-0.138
	G=Σ M*I*OECD	-0.158	0.125	-0.178	0.343	-0.119	-0.123	0.050	-0.132	-0.116
	G=Σ M*I*ESI*OECD	-0.160	0.105	-0.181	0.363	-0.122	-0.125	0.052	-0.138	-0.117
2012	G=Σ M*I	-0.164	0.295	-0.193	0.236	-0.116	-0.101	0.090	-0.137	-0.093
	G=Σ M*I*ESI	-0.188	0.256	-0.220	0.297	-0.132	-0.118	0.083	-0.159	-0.116
	G=Σ M*I*OECD	-0.155	0.176	-0.178	0.441	-0.112	-0.115	0.077	-0.122	-0.102
	G=Σ M*I*ESI*OECD	-0.157	0.152	-0.181	0.465	-0.114	-0.117	0.077	-0.129	-0.103
2013	G=Σ M*I	-0.162	0.333	-0.193	0.206	-0.124	-0.092	0.093	-0.128	-0.090
	G=Σ M*I*ESI	-0.186	0.289	-0.220	0.263	-0.141	-0.109	0.090	-0.148	-0.112
	G=Σ M*I*OECD	-0.155	0.179	-0.178	0.392	-0.108	-0.110	0.076	-0.120	-0.101
	G=Σ M*I*ESI*OECD	-0.157	0.157	-0.181	0.418	-0.110	-0.111	0.077	-0.125	-0.101

Note. This table reports the averages of the standardized foreign ECA competition measures G for different regions and years. See eq. (10), (11), (11), and (14) for the exact definitions of G.

Table 9. Influencing channel: the role of foreign ECA competition

Dependent variable: log value of US exports $\ln X_{jkt}^{US}$

	G=Σ M*I			G=Σ M*I*ESI			G=Σ M*I*OECD			G=Σ M*I*ESI*OECD		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
EXIM support*G	0.000			0.000			-0.000			-0.000		
	(0.000)			(0.000)			(0.000)			(0.000)		
EXIM support (past 2 yrs)*G (past 2 yrs)		0.001			0.000			0.000			0.000	
		(0.001)			(0.001)			(0.001)			(0.001)	
EXIM support (past 3 yrs)*G (past 3 yrs)			0.000			-0.000			-0.001			-0.001
			(0.002)			(0.002)			(0.001)			(0.001)
Other controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Country-industry fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
N	55,068	43,836	33,462	55,068	43,836	33,462	75,972	64,662	53,586	75,972	64,662	53,586
Adj. R^2	0.865	0.870	0.873	0.865	0.870	0.873	0.855	0.861	0.867	0.855	0.861	0.867

Note. This table reports regression results on the intermediating role of foreign competition in the relationship between US EXIM support and US exports. G is foreign ECA competition measure as defined in eq. (10), (11), (11), and (14). Other variables are defined as in Table 5. Standard errors in parentheses are clustered at country-industry level. Superscripts *, **, *** indicate significance at 10%, 5%, and 1% levels respectively.

item $OECD_{c,t-1}$ which indicates whether exporter c is a signatory to the Arrangement in year $t-1$:

$$G_{j,k,t} = \sum_{\substack{c=1,\\ c\neq US}}^{N} M_{j,k,c,t-1} I_{c,t-1} OECD_{c,t-1}, \tag{13}$$

$$G_{j,k,t} = \sum_{\substack{c=1,\\ c\neq US}}^{N} M_{j,k,c,t-1} I_{c,t-1} ESI^{US}_{c,t-1} OECD_{c,t-1}. \tag{14}$$

Again, both (13) and (14) are standardized so that their mean is zero and standard deviation is one.[23]

The results are reported in Table 9. Columns 7-12 show that competing countries' accession to the Arrangement has no additional impact on ECA competition effect. This result suggests that, *ceteras paribus*, EXIM authorization has no effect on US exports to a market which is also sought after by competing countries who are governed by the OECD Arrangement. This finding is broadly consistent with the notion that the Arrangement ensures orderly and healthy competition between the participating members of the Arrangement. Moreover, it also indicates the counteracting effect of WTO's SCM Agreement by ensuring orderly use of ECA financing.

We then examine whether the mediating effect of foreign ECA competition is influenced by the size of American companies who received EXIM funds. It is seen that EXIM authorization to small businesses has gone up in the recent years (see the previous section), and yet it is not clear whether support on small businesses creates more export opportunities as the Bank claims (US EXIM Bank, 2007, 2013). We see from columns 1-6 of Table 10 that in general EXIM support, whether it is on small or larger companies, does not play a significant role in determining the conditioning effect of foreign ECA competition. Columns 7-12 show that the differential effect of the OECD Arrangement is mostly insignificant, except on one occasion (column 10) where the effect is marginally significant at the 10% level and a one standard deviation increase in this competition measure reduces the export effect of EXIM support by 0.1% when US exporters are competing against ECA-supported exports from OECD countries with a similar export structure to the US.

To summarize, we find that regardless of the degree of ECA-financed export competition US firms face in a foreign market, US EXIM Bank's support does not promote US exports in a detectable

Arrangement-participants, the ambiguity in the clause leaves room for countries to maneuver such that ECAs from countries, not Arrangement-participants but WTO members, tend to indulge in providing financing (to its exporters) at terms and conditions that are not viable by the Arrangement-participants. A case in point is the rising number of cases at the WTO for dispute settlements on the violation of the clause on export credits in the WTO's Agreement. One widely reported example is Canada's complaint with the WTO on Brazil violating the SCM Agreement; see the WTO webpage for more details on this disputed case: `https://www.wto.org/english/tratop_e/dispu_e/cases_e/ds46_e.htm`. While in principle both the Arrangement and SCM are binding regulatory frameworks for many competing countries of the US, SCM has a much more universal coverage. To be precise, in our data virtually all (98.4%) of these competing countries' exports (in dollar values) are destined for WTO members, of which only half (51.6%) land in OECD Arrangement countries. Therefore the OECD Arrangement effect we look at here captures the differential effect of the OECD Arrangement relative to WTO export credit regulations, as part of the impact of foreign ECA competition on US exports.

[23] The four measures of foreign ECA competition are highly correlated with each other, with the pairwise correlation coefficient constantly above 0.77 and significant at the 1% level. See Table A.4, Appendix A for the correlation matrix.

Table 10. Interacted effect of foreign ECA competition and EXIM authorization to small businesses

Dependent variable: log value of US exports $\ln X_{jkt}^{US}$

	G=Σ M*I			G=Σ M*I*ESI			G=Σ M*I*OECD			G=Σ M*I*ESI*OECD		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
EXIM_small*G	0.001			0.000			0.000			0.000		
	(0.001)			(0.001)			(0.000)			(0.000)		
EXIM_other*G	0.000			0.000			-0.001			-0.001*		
	(0.001)			(0.001)			(0.001)			(0.001)		
EXIM_small (past 2 yrs)*G (past 2 yrs)		-0.001			-0.001			0.000			0.000	
		(0.001)			(0.001)			(0.000)			(0.000)	
EXIM_other (past 2 yrs)*G (past 2 yrs)		0.001			0.001			-0.001			-0.001	
		(0.002)			(0.001)			(0.001)			(0.001)	
Other controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Country-industry fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
N	55,068	43,836	33,462	55,068	43,836	33,462	75,972	64,662	53,586	75,972	64,662	53,586
Adj. R^2	0.865	0.870	0.873	0.865	0.870	0.873	0.855	0.861	0.867	0.855	0.861	0.867

Note. This table reports regression results on the interacted role of foreign competition and EXIM financing to small businesses in the relationship between US EXIM support and US exports. Variables are defined as in Table 5 and Table 7. Standard errors in parentheses are clustered at country-industry level. Superscripts *, **, *** indicate significance at 10%, 5%, and 1% levels respectively.

way. We also find that while in general the mediating effect of foreign EXIM Bank competition is not affected by the size of American companies that receive the EXIM support, it is constrained by the export credit regulations among OECD countries.

5.4 Industry upstreamness and cross-industry effects of EXIM authorization

Now we assess the effects of EXIM authorization in the context of US domestic value chains. We first look at how EXIM authorization affects firms located in different sections of the value chain. In theory it is not clear whether upstream sectors benefit more or less from EXIM finance than downstream sectors. On the one hand, since upstream sectors rely heavily on the domestic market, EXIM authorization on firms in these sectors may not benefit their exports as much as in downstream sectors. On the other hand, if the US firms in US upstream sectors are also major upstream suppliers in the global market (e.g. firms in the oil industry), EXIM authorization may boost their exports. To have an empirical answer to the net effect, we interact EXIM authorization with a continuous measure of the sector's upstreamness in the US economy adopted from Antràs *et al*. (2012). The results are presented in Table 11. The estimates from models of different time lags show that the export-promoting effects of EXIM support are lower in sectors that are located more towards the upper end of the value chain, but none of these interactions show statistically significance, suggesting that the differences are indistinguishable.

Table 11. Industry heterogeneity - the role of industries' positions in the value chain

Dependent variable: log value of US exports $\ln X_{jkt}^{US}$

	(1)	(2)	(3)
EXIM support	0.008		
	(0.005)		
EXIM support*Upstreamness	-0.003		
	(0.003)		
EXIM support (past 2 yrs)		0.017	
		(0.011)	
EXIM support (past 2 yrs)*Upstreamness		-0.005	
		(0.005)	
EXIM support (past 3 yrs)			0.015
			(0.012)
EXIM support (past 3 yrs)*Upstreamness			-0.008
			(0.007)
Other controls	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes
Country-industry fixed effects	Yes	Yes	Yes
N	84,162	84,162	59,436
Adj. R^2	0.851	0.851	0.863

Note. This table reports regression results on how the effect of US EXIM support on US exports differs across industries of different positions in the US value chain. Variables are defined as in Table 5. Standard errors in parentheses are clustered at country-industry level. Superscripts *, **, *** indicate significance at 10%, 5%, and 1% levels respectively.

Next we check the cross-industry spillover effect of EXIM authorization. Specifically, we are interested in how EXIM authorization to firms in a given industry affects the exports of other industries that are suppliers or buyers to this given industry. An underlying hypothesis is that EXIM support on exports of intermediate inputs in upstream industries may fuel the growth of downstream industries in

other countries and thus creates additional competition to US downstream exporters. This possibility suggests the necessity of checking the externality of EXIM authorization across industries.

To measure the spillover effect of EXIM authorization from other linked industries in the value chain, we weight EXIM authorization in other industries by the cross-industry linkages constructed from input-output coefficients.[24] We use two measures to capture the spillover effect on a given industry in the value chain, one through its links with upstream industries (supplying industries) and the other through its links with downstream industries (demanding industries). The first takes the form of

$$Upstream_{kt} \equiv \sum_{q=1}^{M} \alpha_{kq} EXIM_{qt},$$

where α_{kq} is the proportion of industry k's total input that is supplied from industry q, and $EXIM_{qt}$ is the total EXIM support in industry q in year t. The above measure captures the amount of linked EXIM support in the upstream industries (supplying industries) of industry k in year t. The second takes the form of

$$Downstream_{kt} \equiv \sum_{q=1}^{M} \beta_{kq} EXIM_{qt},$$

where β_{kq} is the proportion of industry k's total output that is supplied to industry q, and $EXIM_{qt}$ is the total EXIM authorization in industry q in year t. This measure captures the amount of linked EXIM authorization in the downstream industries (demanding industries) of industry k in year t. The two parameters for the above cross-industry linkages, α_{kq} and β_{kq}, are from the US Input-Output Table 2007.

Note that since the above cross-industry measures of EXIM authorization are only available at the industry-year level, we now aggregate our data to the same level for regressions. Without previously used control variables at a more disaggregated level, our regressions here only serve descriptive purposes. The results, shown in Table 12, suggest that EXIM authorization has no statistically significant impact both within and across industries.

6 Conclusions

In this paper, we provide evidence on the export-promoting effects of US EXIM Bank authorization. We find that EXIM authorization does not affect US exports across all industries. In fact, it is sectors other than that of aerospace parts and products (NAICS 3364) where EXIM authorization has a positive and significant impact on US exports. Moreover, we find that it is those American businesses that are not classified as small whose exports are more likely to benefit from EXIM au-

[24] Some other studies such as Javorcik (2004) and Amiti and Smarzynska Javorcik (2008) construct and apply cross-industry linkages in a similar way albeit in different contexts.

Table 12. Spillover effect of EXIM authorization along the value chain

Dependent variable: log value of US exports $\ln X_{jkt}^{US}$

	(1)	(2)	(3)
Within-industry EXIM support	0.001		
	(0.001)		
Upstream EXIM support	-0.006		
	(0.010)		
Downstream EXIM support	-0.001		
	(0.011)		
Within-industry EXIM support (past 2 yrs)		-0.001	
		(0.002)	
Upstream EXIM support (past 2 yrs)		-0.017	
		(0.015)	
Downstream EXIM support (past 2 yrs)		0.002	
		(0.015)	
Within-industry EXIM support (past 3 yrs)			-0.001
			(0.003)
Upstream EXIM support (past 3 yrs)			-0.012
			(0.019)
Downstream EXIM support (past 3 yrs)			0.004
			(0.024)
Year fixed effects	Yes	Yes	Yes
N	651	558	465
Adj. R^2	0.990	0.994	0.995

Note. This table reports regression results on the effect US EXIM support spill over to other industries in the US value chain. Variables are defined as in Table 5. Standard errors in parentheses are clustered at country-industry level. Superscripts *, **, *** indicate significance at 10%, 5%, and 1% levels respectively.

thorization. No export benefit from EXIM authorization to small American businesses is detectable. We also find no evidence on whether financing provided by competing countries' ECAs accentuates competition for US exporters in the global marketplace. These results do not change qualitatively when we control for competing exporters' accession to the OECD Arrangement. When taking into account inter-industrial links in the value chain, our results show that the above-found ineffectiveness of EXIM authorization is insensitive to an industry's position in the value chain, and also no evidence affirms the existence of spillover effect of EXIM support across sectors.

Our paper contributes to the growing literature that studies the impact of ECA financing on country exports. Yet, to the best of our knowledge, ours is the first study that provides rigorous empirical evidence in relation to the claims that the US EXIM Bank facilitates US exports through its trade financing programs, and in doing so helps US exporters to counter government-backed financing offered by foreign countries through their ECAs.

The findings in this study also provide important policy lessons for countries, especially lower middle-income countries (e.g. Ghana) that are now in the inception stages of establishing their own ECAs, and other countries (e.g. India and Thailand) that are placing ever more importance to ECA financing in encouraging domestic exports. A possible avenue of future research which is in our agenda is to have a cross-country study of the effect of ECA trade financing activities and investigate the policy making process behind the establishment and running of ECAs across countries of different political regimes.

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A Appendix

Table A.1. Baseline results: alternative sample and regression method

Dependent variable (columns 1-3): log value of US exports $\ln X_{jkt}^{US}$
Dependent variable (columns 4-6): value of US exports X_{jkt}^{US}

	OLS, Sample: EXIM support>0			Poisson regressions, Sample: EXIM support>0		
	(1)	(2)	(3)	(4)	(5)	(6)
EXIM support	0.014			0.009		
	(0.016)			(0.011)		
EXIM support (past 2 yrs)		0.027			0.018	
		(0.031)			(0.021)	
EXIM support (past 3 yrs)			0.002			-0.000
			(0.010)			(0.005)
Other controls	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Country-industry fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
N	1,451	1,451	1,100	1,069	1,069	771
Adj. R^2	0.966	0.966	0.989			

Note. This table reports regression results using alternative samples and regression methods. Variables are defined as in Table 5. Standard errors in parentheses are clustered at country-industry level. Superscripts *, **, *** indicate significance at 10%, 5%, and 1% levels respectively.

Table A.2. List of official state export credit agencies across the world

Country	State Export Credit Agency
Algeria	Compagnie Algerienne D'Assurance et du Garantie des Exportation
Argentina	Banco de Inversion y Comercio Exterior
Armenia	Export Insurance Agency of America
Australia	The Export Finance Insurance Corporation
Austria	Oesterreichische Kontrollbank Aktiengesellschaft (OeKB)
Bangladesh	Sadharan Bima Corporation Export Credit Guarantee Department
Barbados	Central Bank of Barbados
Belarus	Eximgarant of Belarus
Belgium	Credendo Group
Belgium	Delcredere - Ducroire
Bermuda	Hiscox Political Risk
Bermuda	Sovereign Risk Insurance Ltd (Sovereign)
Bosnia and Herzegovina	Investment Guarantee Agency
Botswana	Export Credit and Guarantee Company (BECI)
Brazil	Agencia Brasileria Gestora Fundos Garantidores e Garantias S.A.
Brazil	Banco National de Desenvolvimento Economico e Social - BNDES
Brazil	Brazilian Export Credit Insurance Agency
Bulgaria	Bulgarian Export Insurance Agency
Canada	Export Development Canada
China	China Export and Credit Insurance Corporation (SINO SURE)
China	Export Import Bank of China

(Continued on next page)

Table A.2. – List of official state export credit agencies across the world (continued)

Country	State Export Credit Agency
Colombia	Fondo Nacional de Garantias S.A. (FNG)
Colombia	Banco de Comercio Exterior de Colombia (Bancoldex)
Croatia	Croatian Bank for Reconstruction and Development (HBOR)
Cyprus	Export Credit Insurance Service (ECIS)
Czech Republic	Export Guarantee Insurance Corporation (EGAP)
Czech Republic	Czech Export Bank, a.s.
Denmark	Eksport Kredit Fonde
Egypt	Export Credit Guarantee Company of Egypt (ECGE)
Estonia	KredEx
Estonia	KredEx Credit Insurance Ltd
Finland	Finnvera Plc
Finland	Finnish Export Credit Ltd (FEC)
France	Compagnie Francaise d' Assurance pour le Commerce Exterieur (COFACE)
Germany	Euler Hermes Deutschland (AG)
Germany	PricewaterCoopers AG (PwC)
Germany	Euler Hermes
Ghana	Ghana Export Import Bank
Greece	Export Credit Insurance Organization (ECIO)
Hong Kong	Hong Kong Export Credit Insurance Corporation (HKEC)
Hungary	Hungarian Export-Import Bank Plc
Hungary	Hungarian Export Credit Insurance Plc
India	Export Credit Guarantee Corporation of India Ltd
India	Export Import Bank of India
Indonesia	Indonesian Eximbank
Indonesia	PT. Asuransi Ekspor Indonesia (Persero) (Asuransi ASEI)
Iran	Export Guarantee Fund of Iran
Ireland	The Insurance Corporation of Ireland (ICI)
Israel	Israel Export Insurance Corp Ltd (ASHRA)
Italy	Servizi Assicurativi del Credito all' Esportazione (SACE)
Italy	Societa Italiana per le Imprese all'Estero (Simest SpA)
Jamaica	National Export-Import Bank of Jamaica Limited
Japan	Nippon Export and Investment Insurance (NEXI)
Japan	Japan Bank for International Cooperation
Jordan	Jordan Loan Guarantee Corporation (JLGC)
Kazakhstan	KazExportGarant Export Credit Insurance Corporation (KAZEXPORTGARANT)
South Korea	Korea Trade Insurance Corporation (KSURE)
South Korea	The Export-Import Bank of Korea
Latvia	Latvian Guarantee Agency (LGA)
Lebanon	Lebanese Credit Insurer (LCI)
Lithuania	INVEGA
Luxembourg	Luxembourg Export Credit Agency (ODL)
Macedonia	Macedonia Bank for Development Promotion
Malaysia	Export-Import Bank of Malaysia Berhad
Malta	Malta Export Credit Guarantee Company
Mexico	Banco Nacional de Comercio Exterior S.N.C. (BANCOMEXT)
Netherlands	Altradius NV
New Zealand	Export Credit Office (ECO)

(Continued on next page)

Table A.2. – List of official state export credit agencies across the world (continued)

Country	State Export Credit Agency
Nigeria	Nigerian Export-Import Bank (NEXIM)
Norway	Garanti-Instituttet for Eksportkreditt (GIEK)
Norway	Export Credit Norway (Eksportkreditt Norge AS)
Oman	Export Credit Guarantee Agency of Oman SAOC (ECGA Oman)
Philippines	Philippine Export-Import Credit Agency
Poland	Export Credit Insurance Corporation Joint Stock Company (KUKE)
Portugal	Companhia de Seguro de Creditos, S.A. (COSEC)
Qatar	Qatar Development Bank
Romania	Exim Bank of Romania
Russia	Export Insurance Agency of Russia
Saudi Arabia	Saudi Export Program
Senegal	Societe Nationale d'Assurances du Credit et du Cautionment
Serbia	AOFI - Export Credit and Insurance Agency of the Republic of Serbia
Singapore	ECICS Ltd
Slovak Republic	Export-Import Bank of the Slovak Republic
Slovenia	SID Inc, Ljubljana (SID)
South Africa	Export Credit Insurance Corporation os South Africa
Spain	Compania Espanola de Seguros de Credito a la Exportacion (CESCE)
Spain	Secretaria de Estado de Comercio (Ministerio de Economia)
Spain	Instituto de Credito Oficial (ICO)
Sri Lanka	Sri Lanka Export Credit Insurance Corporation (SLECIC)
Sudan	National Agency for Insurance and Finance of Export of Sudan
Sweden	Exportkreditnamnden
Sweden	Svensk Exportkredit
Switzerland	Swiss Export Risk Insurance (SERV)
Taiwan	Taipei Export-Import Bank of China (TEBC)
Thailand	Export Import Bank of Thailand
Trinidad and Tobago	Export Import Bank of Trinidad and Tobago
Tunisia	Compagnie Tunisienne Pour L'Assurance Du Commerce Exterieur (CONTUNACE)
Turkey	Export Credit Bank of Turkey
Ukraine	The State Export Import Bank of Ukraine
UAE	Export Credit Insurance Co. of the Emirates
UK	Export Credit Guarantee Department (UK Export Finance)
USA	AIG
USA	FCIA Management Company, Inc
USA	Export Import Bank of the United States of America
USA	Overseas Private Investment Corporation (OPIC)
USA	Zurich Surety, Credit & Political Risk (ZURICH)
Uruguay	Banco de Seguros del Estado
Uzbekistan	UZBEKINVEST National Export-Import Insurance Company
Vietnam	Vietnam Development Bank
Zimbabwe	Credit Insurance Zimbabwe Ltd (CREDSURE)

Table A.3. Regional heterogeneity of the effect of EXIM financing to small business

Dependent variable: log value of US exports $\ln X_{jkt}^{US}$

	EXIM related variables		
	Present	Past 2 yrs	Past 3 yrs
	(1)	(2)	(3)
EXIM_small*Africa	0.002	0.013	-0.014
	(0.011)	(0.023)	(0.037)
EXIM_small*Asia	-0.010*	-0.010	-0.016
	(0.006)	(0.008)	(0.013)
EXIM_small*Caribbean	-0.004	-0.008	-0.009
	(0.007)	(0.010)	(0.015)
EXIM_small*Europe	-0.008	-0.008	-0.016
	(0.008)	(0.008)	(0.014)
EXIM_small*Mexico and Central America	-0.004	-0.014**	-0.017*
	(0.004)	(0.007)	(0.010)
EXIM_small*Middle East	-0.007	-0.018*	-0.026**
	(0.006)	(0.010)	(0.013)
EXIM_small*Oceania and South Pacific	-0.017*	-0.025	-0.039*
	(0.009)	(0.018)	(0.024)
EXIM_small*South America	-0.006	-0.005	-0.001
	(0.005)	(0.009)	(0.014)
EXIM_other*Africa	0.015	0.026	-0.030
	(0.012)	(0.024)	(0.030)
EXIM_other*Asia	0.006	0.003	-0.005
	(0.007)	(0.010)	(0.015)
EXIM_other*Caribbean	0.001	-0.004	-0.014
	(0.006)	(0.008)	(0.012)
EXIM_other*Europe	0.005	0.004	-0.006
	(0.007)	(0.008)	(0.012)
EXIM_other*Mexico and Central America	-0.002	-0.001	-0.008
	(0.004)	(0.005)	(0.009)
EXIM_other*Middle East	0.001	0.009	-0.002
	(0.007)	(0.016)	(0.017)
EXIM_other*Oceania and South Pacific	0.009	-0.000	-0.020
	(0.019)	(0.010)	(0.024)
EXIM_other*South America	-0.003	-0.005	-0.004
	(0.004)	(0.007)	(0.011)
Other controls	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes
Country-industry fixed effects	Yes	Yes	Yes
N	60,960	73,520	60,960
Adj. R^2	0.862	0.856	0.862

Note. This table reports regression results on the heterogeneous effects US EXIM support on US exports across regional markets with North America being the reference (omitted) market. Variables are defined as in Table 5 and Tale 7. Standard errors in parentheses are clustered at country-industry level. Superscripts *, **, *** indicate significance at 10%, 5%, and 1% levels respectively.

Table A.4. Correlation coefficients of foreign ECA competition measures

	G=Σ M*I	G=Σ M*I*ESI	G=Σ M*I*OECD	G=Σ M*I*ESI*OECD
G=Σ M*I	1.000			
G=Σ M*I*ESI	0.940 (0.000)	1.000		
G=Σ M*I*OECD	0.809 (0.000)	0.935 (0.000)	1.000	
G=Σ M*I*ESI*OECD	0.774 (0.000)	0.924 (0.000)	0.990 (0.000)	1.000

Note. This table reports the correlation coefficients of the four measures of foreign ECA competition used in this research. Standard errors are in parentheses.