Sovereign default and international trade: The mitigating effects of export credit insurance*

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Abstract

This paper provides evidence that export credit insurance can significantly mitigate the decline in imports that a country typically experiences after defaulting on its sovereign debt. Moreover, my results suggest that extensive use of export credit insurance could fully counteract the decline in trade even at high levels of default. I show that it is in particular insurance provided by *public* export credit agencies (ECAs) that leads to the observed mitigating effects. However, as nonpayment of trade credit increases during periods of sovereign default, ECAs are more effective in recovering claims than private insurance companies and thus do not distort markets, but are an overall efficient mechanism of risk (re-)allocation.

Keywords: Sovereign default, International trade, Export finance, Export credit guarantees, Export credit insurance

JEL *Classification Numbers*: F10, F34, G15, O19.

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1 Introduction

This paper examines the mitigating effects of export credit insurance on the decline in trade that typically follows sovereign defaults. Governments are usually unable to pledge sufficient assets as collateral for sovereign debt that could be seized by foreign creditors, so incentives not to default are low (Martinez et al. 2022). Yet, past experience has shown that sovereign defaults negatively affect the real economy.[1] Since large parts of sovereign debt are held by foreign creditors, the literature has raised the point that contagion from sovereign defaults to the real economy could lead to a decline in international trade. Subsequent research has confirmed that this risk tends to materialize.[2] Figure 1, for instance, shows that imports of a country that defaults on its government debt on average decline in the following years by initially about 18% relative to their pre-default level and tend to stay 10% below pre-default levels for 2-4 years after the country is no longer in default.

Recent evidence suggests that most of this decline in trade following a sovereign default is due to the fact that financial markets' confidence in the private sector of defaulting countries is significantly weakened and access to bank credit dries up.[3] Because of its dependence on external financing, international trade is significantly affected by the contraction in bank credit to private firms located in countries that default on sovereign debt.[4]

Against this background, the aim of this paper is therefore to examine whether and how export credit insurance can counterbalance the trade decline of defaulting countries. Export credit insurance strengthens international trade by facilitating access to bank credit for international transactions. I show that this channel is especially effective in times of sovereign default. The underlying mechanism is that export credit insurance increases the banks' willingness to lend again by relieving the banks of (perceived) payment risk during times of sovereign default. Hence, export credit insurance proves a means to overcome distortions by allowing private sector firms to access debt markets when sovereigns default.

Export credit guarantees (in case of public entities) and export credit insurance are insurance contracts that insure bank loans and credit tied to export transactions against payment default of the importing party.[5] The usual timeline for obtaining an export credit insurance is as follows: An importer in country A matches with a potential exporter in country B for the supply of goods in a one-off or recurring transaction, or for a large and long-term project. Usually, these transactions require some form of external finance because the firms are not able to raise the required funds internally. Both parties thus discuss the terms of financing. At this stage, they

[1] See Trebesch & Zabel (2017), Mendoza & Yue (2012) or the overview article by Tomz & Wright (2013).

[2] Fang et al. (2022) discuss different creditor types on sovereign debt. Papers studying declining trade are Eaton & Gersovitz (1981), Rose (2005), Martinez & Sandleris (2011), and Serfaty (2021).

[3] See Zymek (2012), Kaas et al. (2020), Hébert & Schreger (2017), Arteta & Hale (2008), and Ağca & Celasun (2012).

[4] The majority of international transactions are financed by bank credit (Auboin 2009). Among other things, international trade is highly dependent on external finance because of the substantial time lag between production and delivery of goods, but is also subjected to more payment risk. Given that defaulting countries do not appear to face explicit or implicit trade sanctions (Martinez & Sandleris 2011) this seems to be the main channel of action by which trade declines in times of sovereign default (Zymek 2012).

[5] See for instance The International Credit Insurance & Surety Association (2015) and https://www.berneunion.org/

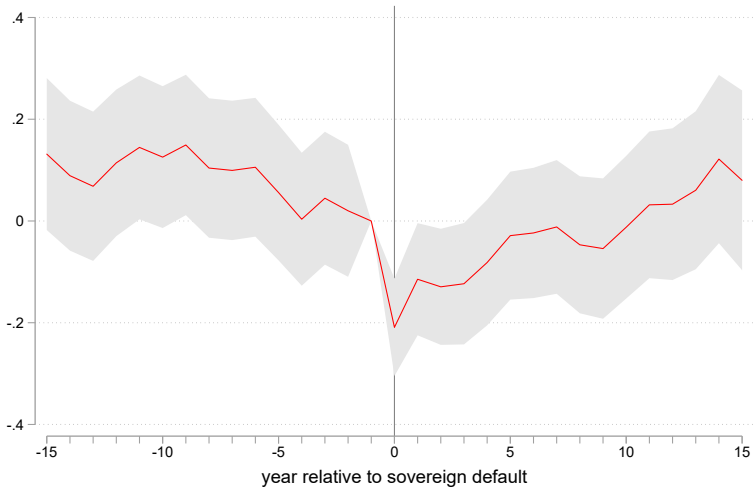


Figure 1: Trade decline following sovereign default

Data: BoC-BoE Sovereign default database & CEPII. The figure shows the typical decline in trade in the immediate aftermath of a sovereign default. The graph shows coefficients γ_κ and their 95% confidence intervals from estimating the equation $\log(imports)_{dt} = \gamma_{t<t^*-15} + \sum_{\kappa=-15,\ \neq -1}^{15} \gamma_\kappa \mathbb{1}\{t = t^* + \kappa\} + \gamma_{t>t^*+15} + \beta_1 \log(GDP)_{dt} + \beta_1 \log(GPD\ p.c.)_{dt} + \alpha_d + \theta_t + \epsilon_{dt}$, where t^* indicates the year(s) of sovereign default in country d. A sovereign default is defined when a country defaults on debts with a debt value greater than 1% of GDP.

typically approach one or more banks (situated in any country A, B or a third country) who conduct due diligence on the transaction. If the banks deem the risk to be too high, they or one of the trading partners involved contact either the (public) export credit agency of the exporter's country B or a private insurance company, which then itself assesses the project and offers export credit insurance on the bank loan which eventually will be disbursed. Thereafter the trade transaction takes place. If then the importer defaults and the bank loan cannot be serviced, the insurance agency will pay the bank claims and attempt to recover them from the importer. Thus, the export credit insurance shifts (parts of) the payment risk from the bank to the insurance agency and it is understood that this will increase the banks' willingness to lend. In this way, export credit insurance is intended to make it easier for firms to access financing when banks are otherwise unwilling to grant credit for certain trade transactions because the banks deem them too risky.[6]

For this paper, I base my analysis on a unique, comprehensive cross-country data set of export credit insurance activities from both public and private insurance companies that covers more than 80% of the global export insurance business for the period of 2005-2019 for a large sample of exporting countries and all respective importing countries. The data also include export credit agencies from emerging markets. Identification of the effects comes from the structural gravity model of trade (e.g. Anderson & Van Wincoop (2003), Yotov (2022*a*)) and the bilateral structure of the data that allows me to identify origin and destination of trade

[6]This may be because of banks' risk portfolio considerations or a different perspective on overall country risk rather than the profitability of the trade itself. See also Buus et al. (2022) for an extensive discussion on the mechanisms.

covered by export credit insurance.

I show that export credit insurance can indeed help to offset (significant parts of) the trade decline that occurs when countries default on their public debt. If applied extensively, i.e. at levels of more than the 75th percentile of the observed distribution of the insured value of export credit, export credit insurance is even able to offset all of the otherwise occurring decline in trade.

After noting a general positive effect of export credit insurance on imports in times of sovereign default, I turn to examine the channels through which this effect works. The richness of the data on export credit insurance allows me to differentiate if insurance is granted by private insurance companies or public export credit agencies. It is predominantly insurance from *public* export credit agencies (ECAs) that leads to the observed effects while private insurance agencies have little differential effect on trade during and following sovereign debt defaults. This is consistent with the fact that public ECAs in particular insure exports to 'high risk' destinations (Buus et al. 2022), which are also more likely to default on their external debt.

Ex ante, one would expect demand for goods used either as intermediate or for final consumption to be largely unaffected by sovereign defaults. Therefore, imports of such goods should remain valuable even if bank loans are required to finance them. The data differentiate by repayment time frames ('tenor length' in the industry's lingo) of the underlying export credits. Short-term credit is mainly used for intermediates and final goods whereas long-term credit is used to finance capital goods used for investment projects. I find that the main impact of export credit insurance on trade comes from short-term trade credit, i.e. credit insurance with repayment time frames of less than 12 months, while the effect of insurance of long-term debt on trade does not differ much between defaulting and non-defaulting countries. This result indicates that trade in convenience goods or intermediate inputs remains profitable while trade in capital goods that are used for investment projects with longer amortization periods is no longer valuable even from a pure profit perspective when the economy is exposed to a sovereign default.

In addition, the data classify the type of debtor and thus also importer of the goods covered by export credit insurance in public (i.e. state owned) or private. My results show that trade appears to be still valuable and efficient when private importers are involved. When public debtors are responsible for the imports, export credit insurance is not able to prevent declining imports. This result is intuitive because the government as the ultimate owner of public institutions is already in default. A general contraction in economic activity of public entities is thus to be expected.

In the last part of the paper, I assess whether default risks for export loans are actually higher in times of sovereign default and how this affects insurance agencies. While previous research has shown that the supply of private credit from banks shrinks during defaults, little has been said about whether this contraction is justified because the profitability of the underlying trade transactions decreases. I can evaluate if nonpayment on export credits increases which is reflected in the data through arrears and claims paid on insured credit. Further, I address concerns about pure risk shifting from private actors to insurance agencies and, in particular,

public ECAs. The data contain information on insurance payments recovered and thus provide information on the effectiveness of insurance agencies even after loan defaults.

While export credit insurance helps imports to withstand defaulting periods at higher levels than without such insurance, it does come at additional costs: The amount of nonpayment of trade credit increases in the course of sovereign defaults. Thus, there seems to be a redistribution of payment risk – and ultimately also losses – from private banks (and exporters) to public export credit agencies. However, the increase in claims is economically not very pronounced. One argument for the establishment of ECAs is their increased ability to recover claims on unpaid loans. Indeed, also in course of sovereign defaults, I find strong indications that ECAs are able to recover large parts of their claims. Moreover, recoveries on defaulting trade credits are higher when they occur during sovereign defaults – and thus, at least partly, due to circumstances that are outside the influence of the importing firms – than when they occur during more stable macroeconomic periods.[7]

Related literature. This paper combines the literature on sovereign defaults and their impact on international trade and the literature on the dependence of international trade on external finance, specifically also the effect of export credit insurance on international trade.[8]

Based on the argument that international trade could be used as an implicit sanction to deter defaults on sovereign debt (Eaton & Gersovitz 1981), several papers have shown that trade contracts for countries that default on external debt (Rose (2005), Borensztein & Panizza (2010), Martinez & Sandleris (2011), Zymek (2012), Asonuma et al. (2016), Kikkawa & Sasahara (2020), Gu (2021), Serfaty (2021)). Importantly, Martinez & Sandleris (2011) have shown that this decline cannot be pure retaliation of creditor countries that are affected by the default but that it occurs even for trading partners that are not creditor countries.

Relevant for the mechanisms brought forward in the current paper is Zymek (2012), who shows that following sovereign default trade declines in particular in sectors that are highly dependent on external finance whereas trade declines less strongly in sectors that are less dependent on external funds.[9] More recently, Kaas et al. (2020) show that access to international financial markets for private sector firms dries out because their risk is artificially increased due to fiscal policies of their government when it is in default.[10] In addition, Arteta & Hale (2008) show that in the course of government defaults in emerging economies the private sector loses access to international debt markets. Emerging economies are also the main users of export credit insurance (Buus et al. 2022). Supporting evidence comes from Ağca & Celasun (2012), who show that borrowing costs for the commercial sector are higher at higher levels of government debt. Alessandri & Bottero (2020) show that when aggregate uncertainty is high,

[7] One explanation for this could be that a sovereign default is often combined with a currency crisis. This causes firms to default, but it is temporary, allowing for recoveries from those firms that are fundamentally healthy.

[8] The present paper also speaks to the literature on sovereign risk, defaults, and, in parts, debt restructuring and sustainability in general (e.g. Das et al. (2012), Cruces & Trebesch (2013), Schlegl et al. (2019), Mitchener & Trebesch (2021), Engel & Park (2022), Hurtado et al. (2022), Gilchrist et al. (2022), Horn et al. (2022)).

[9] This is further supported by Hébert & Schreger (2017) who show that an increase in the probability of a country to default leads to a decrease in the value of that country's firms' equity.

[10] In recessionary periods, governments tend to increase tax rates which lowers profitability of the private sector and raises borrowing costs and risk on the private sector.

the supply of bank loans contracts and firms' loan applications are less successful. The present paper thus highlights an important mechanism through which the private sector's access to private credit is increased. The empirical exercises of this paper reveal export credit insurance as one mechanism through which total credit to a (defaulting) country's private sector can be influenced.

Further, this paper is related to the literature on international trade, credit constraints, and risk mitigation. Amiti & Weinstein (2011), Schmidt-Eisenlohr (2013), Manova (2013), and Paravisini et al. (2015) are seminal papers that highlight the vulnerability of trade to external finance.[11] In this paper, I study a particular form of macroeconomic distress that influences credit conditions for imports into troubled countries.

A more widely studied tool of payment risk mitigation in international trade are letters-of-credit. Crozet et al. (2022), for instance, evaluate the impact of letters-of-credit on international trade during different macroeconomic environments. The authors show that products that rely on letters-of-credit are more resilient to aggregate real shocks when supply of letters-of-credit is constant while the opposite holds when financial shocks reduce the supply of letters-of-credit. Further research on the role of banks in international trade and the use of letters-of-credit as a risk minimizing tool has been, among others, conducted by Demir et al. (2017), Niepmann & Schmidt-Eisenlohr (2017*a*), Niepmann & Schmidt-Eisenlohr (2017*b*), and Niepmann & Schmidt-Eisenlohr (2022). While letters-of-credit as an instrument that shifts the payment risk from firms to banks are by now well understood export credit insurance as a tool that shifts this risk away from banks to other actors is less well known.

The present paper shows that, if banks are not willing provide credit for exports to countries during defaults and a market failure occurs because trade investments are still valuable, export credit insurance is an instrument that can overcome this market failure. Letters-of-credit are not able to achieve this because they are not able to relieve banks from payment risk – a main goal of export credit insurance so far not addressed in the literature.

In revealing this, the current paper appends the literature on export credit insurance. This line of research is limited, so far, and focuses on the general trade promoting effects of trade credit insurance mostly. For instance, Egger & Url (2006), Moser et al. (2008), Janda et al. (2013), van den Berg et al. (2019), and Hur et al. (2022) use sectoral data for Austria, Germany, the Czech Republic, the Netherlands, and Korea, respectively, to show that export credit insurance at the aggregate level has consistent trade promoting effects across countries.[12] Badinger & Url (2013), Felbermayr & Yalcin (2013), Heiland & Yalcin (2021), Agarwal et al. (2021), and Jäkel (2021) are able to access firm level data for Germany, Sweden, and Denmark and confirm the aggregate trade promoting effects of export credit guarantees also on the firm level. Buus et al. (2022) document the general patterns of export credit insurance usage and reveal pronounced differences between public and private trade insurance companies and heterogeneity in usage of export guarantees across firms. van der Veer (2015) explicitly considers the role of *private* export credit insurance agencies, whose activities also lead to higher exports. The

[11] See also Manova (2008), Chor & Manova (2012), Antras & Foley (2015), Muûls (2015), and Demir & Javorcik (2018) among others.

[12] Auboin & Engemann (2014) rely on destination-country-level data from the Berne Union.

present paper extends this line of research by documenting an explicit channel through which export guarantees foster exports in bad economic periods and compares the effects of *private* and *public* export credit insurance.

The rest of the paper is structured as follows. In Section 2, I introduce the data and present descriptive statistics on the incidences of sovereign default and subsequent trade collapses in recent years as well as export insurance and claims/arrears on insured exports. The main analysis in Section 3 employs a structural gravity model of trade to identify causal effects: I show that use of export credit insurance offsets the decline in trade for a defaulting country. Thereafter in Section 4, I explore the contributions of private and public export insurance agencies and explore which type of trade credit, short- or long-term is responsible for these mitigating effects on trade. Finally in Section 5, I assess if there is indeed the by banks expected increase in payment risk and how private and public export credit insurers are affected by this.

2 Data and descriptive statistics

The two main data sources for this paper are data on export credit insurance from the Berne Union, the largest association of export credit agencies and private export insurance companies, and the Bank of Canada-Bank of England database on sovereign defaults.

Data from the Berne Union is available annually at the insurance company-destination country level for the period of 2005-2020, but proprietary.[13] These data are also used by Buus et al. (2022). The Berne Union (BU) is the (self proclaimed) "leading global association for the export credit and investment insurance industry."[14] The BU members cover the vast majority of export credit insurance as well as other cross-border insurance and lending activities. For the current paper, I consider both *public* export credit agencies (ECAs), which are covered by the OECD regulations of the 'Working Party on Export Credits and Credit Guarantees', and *private* insurance agencies that are active in export credit insurance.[15] The group of (public) export credit agencies sets voluntary rules under OECD auspices, which the ECAs adhere to, to make their activities conform to WTO rules of non-subsidization of exports and are thus supposed to mainly serve markets that are otherwise not able to obtain export credit insurance on the private market.

The data cover 43 public ECAs, representing mainly high or medium income countries and 12 private insurance companies that, according to the BU, make up for over 90% of the private export credit insurance business worldwide.[16] The data contain information on export-insurer to importing country data for a range of variables. I am able to distinguish new insurance, insurance stock, arrears and claims paid as well as recoveries on past claims in value between short-term (related to debt contracts of length less than or equal to 12 months) and long-term debt contracts. Further, I am able to distinguish if the insured debt is issued by private or

[13] Note, however, that aggregate data on insured imports are publicly available through the *joint external data hub* of the Bank for International Settlements, the International Monetary Fund, the Organization for Economic Cooperation and Development, and the World Bank. Auboin & Engemann (2014) use these data for their study.

[14] See https://www.berneunion.org/

[15] See https://www.oecd.org/trade/topics/export-credits/

[16] Figure A.1 in the Appendix provides a geographical picture of the origin countries in the data.

public debtors. See Table 1 for summary statistics on some of these variables.[17]

The Bank of Canada-Bank of England database on sovereign debt defaults provides the most encompassing data set on sovereign defaults and is freely accessible.[18] The data contain information on sovereign defaults in a wide definition, i.e. it records also as default any circumstances where payment might still happen but the creditor has incurred "material economic losses on the sovereign debt they hold" (Beers et al. (2021), p.2). This would thus also include pre-emptive debt restructurings (Asonuma & Trebesch 2016). The data are collected from various sources and cover most sovereigns. Further, the data differentiate default by creditor (main creditor groups are international organizations such as the IMF or World Bank, other sovereigns organized in the Paris Club, China, and private creditors).

I supplement these data with data on trade flows and trade cost variables from the CEPII database (Head et al. 2010) and data on government debt from the IMF Global Debt Database (Mbaye et al. 2018). All monetary values are in 2005-US Dollar deflated with the US-producer price index. Since the year 2020 is characterized by the Covid pandemic and supplementary data through CEPII are not yet available, I restrict the analysis to the period 2005-2019.

Table 1 highlights that private insurance agencies are more active in short-term insurance of export credit (less than a year repayment time frames), while public ECAs are issuing more long-term insurance. As Buus et al. (2022) show, private insurance companies restrict their business to safer destinations such as OECD countries. For more risky destinations, ECAs cover also the majority of the short-term insurance business.

Table 1: ECAs vs. Private insurers

	ECAs			Private insurers		
	mean	median	std.dev.	mean	median	std.dev.
Short-term insurance	4,918.86	618.15	11,933.18	57,333.40	5,891.43	90,829.43
Long-term insurance (flow)	2,615.11	556.85	4,566.06	1,313.41	1,048.28	1,344.57
Long-term insurance (stock)	9,852.69	1,846.41	16,803.18	3,460.26	2,723.55	3,429.56
Total insurance (stock)	14,771.54	5,612.84	24,719.51	60,793.66	10,500.73	91,135.33
Total insurance (flow)	7,533.97	1,975.61	14,775.64	58,646.81	7,068.08	90,959.96
Claims paid short-term insurance	24.11	1.94	80.27	50.89	11.53	67.18
Claims paid long-term insurance	40.81	6.99	64.36	8.13	5.33	9.57
Number of insurers	43			12		

Notes: Table reports summary statistics as average of yearly total per insurer (ECA or private). Flows and stock values in million 2005-USD. Data: Berne Union 2005-2019.

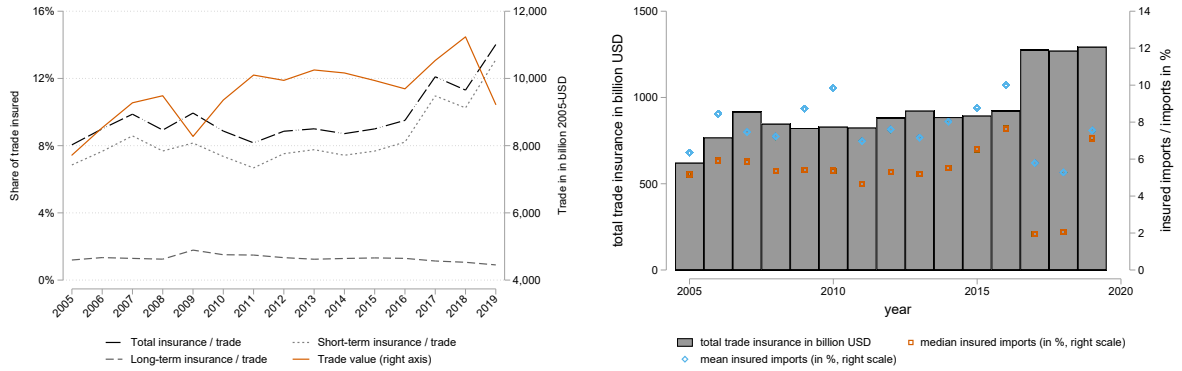
Figure 2 provides information on the extent to which global trade is insured by export credit insurance. Across the sample period about 8-14% of global trade are insured (cf. Panel (a)) while the median (mean) country to country export share that is insured ranges between 5-6% (6-10%), respectively.[19] Letters-of-credit, the other widely used risk mitigation instrument in international trade, cover about 15% of global trade (Niepmann & Schmidt-Eisenlohr 2017*a*).

[17] Ideally – in light of Zymek (2012) – I would like to use data on trade insurance by sector to investigate if trade insurance is more effective for sectors more dependent on external financing. Unfortunately, such data is not available and I thus have to accept this limitation.

[18] https://www.bankofcanada.ca/2021/07/staff-analytical-note-2021-15/. The method report Beers et al. (2021) can be accessed here: https://www.bankofcanada.ca/wp-content/uploads/2020/06/tr117.pdf

[19] These shares fall in the years 2017 and 2018 for unknown reasons.

In comparison, export credit guarantees are slightly less extensively used but their functioning is also very different. They take the payment risk away from both firms and banks whereas letters-of-credit take risk away from firms and reduce information asymmetries.[20]



(a) Insured share in total trade

(b) Bilateral trade and trade insurance

Figure 2: Trade insurance

Data: Berne Union & CEPII. Panel (a) shows total trade and total trade insurance as share of total trade not differentiating by destination country. Panel (b) shows total trade insurance values and mean and medians of bilateral trade flows supported by export credit insurance.

Table 2 contains information on government debt and sovereign defaults. It highlights that mostly smaller countries, here characterized by lower total government debt, default on their debt. Sovereign defaults are selective, i.e. sovereigns seldom default on all their outstanding debt. While this is partly because payment installments are spread over years and rarely all debt contracts have to be met in one single year, countries select which debtor to default on.

Table 2: Government debt and debt in default

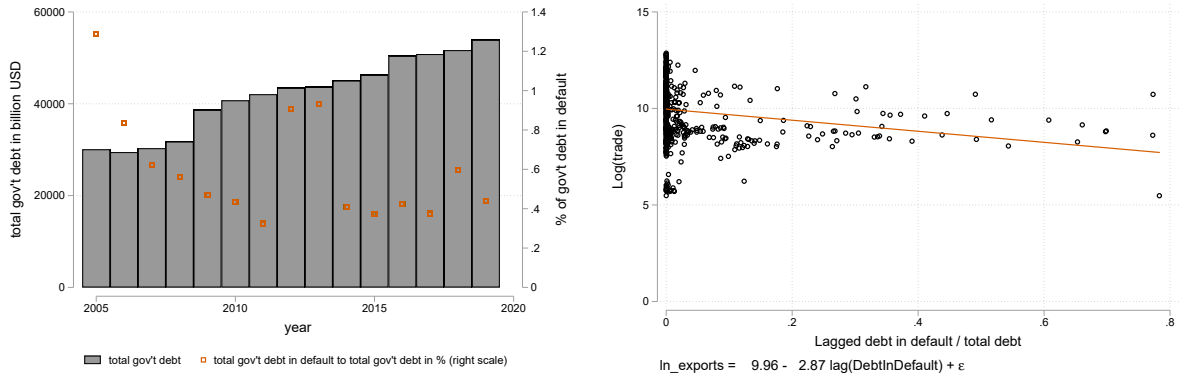
	mean	median	sd	p10	p90
All country-year observations					
Government debt in million USD	500,064.84	37,243.25	1.80e+06	1,930.48	1.05e+06
Government debt in default in million USD	1,715.50	10.67	9,512.14	0.00	1,704.62
Share of debt in default	0.04	0.00	0.13	0.00	0.11
Observations	2816				
Non-zero government debt in default					
Government debt in million USD	57,800.73	8,191.51	178972.46	1,409.69	92,036.04
Government debt in default in million USD	2,476.15	79.97	11,346.39	0.95	3,082.25
Share of debt in default	0.07	0.01	0.16	0.00	0.26
Observations	1599				

Notes: Summary statistics over country-year observations. Values in million 2005-USD Data: BoC-BoE data & IMF GDD. 2005-2019.

Figure 3 provides basic information about the time series of government default. Panel (a) shows that while global government debt has been increasing over the sample period, the value

[20]Table A.1 in the Appendix provides further comparison between bilateral shares of trade covered by letters-of-credit and export credit insurance. It also provides more insights into the distribution of export credit insurance intensity across countries for the year 2013.

of debt in default has been relatively stable (with exception of the sovereign debt crisis following the Great Recession in the mid-2010er years). In general, less than 1.5% of global government debt are in default per year. Panel (b) of Figure 3 reveals that most defaults affect less than 20% of total government debt. It further shows a negative correlation between the one year lagged share of government debt in default and the countries' import value.



(a) Government debt and debt in default

(b) Trade and defaults of gov't debt

Figure 3: Government default and trade

Data: BoC-BoE data & IMF GDD. Trade is log of imports in million 2005-USD.

3 Sovereign defaults, trade insurance, and the decline in trade

In this section, I examine to what extent, if at all, export credit insurance offsets the decline in trade that is found to occur when countries default on their external government debt. I first discuss the empirical approach and then present the main results. In the following sections, I examine channels and mechanisms in more detail.[21]

Based on the structure of the seminal paper by Anderson & Van Wincoop (2003), exports from origin country o to destination country d in year t can be expressed as

$$exports_{odt} = \frac{Y_{ot}Y_{dt}}{Y_t}\left[\frac{\tau_{odt}}{P_{ot}P_{dt}}\right]^{1-\sigma}, \tag{1}$$

where Y_t denotes world GDP and Y_{ot}, Y_{dt} country o and d's GDP, respectively. $P_{\cdot t}$ are the respective country's multi-lateral resistance terms determining each country's aggregate trade opportunities with the world and σ is the elasticity of substitution. τ_{odt} is a function of directional trade costs for exports from country o to d.[22]

[21] In Section A.1 in the Appendix, I revisit previous studies on sovereign default and international trade, confirming the persistent effects of default on trade.

[22] See Yotov (2022*a*) for various alternative structural approaches which all result in similar equations for bilateral trade.

Log-linearizing Equation (1) results in

$$\begin{aligned}\ln(exports)_{odt} =& \ln(\frac{Y_{ot}Y_{dt}}{Y_t}) + (\sigma-1)\ln(P_{ot}P_{dt}) + (1-\sigma)\ln(\tau_{odt}) \\ =& \ln(Y_{ot}) + (\sigma-1)\ln(P_{ot}) + \ln(Y_{dt}) + (\sigma-1)\ln(P_{dt}) \\ & - \ln(Y_t) + (1-\sigma)\ln(\tau_{odt})\end{aligned} \tag{2}$$

This is an estimable equation, where the second line highlights how I can collect terms to arrive at the estimating Equations (4) and (5) where the corresponding fixed effects in Γ cover the multi-lateral resistance terms. It is sufficient to include origin- and destination-year effects to control for world and country specific GDP, and multi-lateral resistance terms.

I assume that directional trade costs of exports from country o to country d can be approximated by

$$\begin{aligned}\tau_{odt} =& \exp\left[\mu_1 \ln(distance)_{od} + \mu_2 \ln(language)_{od} + \mu_3 \ln(border)_{od}\right. \\ & + \mu_4 \ln(trade\ agreement)_{odt} + \mu_5 \ln(default)_{dt} + \mu_6 \ln(trade\ insurance)_{odt} \\ & \left. + \mu_7 \ln(default)_{dt} \times \ln(trade\ insurance)_{odt}\right]\end{aligned} \tag{3}$$

The trade cost Equation (3) consists of general trade cost determinants such as the distance between the trading countries, whether they share the same language and a border or are in a trade agreement, but also if the importing country is in default on its sovereign debt and the degree to which exports are insured by export credit insurance. I expect the signs of the coefficients on these variables to correspond to the findings of the prior literature, i.e. $\mu_5 < 0$ and $\mu_6 > 0$. Of particular interest is, however, if export credit insurance has differential effects on total exports by whether the importing country is in default (and potentially to what extent); i.e. sign and size of μ_7.

Export credit insurance should affect trade costs in the following way. Access to finance is not only influenced by the exporting country's financial market but also by the (perceived) payment risk of the importing market. As Buus et al. (2022) show, export credit insurance is used more intensively the riskier a destination market is. Since export credit insurance moves the payment risk from firms and banks to the insurance agency it will increase banks' willingness to lend. Similarly, a sovereign default is likely to affect trade costs for a number of reasons, but mainly because it seems to signal increased payment risk from the private sector. This makes external financing more difficult or even restricts it entirely. Taken together, this means that export credit insurance helps to compensate for the increase in aggregate trade costs by sovereign defaults: The higher the (perceived) payment risk on export loans the more effective should export insurance be in facilitating trade.

Because ECAs are intended to insure exports from their origin country to the destination country, I take the perspective of the ECA-origin country and examine origin to destination trade, where o indexes ECA-origin country.[23]

Since I am facing zero observations on both trade and trade credit insurance, I employ two

[23]The inclusion of directional origin-destination fixed effects, where origin is defined at the export credit insurance agency level, also covers the exporting country's effects of the gravity framework.

different estimators. To account for zero trade flows, I estimate both a linear regression on transformed values and a Poissson pseudo-maximum likelihood (PPML) estimator on levels of trade flows to account for heteroskedasticity in the error terms. For the transformation, I rely on the inverse hyperbolic-sine transformed values of both trade and trade credit insurance as well as the remaining control variables which are otherwise included in logarithmic form.[24]

As a first take, I estimate a regression that should confirm that (a) trade declines following sovereign default and (b) trade is fostered by trade credit insurance, both results of various studies mentioned above but never tested conjointly or for the period of observation of this paper:

$$\ln(exports)_{odt} = \alpha + \beta_1 default_{dt-1} + \beta_2 \ln(trade\ insurance)_{odt} + \Gamma + \mathbf{Z'}_{odt}\boldsymbol{\beta} + \varepsilon_{odt} \tag{4}$$

Then, to identify the potential differential impact of export credit insurance on trade in the course of sovereign defaults, I further include an interaction term between sovereign defaults and export insurance.

$$\begin{aligned}\ln(exports)_{odt} = &\alpha + \beta_1 default_{dt-1} + \beta_2 \ln(trade\ insurance)_{odt} \\ &+ \beta_3 default_{dt-1} \times \ln(trade\ insurance)_{odt} + \Gamma + \mathbf{Z'}_{odt}\boldsymbol{\beta} + \varepsilon_{odt},\end{aligned} \tag{5}$$

where $default_{dt-1}$ is either an indicator equal to one if country d has been in default in the previous year and zero otherwise, or it is a continuous variable measuring the log-value of debt in default in the previous year, or the share of debt in defaults in country d's GDP. $\ln(trade\ insurance)_{odt}$ is the logarithmic value of export credit insurance issued on exports of o to d in year t. Γ denotes the set of origin-, destination-, and year-fixed effects or combinations thereof, depending on the specification. $\mathbf{Z}_{odt}$ is the vector of other control variables including typical gravity variables that control for country to country trade costs as per Equation (3). ε_{odt} denotes the error term. For all estimations, I cluster standard errors at the origin-destination pair level.[25]

The interaction term $default_{dt-1} \times \ln(trade\ insurance)_{odt}$ allows me to identify the differential effect of trade credit insurance on trade flows even in specifications with origin-destination-pair, origin-time, and destination-time fixed effects which otherwise collect most factors that cause trade flows.[26]

[24]The (adjusted) inverse hyperbolic-sine transformation, $\ln((x + \sqrt{x^2+1})/2)$, similarly to the also largely used $\log(x+1)$ transformation can be considered equal to the log values for large values of exports or insurance and is reasonably close to the true (log) values for small values of insurance and exports. Yet, both of these transformations can lead to biased estimates if errors are heteroskedastic (Silva & Tenreyro 2006). This is why I also employ the PPML estimator.

[25]Note, that I write $\ln(exports)_{odt}$ for the dependent variable even though it enters in levels in the PPML estimations. The reason is that the results reported should be interpreted just as a common logarithmic transformation of the left-hand side variable. Similarly, even though I use inverse hyperbolic sine transformed values in the linear regressions, results can just be interpreted as a logarithmic regression i.e. as (semi-)elasticities.

[26]This empirical strategy allows to identify the causal effects of export credit insurance on trade and its differential impacts during times of sovereign default. The inclusion of the most sophisticated set of fixed effects, origin-destination pair, origin-time, and destination-time, has been shown to be the estimable version of the structural export equation from a variety of theoretical foundations (Head & Mayer (2014), Yotov et al. (2016), Larch et al. (2019), Yotov (2022*b*), and Yotov (2022*a*)).

For the main analysis I restrict the regression to only the inclusion of one year lagged defaults, however the results are robust to inclusion of more lags and current default (these results are available on request). The reasoning for inclusion of the first lag is that most contracts are fixed some time before shipment occurs and thus I argue that trade will mostly adjust in the year following the sovereign default.[27]

Endogeneity

It may well be argued that more export credit insurance is used when countries are in default, at least relative to total exports to that country. In addition, if export credit guarantees tend to be more effective in times of sovereign default, their use might increase while trade declines. So, endogeneity poses a threat to identification.

The imposed fixed effects are able to control for most of the endogeneity concerns. The use of or demand for export credit insurance due to declining trade should increase for all exporting countries against a defaulting importing country. Thus, destination-time fixed effects pick up any changes in the demand for export credit insurance that may be caused by the default event. Similarly, inclusion of the default variable mitigates a potential omitted variable bias.

In addition, origin-time fixed effects will control for any origin country supply shocks to either that country's trade or the supply of export credit guarantees for exporters of that country. Lastly, origin-destination pair fixed effects will control for time-invariant differences in origin-destination specific trade flows. Further, the time period under consideration spans 15 years, a time frame reasonably not subject to large structural changes in global trade patterns or other factors that could influence the origin-destination specific trade relation.[28]

Results

Table 3 reports results from estimation of Equation (4). I report results of two different specifications, odd columns are estimated based on a log-linear estimator while even columns are estimated with the PPML estimator. I report results for three types of sovereign default variables. In columns (1) and (2), the default variable is an indicator equal to one if the importing country defaults on any share of its external sovereign debt and zero otherwise. The results indicate a decline in *o-d* trade flows of about 1-2% on average if country d defaults on sovereign debt. Given that countries usually default on rather small shares of their total sovereign debt as Panel (b) of Figure 3 shows, these are sizable effects. In columns (3) and (4), I change the default variable to the share of government debt in default relative to the country's GDP. The implied decline in trade is in line with the indicator specification, per 1% government debt in default to GDP trade is lowered by about 12-18%. Finally, in columns (5) and (6), the dependent default variable is changed to the log of total debt in default. As before, results are in line with the remaining specifications indicating a default elasticity of imports of about -.006.

[27] I do not show results of more lags for reasons of multi-collinearity since defaults are correlated over years as well as for expositional purposes.

[28] The last main structural and persistent shock to international trade was arguably China's WTO accession which happened in 2001, and thus before the start of the period of observation of this paper.

Throughout all specifications, the estimated effects of export credit insurance are in line with prior studies. Here I can calculate an effectiveness ratio (the dollar increase in international trade per 1 dollar of export credit insurance) of about .3, very similar to what, e.g., Felbermayr & Yalcin (2013) find.[29] Note that in this specification, I cannot include destination-time fixed effects as these would fully account for the coefficients of interest, making this an ad hoc specification not founded on the gravity structure. Also note that the inclusion of origin-destination fixed effects takes out significant parts of the variation; I show results for a specification without origin-destination pair fixed effects in Appendix Table A.4. The remaining control variables are in line with the theory foundations of trade costs; with exception of the indicator for a trade agreement between origin and destination all estimates are consistent across estimators.

These results thus confirm across several export credit insurance agencies that their activities foster international trade and that sovereign defaults lead to contractions in trade.

Table 3: Sovereign defaults, trade insurance, and trade

	(1)	(2)	(3)	(4)	(5)	(6)
log(total export insurance)	0.018***	0.010***	0.018***	0.010***	0.018***	0.010***
	(0.003)	(0.002)	(0.003)	(0.002)	(0.003)	(0.002)
$\mathbb{1}\{\text{default}\}_{dt-1}$	-0.031***	-0.038				
	(0.012)	(0.024)				
Debt in default / GDP			-0.206***	-0.121		
			(0.069)	(0.087)		
$\log(\text{default})_{dt-1}$					-0.006***	0.002
					(0.002)	(0.003)
trade agreement	-0.005	0.087***	-0.007	0.087***	-0.005	0.087***
	(0.016)	(0.022)	(0.016)	(0.022)	(0.016)	(0.022)
log(GDP) destination	0.338***	0.406***	0.309***	0.400***	0.329***	0.409***
	(0.045)	(0.064)	(0.044)	(0.064)	(0.044)	(0.064)
log(GDP p.c.) destination	0.339***	0.146**	0.368***	0.151**	0.346***	0.145**
	(0.051)	(0.071)	(0.051)	(0.071)	(0.051)	(0.071)
Observations	63428	62034	62974	61603	63428	62034
R^2	0.975	0.995	0.975	0.995	0.975	0.995
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Origin-destination-pair FE	Yes	Yes	Yes	Yes	Yes	Yes
Origin-time FE	Yes	Yes	Yes	Yes	Yes	Yes
Estimator	OLS	PPML	OLS	PPML	OLS	PPML

Notes: Clustered standard errors in parentheses, * $p < 0.10$, ** $p < .05$, *** $p < .01$.
Dependent variable are log(exports), for linear estimations I include zero observations by the hyperbolic sine transformation. For estimations with PPML R^2 denotes the pseudo-R^2.

Table 4 reports estimation results for Equation (5). Note that here I am able to include the most restrictive set of fixed effects with origin-year and destination-year fixed effects that account for the multilateral resistance terms in each specification, and origin-destination pair fixed effects in all even columns. As before, I test the three different variables for sovereign default, an indicator in columns (1)-(4), the share of debt in default to GDP in columns (5)-(8), and the log value of defaulted debt in columns (9)-(12). While the level effects of export credit

[29] Assume imports at a level of 100 and as shown above a mean level of export credit insurance of about 6. Then a 10% increase in export credit insurance leads to an increase in imports of about .18 and the effectiveness ratio is .18/.6=.3.

insurance are in similar ranges as before, the interaction between export credit insurance and the default variable is positive and statistically significant with few exceptions. This indicates that, in fact, export credit insurance does mitigate the decline in trade during times of sovereign default.

Starting with the indicator for sovereign default with results presented in columns (1)-(4). These imply that, if a country is in default, the positive effect of export credit insurance is amplified by an order of magnitude. To be precise, I find that the impact of export credit insurance is almost doubled when the importing country is in default. For instance in column (1), instead of an export credit insurance elasticity estimate of .1 it is .196 when facing a defaulting country. This stark increase in effect holds true throughout all specifications and estimators.

When changing the default variable to the share of government debt in default in GDP, the differential impact of export credit insurance is similarly pronounced. Per 10 percentage points higher share of debt in default in GDP, the elasticity estimate of export credit insurance is increased by about 25%.[30] Quantitatively very similar results emerge when I consider the log value of debt in default, see columns (9)-(12).

Thus, independent of how I measure sovereign default, I always find that export credit insurance is more effective if a country defaults on its government debt, i.e. the positive impact of export credit insurance on imports to the defaulting country is amplified significantly. As expected, all gravity variables are consistent across specifications and in expected ranges.

[30]Consider column (5): the trade credit insurance elasticity is .12 while the coefficient on the interaction between log of trade insurance and the share of sovereign debt in default is .3. If the share of debt in default increases by 10 percentage points, the sum of evaluated coefficients becomes .12+.03 and is thus by 25% higher.

Table 4: Sovereign defaults and trade insurance: Effects on trade

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
log(total export insurance)	0.100***	0.000	0.096***	0.006***	0.122***	0.004	0.099***	0.006***	0.110***	0.002	0.097***	0.006***
	(0.015)	(0.003)	(0.015)	(0.001)	(0.014)	(0.003)	(0.015)	(0.001)	(0.015)	(0.003)	(0.015)	(0.001)
$\times \mathbb{1}\{\text{default}\}_{dt-1}$	0.096***	0.015***	0.047***	0.005*								
	(0.017)	(0.004)	(0.018)	(0.003)								
$\times$ debt in default / GDP_{dt-1}					0.303***	0.077***	0.209***	0.019				
					(0.076)	(0.028)	(0.065)	(0.016)				
$\times \log(\text{default})_{dt-1}$									0.013***	0.002***	0.009***	0.001
									(0.002)	(0.001)	(0.003)	(0.000)
log(distance)	-0.116		-0.233***		-0.105		-0.231***		-0.115		-0.232***	
	(0.167)		(0.072)		(0.168)		(0.072)		(0.167)		(0.072)	
trade agreement	1.063***	0.017	0.807***	0.105***	1.080***	0.016	0.812***	0.104***	1.067***	0.017	0.810***	0.105***
	(0.164)	(0.022)	(0.076)	(0.022)	(0.166)	(0.022)	(0.076)	(0.022)	(0.165)	(0.022)	(0.076)	(0.022)
common border	1.192***		0.771***		1.186***		0.771***		1.186***		0.771***	
	(0.194)		(0.091)		(0.194)		(0.091)		(0.194)		(0.091)	
common language	0.736***		0.304***		0.744***		0.304***		0.740***		0.303***	
	(0.093)		(0.079)		(0.094)		(0.079)		(0.094)		(0.079)	
colonial dependence	0.612***		0.176**		0.625***		0.176**		0.619***		0.176**	
	(0.089)		(0.073)		(0.089)		(0.073)		(0.090)		(0.073)	
Observations	63930	63416	63040	62022	63519	62962	62649	61591	63930	63416	63040	62022
R^2	0.815	0.978	0.910	0.997	0.814	0.978	0.910	0.997	0.814	0.978	0.910	0.997
Origin-destination-pair FE	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes
Origin-year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Destination-year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Estimator	OLS	OLS	PPML	PPML	OLS	OLS	PPML	PPML	OLS	OLS	PPML	PPML

Notes: Clustered standard errors in parentheses, * $p < 0.10$, ** $p < .05$, *** $p < .01$. Dependent variable are log(exports), for linear estimations I include zero observations by the hyperbolic sine transformation. For estimations with PPML R^2 denotes the pseudo-R^2.

To gauge what these results imply for trade it is useful to consider the marginal effects of trade credit insurance and the corresponding predicted values of trade over the distribution of default value observed in the data. Figure 4 reports these differential effects of trade insurance on trade by default severity. In Panels (a) and (b) the figure shows the trade elasticity of export credit insurance along the distribution of default based on the estimation specification corresponding to column (11) of Table 4, i.e. a PPML regression on log-values of export credit insurance, its interaction with the log-value of sovereign debt in default, and remaining gravity variables accounting for multi-lateral resistance terms. In Panels (c) and (d), the figure shows predicted trade values by percentiles of trade insurance along default severity.

Panels (a) and (b) graphically highlight what already becomes clear from the results presented in Table 4. The differences in trade elasticity of export credit insurance across the distribution of sovereign default severity are strong. While usage of export credit insurance leads to higher exports generally, this effect is stronger the more severe the default of the importing country is. Exports to any country will increase by about .2 percent for any percent increase in trade insurance if it is not in default, this elasticity more than doubles for countries that default on all their external debt and are exposed to the average level of export credit insurance (see Panel (a)). Panel (b) goes into more detail and shows at any level combination of debt in default and export credit insurance the marginal percentage increase in imports per 1 percent increase in export credit insurance. It shows that in particular at high levels of the distribution of export credit insurance the marginal impact on trade is large. Beginning with the 75th percentile of the export credit insurance, the increase of this marginal effect towards higher levels of sovereign debt in default becomes quite steep. If a country is not in default (origin of the x-axis) any marginal increase in export credit insurance at the 75th percentile will result in an increase of total trade of about 0.5 percent. If the country is in default at very high levels, this effect is 0.7. Moreover, if large extends of imports are covered by export credit insurance, the trade elasticities are even higher and can reach levels of more than 1 while still increasing with higher levels of sovereign debt in default.

Panels (c) and (d) of Figure 4 show changes in levels of trade by combination of export credit insurance and sovereign debt in default. The underlying regression differs from that corresponding to Panels (a) and (b) in that it includes only origin-time and origin-destination pair fixed effects to be able to estimate predicted levels of trade for different levels of sovereign debt in default, which with the inclusion of destination-time fixed effects is not possible. Panel (c) shows a contour plot of levels of trade in million USD at every combination of export credit insurance and log of sovereign debt in default across the observed distributions of these variables.

This graph is very informative about the power of export credit insurance in times of sovereign default. For values of export credit insurance below the 75th percentile of the observed distribution, imports of a country decline with higher levels of debt in default. To see this, start at any level of trade insurance below the 75th percentile at the origin of sovereign debt in default. If at that level of export credit insurance the importing country defaults on larger and larger values of its debt, we move vertically up from the x-axis in the graph but 'downhill' in trade value. Thus, imports decline at increasing levels of sovereign debt in default. However,

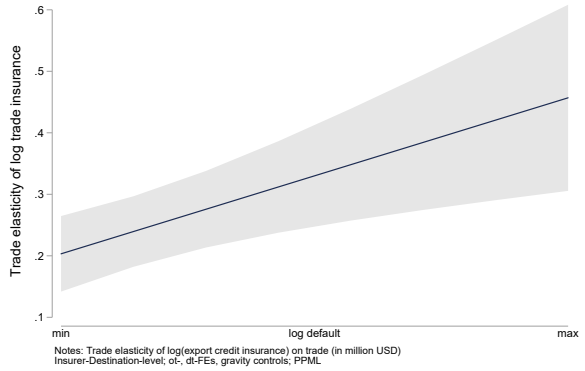
if imports of a country are exposed to high levels of export credit insurance (at and above the 75th percentile), increasing sovereign debt in default does no longer lead to declining imports – one no longer moves 'downhill' in trade value when moving vertically to higher levels of debt in default. Rather, the general positive effects of export credit insurance on trade outweigh the negative impact of sovereign default on trade at any level of default. The amplification of this positive impact becomes so strong that imports tend to increase again with a marginal increase in export credit insurance and more so the higher the level of debt in default is.

Panel (d) shows this effect in an alternative way. It shows the predicted value of imports in thousand USD along the distribution of sovereign default severity for 6 values of export credit insurance, i.e. for the 1st, 25th, 50th, 75th, 90th, and 99th percentile of insurance observed in the data. It more directly shows that, if a country's imports are not covered by trade insurance, imports to that country will decline substantially, by about .4 log points, with larger values of sovereign default (cf. the predicted value for trade covered by trade insurance equivalent to the 1st percentile of the trade insurance distribution in the data). However, as more and more trade is covered by export credit insurance (moving from the 1st to the 99th percentile of the trade insurance distribution), the impact of a sovereign default on trade diminishes. In fact, if most of a country's imports are covered by trade insurance the positive effect on trade of this instrument dominates the negative effect of sovereign defaults on trade such that there is no statistically significant difference in trade values between no default and default on all of a country's sovereign debt (see the pink, dashed line associated with the 90th percentile of trade insurance but also the green, dash-dotted line for the 75th percentile of trade insurance).

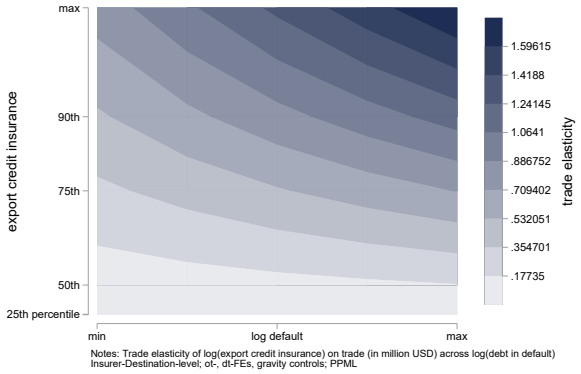
This section thus detects that export credit insurance is a very powerful tool to stabilize countries' imports when it is in sovereign default. While prior research has shown that during sovereign defaults the private sector loses access to external finance, these results strongly indicate that export credit insurance is able to uphold access to bank finance for imports in macroeconomic environments that impede firms' ability to source external funds (Arteta & Hale 2008). The results can also be interpreted as indication that sovereign defaults should not only be seen as a signal for the quality of the private sector, as the model of Sandleris (2008) would suggest, however I will revert to this in Section 5.

In Section B in the Appendix, I address potential concerns about additional channels that could undermine the results presented. Specifically, I address if effects differ by importing country's development status or international sovereign debt management programs such as the HIPC program.[31] I find that the effects presented here are valid for most countries to almost equal extents. Further, I check if the results are driven by a currency crisis rather than a sovereign debt crisis. This is not the case. Finally, I consider different periods of global or regional distress during which effects could differ. These are the Great Recession, the Trade Collapse period, and the Euro Debt Crisis. During none of these, the differential impact of export credit insurance on trade during sovereign default is significantly different than over the whole sample period.

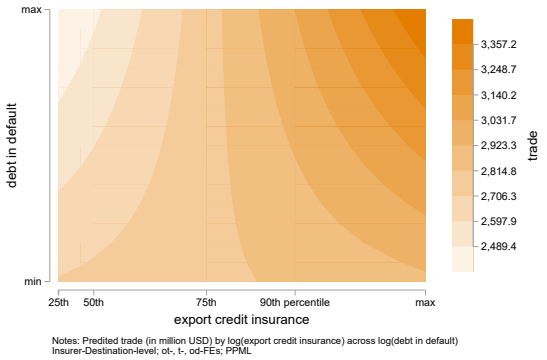
[31] HIPC stands for heavily indebted, poor countries.



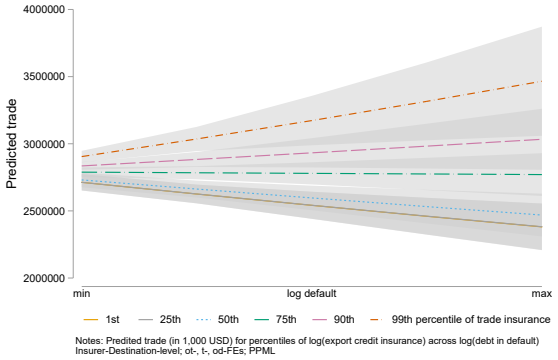
(a) Trade elasticity of trade insurance over default



(b) Trade elasticity of trade insurance on trade over default



(c) Predicted log trade value over default by trade insurance percentiles



(d) Predicted log trade value over default by trade insurance percentiles

Figure 4: Visualization of effects of trade insurance on trade in case of default

Notes: The figures show trade elasticities of export credit insurance in Panels (a) and (b) and predicted values of trade in Panels (c) and (d) for different forms of representation. Results in Panels (a) and (b) from a PPML regression including *ot*- and *dt*-fixed effects to account for multilateral resistance terms and trade cost variables as in column (11) of Table 4. For Panels (c) and (d), the respective regression includes *ot*-, *od*- and *t*-fixed effects to be able to estimate predicted levels of trade for different values of sovereign debt in default.

4 Mechanisms

The previous section has shown that while export credit insurance in general has trade promoting effects, these effects become stronger when economic circumstances worsen. In particular, export credit insurance offsets the decline in trade that occurs when countries default on their external sovereign debt.

In this section, I explore in more detail the channels through which export credit insurance mitigates the decline in trade. The data allow me to distinguish between two types of insurance agencies that are active in export credit insurance, publicly owned and privately owned. The legal background for public export credit agencies stipulates that they should only insure non-marketable risks, i.e. they are intended to only be active on markets for which no private insurance contract can be found. Contrary to private insurance companies, which are mostly

active for exports to markets that are less risky in a variety of definitions[32], i.e. their insurance activity is concentrated on OECD markets and short-term business, public export credit agencies are active on markets where supply by private companies is low (Buus et al. 2022). Moreover, even within markets, as risk increases, supply of private insurance companies is reduced (at least in relative terms) as compared to the supply of public ECAs. Hence, I expect that public export credit agencies are the main driver of the aggregate effects discussed in the previous section. In a first step, I thus assess the differences between effects of export credit insurance issued by private companies on trade by sovereign default intensity and the effects of insurance issued by public ECAs.

Further, the data allow to distinguish between short- and long-term debt contracts that are related to regular export transactions of final and intermediate goods and large, long-term, investment projects, respectively. While the former can cover both intermediate and final goods that are exported in a regular fashion, the latter typically cover exports of intermediates or capital goods that are used in long-term projects and are thus expected to be more sensitive to changes in the general macroeconomic environment. Here, it is ambiguous whether any differences exist depending on the length of the insurance contract. Fuentes & Saravia (2010), for instance, show that FDI inflows from creditor countries contract following default while this is not generally the case for FDI from non-creditor countries. Since FDI, especially green-field FDI, is related to substantial parts of imports of capital goods their paper would suggest imports covered by long-term insurance from creditor countries to contract while the effect on imports from non-creditor countries remains ex ante ambiguous.

Lastly, the data allow me to differentiate the type of debtor (public or private debtor) on the credit insured by export credit insurance. While private debtors are independent of the sovereign and its debt, public debtors are entities that the government directly controls and, therefore, their debt has to be considered sovereign debt. Yet, because sovereign defaults are selective, it is a priori not clear that there will be defaults on debt on imports of capital goods or other intermediate goods used for infrastructure or other capital projects that would be covered by export credit insurance. Nonetheless, such projects may be put on halt when the government is no longer credit worthy irrespective of whether it has decided to default on this particular debt contract. Thus, I expect that the moderating impact of export credit insurance on trade will come primarily through bank lending to private borrowers related to commercial imports for production or consumption and independent of the government's actions.

In the following, I will study these channels individually and assess through which the aggregate effects materialize.

4.1 Public vs. private trade insurance

As outlined above, different types of insurance agencies are active on different types of markets and in different risk environments (Buus et al. 2022). In this subsection, I study whether the mitigating effects of export credit insurance from public ECAs on trade are distinctly dif-

[32]Not at last according to the ECAs' own risk classes as published by the OECD working group on export guarantees: https://www.oecd.org/trade/topics/export-credits/arrangement-and-sector-understandings/financing-terms-and-conditions/country-risk-classification/

ferent from those of private insurance companies. To this end, I pool the samples of public and private insurance companies as before but explicitly differentiate the trade insurance variable by type of insurer. This specification is isomorphic to a specification in which I would introduce an interaction with an indicator for whether the insurance is issued by a public ECA or a private insurance agency. This specification allows to assess statistical and economic differences in effects of export credit insurance on trade between the type of issuing insurance company.

$$\begin{aligned}\ln(exports)_{odt} =& \alpha + \beta_1 default_{dt-1} + \beta_2 \ln(public\ trade\ insurance)_{odt} \\ &+ \beta_3 \ln(private\ trade\ insurance)_{odt} \\ &+ \beta_4\ default_{dt-1} \times \ln(public\ trade\ insurance)_{odt} \\ &+ \beta_5\ default_{dt-1} \times \ln(private\ trade\ insurance)_{odt} \\ &+ \Gamma + \mathbf{Z'}_{odt}\boldsymbol{\beta} + \varepsilon_{odt}\end{aligned} \tag{6}$$

Variables are as in the main specification, $\ln(public\ trade\ insurance)_{odt}$ is the log value of export credit insurance issued by public ECAs and $\ln(private\ trade\ insurance)_{odt}$ the respective value for export credit insurance issued by private insurance companies. Results for the variables of interest are displayed in Table 5. I restrict the default variable to the log of debt in default for conciseness and do not report results on additional control variables. These are as before; all results also hold for the remaining specifications of sovereign default and are available on request. As in the previous section, I find that export credit insurance has positive effects on trade for both types of insurance agency. When I compare the differential impact of trade insurance at higher values of sovereign default between insurance issued by private and by public entities, I similarly do not find stark differences between effects of insurance issued by public export credit insurance and private insurance companies. But this specification is not able to address changes in import value because these are absorbed by the destination-time fixed effects as will become clear next.

To clearly identify, which, if any, type of insurance company is more efficient or effective in mitigating the negative impact of sovereign default on trade, it is again useful to consider the differential impacts of trade credit insurance over the distribution of default. As in the previous section, I consider the marginal effects of trade insurance on trade, expressed as the trade elasticity of export credit insurance, across the distribution of sovereign default. I plot these effects in Panel (a) of Figure 5, which are based on the PPML estimator including *ot*- and *dt*-fixed effects as well as trade cost variables as controls, corresponding to results presented in column (3) of Table 5.

Consistently, the marginal effects of public export credit guarantees on trade are significantly larger than those of private insurance by a difference in trade elasticity of about .11. Both increase with larger values of debt in default, i.e. their effectiveness increases the more adverse the macroeconomy is towards firms obtaining external credit from banks. Yet, the difference between public and private export credit insurance remains intact for the whole distribution of debt in default and is statistically significant. Thus, export credit insurance issued by public ECAs appears to be more efficient than insurance issued by private insurance companies.

Table 5: Public vs. private insurance

	(1)	(2)	(3)	(4)
log(public export insurance)	0.115***	-0.002	0.104***	0.006***
	(0.017)	(0.003)	(0.016)	(0.001)
$\log(\text{default})_{dt-1}$ × log(public export insurance)	0.013***	0.003***	0.007**	0.001
	(0.003)	(0.001)	(0.003)	(0.001)
log(private export insurance)	0.097***	0.022**	0.065**	0.002
	(0.029)	(0.009)	(0.026)	(0.004)
$\log(\text{default})_{dt-1}$ × log(private export insurance)	0.012***	0.000	0.010***	0.001
	(0.003)	(0.001)	(0.003)	(0.001)
Observations	63930	63416	63040	62022
R^2	0.814	0.978	0.910	0.997
Origin-year FE	Yes	Yes	Yes	Yes
Destination-year FE	Yes	Yes	Yes	Yes
Origin-destination-pair FE	No	Yes	No	Yes
Gravity controls	Yes	Yes	Yes	Yes
Estimator	OLS	OLS	PPML	PPML

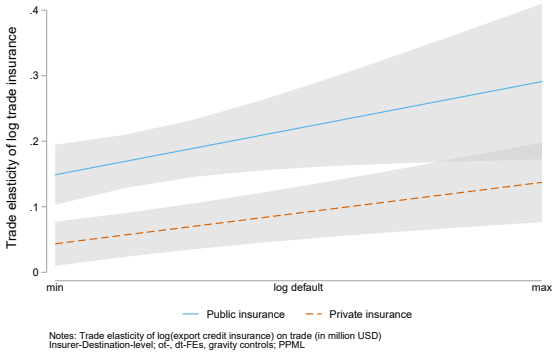
Notes: Clustered standard errors in parentheses, * $p < 0.10$, ** $p < .05$, *** $p < .01$.
Dependent variable are log(exports), for linear estimations I include zero observations by the hyperbolic sine transformation. For estimations with PPML R^2 denotes the pseudo-R^2. All columns include the same set of gravity variables as in the previous section and implied by Equ.'s (1) and (3); results are omitted for brevity.

I next consider the predicted levels of trade across different levels of trade insurance of public and private insurance agencies along the distribution of sovereign default. These results are shown in Panels (b) and (c) of Figure 5. The predicted levels are computed from estimation of Equation (6) that includes *ot*- and *od*-fixed effects as well as gravity variables. As in the previous section, the specification does not include destination-time fixed effects to be able to compute predicted trade for different values of sovereign debt in default.

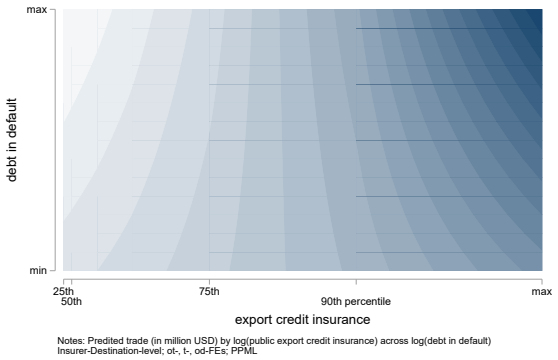
This exercise confirms the previous finding that export credit agencies are more efficient than private export credit insurance companies in mitigating the contraction in trade associated with sovereign default. Similar to the aggregate results, export credit insurance can fully offset the decline in trade even at high levels of default. However, this is only the case for export credit insurance from public ECAs at reasonable levels of insurance intensity. This can be seen by comparing the increase or decrease in trade fixing the level of trade insurance at some percentile across Panels (b) and (c) of Figure 5. For instance, fix the level of export credit insurance at the 75th percentile of the distribution of either publicly or privately issued insurance. Moving vertically up from the x-axis, i.e. letting the value of sovereign debt in default increase will lead to a slight decline in trade (moving 'downhill' in the contour plot where darker colors indicate higher levels of trade) in Panel (b) for export credit insurance issued by public export credit agencies. For insurance issued by private insurance companies this decline is stronger (Panel (c)). Further, for export credit insurance from ECAs we observe the level of insurance for which it starts to fully offset the contraction in trade at lower levels in the distribution than for privately issued insurance.

These results show, that it is predominantly public export credit agencies that are responsible for the moderating effect of export credit insurance on trade in times of sovereign default. Yet,

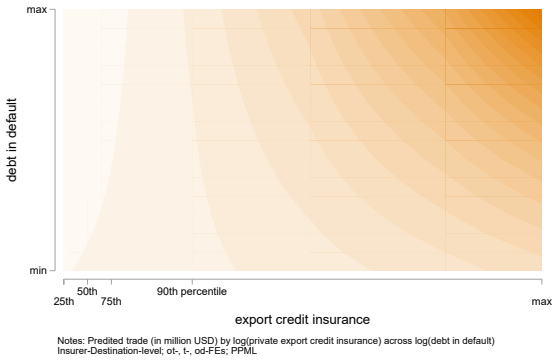
this is not to say that insurance from private insurance companies would be ineffective in general. Rather the differences stem from the fact that private companies, similarly to banks, refrain from entering markets that pose high levels of risk.



(a) Marginal effects of trade insurance on trade over default



(b) Predicted trade by public insurance



(c) Predicted trade by private insurance

Figure 5: Public vs. private export credit insurance agencies over default

4.2 Short- vs. long-term trade insurance

Having established that it is predominantly insurance from public ECAs that offsets the negative effects of sovereign default on trade, I next examine whether (recurring) trade in goods related to short-term bank loans or trade in goods related to long-term debt contracts is affected more by export credit insurance in times of default. As outlined above, the former is presumably influenced to a lesser extent by sovereign defaults – apart from its effect on restricting access to finance – because final consumption of these goods is more independent from macroeconomic circumstances.

To this end, I classify the type of trade credit insurance by its tenor (repayment time frames) into short-term insurance ($\leq$ 12 months tenor) and long-term insurance ($>$ 12 months tenor)

and estimate the following regression.[33]

$$\begin{aligned}\ln(exports)_{odt} =& \alpha + \beta_1 default_{dt-1} + \beta_2 \ln(short\text{-}term\ trade\ insurance)_{odt} \\ &+ \beta_3 \ln(long\text{-}term\ trade\ insurance)_{odt} \\ &+ \beta_4\ default_{dt-1} \times \ln(short\text{-}term\ trade\ insurance)_{odt} \\ &+ \beta_5\ default_{dt-1} \times \ln(long\text{-}term\ trade\ insurance)_{odt} \\ &+ \Gamma + \mathbf{Z'}_{odt}\boldsymbol{\beta} + \varepsilon_{odt}\end{aligned} \tag{7}$$

As in the previous subsection, I only present results for the log of debt in default as the default variable. Results of alternative specification are robust and available upon request. The results, presented in Table 6, suggest that most of the aggregate effect stems from insurance on trade associated with short-term debt contracts. Dependent on the specification, the level effects of short-term export credit insurance are significantly larger than those of long-term export credit insurance.

In addition, the interaction between trade credit insurance and level of sovereign default shows that the increase in the trade elasticity of short-term trace credit insurance is about three times as high in levels as that of long-term insurance and both are statistically distinct from another for specifications without origin-destination fixed effects.[34]

As before, I present marginal effects of both short-term and long-term insurance on trade and the predicted values of trade for different levels of short- and long-term trade credit insurance across the distribution of default severity in Figure 6. The trade elasticity of short-term and long-term export credit insurance is computed from the preferred specification including origin-time, destination-time, and gravity controls (corresponding to results reported in column (3) of Table 6). Likewise, for computation of the predicted level of trade, the regression specification does include origin-time, origin-destination pair and year fixed effects to be able to predict trade at different levels of sovereign default.

Panel (a) shows the trade elasticity of export credit insurance and highlights that only marginal effects of insurance of short-term debt on trade are increasing with higher levels of default. For this type of insurance the marginal effect increases by a factor of two. For long-term insurance the marginal effect is constant across different levels of sovereign default. Thus, only insurance of short-term credit has mitigating effects on the decline in trade caused by sovereign default.

This becomes once again apparent from Panels (b) and (c) of Figure 6. These show the predicted levels of trade for across the distribution of trade insurance for short-term and long-term debt contracts, respectively, along levels of sovereign default. Panel (b) shows the contour plot for short-term insurance. Paralleling the main results, it shows that while for low values of short-term export credit insurance (below the 75th percentile) higher levels of sovereign debt in default will lead to declining imports, for higher values of short-term export credit insurance the

[33] Note that 'tenor' length differs from 'maturity' of a loan: 'tenor' is equal to 'maturity' at date of issuance and constant over time.

[34] For this approach, inclusion of origin-destination fixed effects takes out too much variation and results become fuzzy.

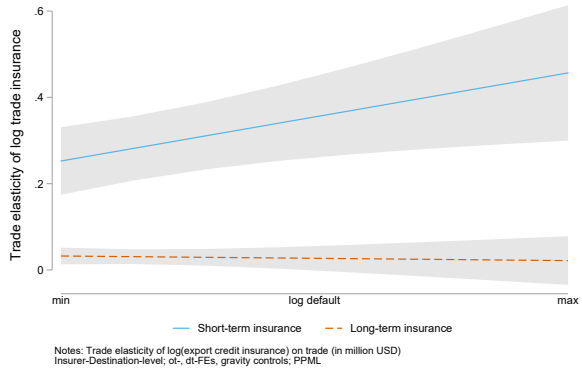
positive effect of insurance again outweighs the negative effects of default and the effectiveness of the former is increasing so that at a given level of sovereign default trade will increase with higher levels of insurance. Oppositely, Panel (c) shows that this is not the case for insurance of long-term debt. While at any level of sovereign default increasing use of long-term export credit insurance will lead to increasing trade, it is not the case that at high levels of long-term insurance insurance gets more effective at higher levels of sovereign default such that the negative impact of the latter on trade were outweighed.

Hence, only insurance on short-term debt is able to fully offset the negative impact of sovereign default on trade. This is an intuitive result since it is predominantly intermediate inputs and final goods whose imports are covered by such debt whereas long-term debt is usually used to finance imports of capital goods or imports related to large investment projects. While the former will remain valuable to be used in production and hence sovereign defaults will have no impact on the profitability of imports of such goods, sovereign defaults are associated with increasing long-term risk that leaves investment projects too risky to be continued further. Then, also insurance on debt is not able to lead to higher imports because it is not a distortion on capital markets that leads to lower trade but real effects due to increasing risk that make the projects unprofitable.

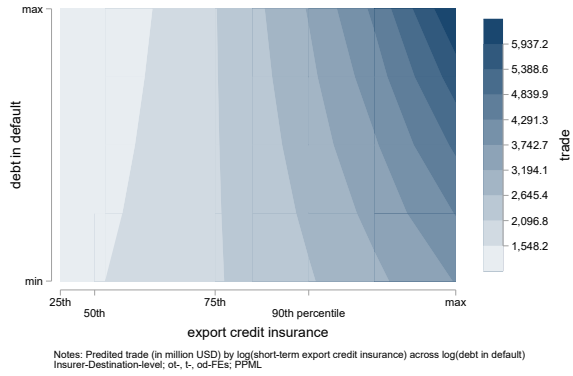
Table 6: Short- vs. long-term export credit insurance

	(1)	(2)	(3)	(4)
log (short-term export insurance)	0.128^{***}	0.004	0.116^{***}	0.005^{**}
	(0.020)	(0.004)	(0.018)	(0.002)
$\log(\text{default})_{dt-1}$ × log (short-term export insurance)	0.013^{***}	0.000	0.007^{**}	0.000
	(0.003)	(0.001)	(0.003)	(0.001)
log (long-term export insurance)	0.029	0.001	0.038^{***}	0.002^{**}
	(0.020)	(0.002)	(0.012)	(0.001)
$\log(\text{default})_{dt-1}$ × log (long-term export insurance)	0.005	0.002^{***}	-0.001	0.000
	(0.003)	(0.001)	(0.003)	(0.000)
Observations	63930	63416	63040	62022
R^2	0.815	0.978	0.913	0.997
Origin-year FE	Yes	Yes	Yes	Yes
Destination-year FE	Yes	Yes	Yes	Yes
Origin-destination-pair FE	No	Yes	No	Yes
Gravity controls	Yes	Yes	Yes	Yes
Estimator	OLS	OLS	PPML	PPML

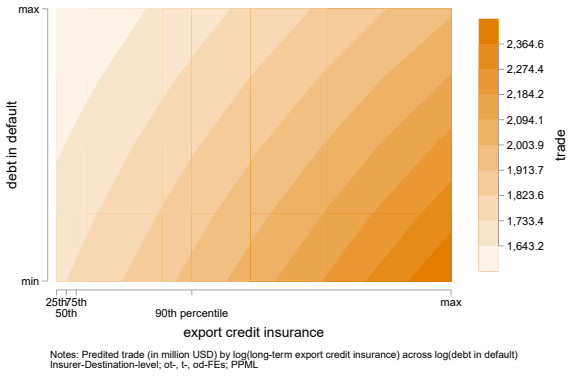
Notes: Clustered standard errors in parentheses, * $p < 0.10$, ** $p < .05$, *** $p < .01$.
Dependent variable are log(exports), for linear estimations I include zero observations by the hyperbolic sine transformation. For estimations with PPML R^2 denotes the pseudo-R^2. All columns include the same set of gravity variables as in the previous section and implied by Equ.'s (1) and (3); results are omitted for brevity.



(a) Marginal effects of trade insurance on trade over default



(b) Predicted log trade value: Short-term insurance



(c) Predicted log trade value: Long-term insurance

Figure 6: Short- vs. long-term export credit insurance over default

4.3 Private or public debt?

Finally, I study whether there are differences between the debtor type. The data yield information about the type of debtor and hence the type of importer; they distinguish between public and private buyers. This distinction is critical for the question of the current paper, since I am concerned with the effect of export credit insurance on trade when a country defaults on its public/sovereign debt. As said before, countries tend to default selectively for a variety of reasons but in general one should assume that even public debt not currently in default is at increased risk. Thus, the effect of insurance of public debt is unclear ex ante. Potentially, trading parties involved in deals with public debt may be willing to uphold the projects or they regard the increased risk as too high and thus abstain from the contracts and trade declines even though the debt would be insured.

To assess this question, I estimate

$$\begin{aligned}\ln(exports)_{odt} =& \alpha + \beta_1 default_{dt-1} + \beta_2 \ln(trade\ insurance\ on\ public\ debt)_{odt} \\ &+ \beta_3 \ln(trade\ insurance\ on\ private\ debt)_{odt} \\ &+ \beta_4\ default_{dt-1} \times \ln(trade\ insurance\ on\ public\ debt)_{odt} \\ &+ \beta_5\ default_{dt-1} \times \ln(trade\ insurance\ on\ private\ debt)_{odt} \\ &+ \Gamma + \mathbf{Z'}_{odt}\boldsymbol{\beta} + \varepsilon_{odt}\end{aligned} \tag{8}$$

Results are shown in Table 7 that has the same structure as previous tables. I cannot identify stark differences in the linear effects of trade credit insurance on public or private debt, even though levels differ slightly (cf. rows 1 and 3 of columns (1) and (3), my preferred specification not including origin-destination pair effects). This confirms that, generally, trade and its dependence on external finance is independent of the debtor type. No matter if it is a private debtor or a public debtor, export credit insurance has similar effects in mitigating credit constraints. Yet, one sees that only insurance of private debt has a differential impact on trade at higher levels of sovereign default. This is once again highlighted in Figure 7, which reports the trade elasticities of export credit insurance on trade for both types of debtors in Panel (a) and the predicted log trade value for different levels of trade credit insurance on either debt issued by public or private debtors across the distribution of defaults in Panels (b) and (c), respectively.

It visualizes that only insurance of trade credit with private debtors shows differential effects across the default distribution. The trade elasticity of insurance on export credit with public debtors even declines towards higher levels of sovereign debt in default. This result is sensible out of the reasons discussed. At higher levels of default, insurance on export credit with public debtors might be an adverse signal that has a negative impact on overall trade.

Panels (b) and (c) report predicted trade values across distributions of both export credit insurance and sovereign debt in default. It shows that for public creditors (Panel (b)) trade will always decline with increasing default levels, irrespective of the level of insurance on credit. For private creditors, once again, high levels of export credit insurance can fully mitigate the adverse effects of default and it even becomes more efficient at higher levels of default.

These results are interesting as they show that when access to credit for private companies declines due to sovereign default (Arteta & Hale (2008) and Zymek (2012)) export credit insurance can counter this effect and restore access to credit. However, this is not true for public debtors. This might indicate that for public debtors the direct signal of a defaulting ultimate debtor is stronger than the loss in access to private credit this debtor can recoup by relying on credit insurance.

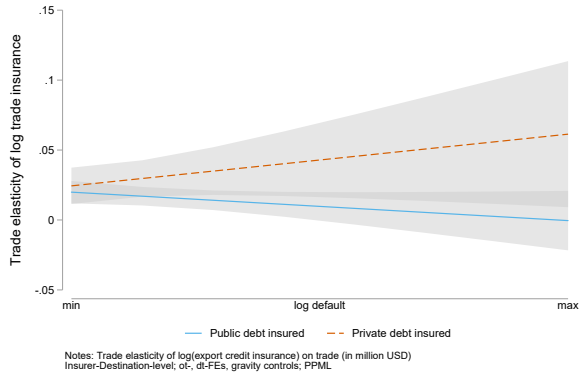
Overall, this section has detected the mechanism through which export credit insurance is able to ease the access to finance for trade credit when the importing country defaults on its external debt. It is mostly insurance by public ECAs that keeps short-term debt held by private debtors at higher levels than would emerge without export credit insurance. These results also allow to speak more about the channel through which sovereign defaults affect international

trade. Sovereign defaults appear to affect private firms that regularly engage in international trade transactions only by preventing them from accessing financial markets. Export credit insurance can offset this effect by relieving lending banks from (perceived) risk and thereby opening this bottleneck of international trade.

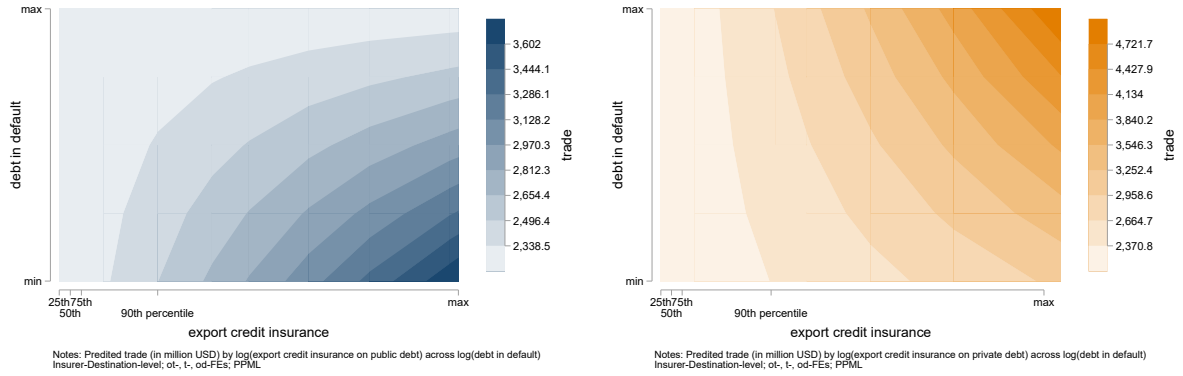
Table 7: Public vs. private debt insured

	(1)	(2)	(3)	(4)
log export insurance on public debt	0.046**	0.004*	0.070***	0.000
	(0.018)	(0.002)	(0.014)	(0.002)
$\log(\text{default})_{dt-1}$ × log export insurance on public debt	-0.001	0.001*	-0.005	0.001*
	(0.003)	(0.001)	(0.003)	(0.001)
log export insurance on private debt	0.034	-0.001	0.036***	0.002*
	(0.021)	(0.002)	(0.010)	(0.001)
$\log(\text{default})_{dt-1}$ × log export insurance on private debt	0.011***	0.001**	0.004	-0.000
	(0.003)	(0.001)	(0.003)	(0.000)
Observations	63930	63416	63040	62022
R^2	0.812	0.978	0.909	0.997
Origin-year FE	Yes	Yes	Yes	Yes
Destination-year FE	Yes	Yes	Yes	Yes
Origin-destination-pair FE	No	Yes	No	Yes
Gravity controls	Yes	Yes	Yes	Yes
Estimator	OLS	OLS	PPML	PPML

Notes: Clustered standard errors in parentheses, * $p < 0.10$, ** $p < .05$, *** $p < .01$.
Dependent variable are log(exports), for linear estimations I include zero observations by the hyperbolic sine transformation. For estimations with PPML R^2 denotes the pseudo-R^2. All columns include the same set of gravity variables as in the previous section and implied by Equ.'s (1) and (3); results are omitted for brevity.



(a) Marginal effects of trade insurance on trade over default



(b) Predicted log trade value: Public debt insured

(c) Predicted log trade value: Private debt insured

Figure 7: Public vs. private debt insured by export credit guarantees

5 Do export insurance companies take over the risk?

The fact that export credit insurance can moderate the decline in trade during sovereign defaults suggests that there is a reallocation of risk – and potentially losses – from private exporters or their banks to public export credit agencies. A discussion about whether ECAs are an effective mechanism or rather pose a distortionary subsidy is thus warranted.

As mentioned in the data section, the Berne Union data also include information on arrears and claims on trade insurance. I can utilize this information to study if there is a pure market failure of private debt and insurance markets when countries default on their sovereign debt or if indeed risk also on trade credit rises and the decline in credit supply is efficient and is distorted upwards by export credit insurance.

Before I turn to this, however, I first check on whether there are differences in the change in export credit insurance between private insurance companies and public ECAs that would already indicate declining supply of private insurance. Therefore, I estimate

$$\begin{aligned}\ln(\textit{trade insurance})_{odt} =& \alpha + \beta_1 \textit{default}_{dt-1} + \beta_3 \mathbb{1}\{\text{public ECA}\}_o \times \textit{default}_{dt-1} \\ &+ \Gamma + \mathbf{Z'}_{odt}\boldsymbol{\beta} + \varepsilon_{odt},\end{aligned} \tag{9}$$

where variables are defined as before. $\mathbb{1}\{\text{public ECA}\}$ is an indicator equal to one if the insurance

agency issuing the export credit insurances is an ECA and zero if it is a private insurer. This exercise suggests that a sovereign default is associated with a decrease in both public and private export credit insurance following sovereign default; results are shown in Table 8. The estimated effect of sovereign default value on export credit insurance is negative and significantly different from zero. I cannot judge whether this finding is due to changes in the demand for insurance or changes in the supply of insurance. Most likely, both factors play a role here. As mentioned in the introductory section, insurance agencies also always assess the projects for which export credits are to be used. If they find payment risk to be increasing they will not or only at higher costs insure the corresponding bank credit such that the supply curve of export credit insurance will shift north-west.

Further, I cannot identify differences in the decline in export credit insurance associated with sovereign default between private insurance companies and ECAs. The interaction between the indicator for public ECAs and the default variable is by a factor of 2-3 smaller than the estimate on the default variable and it is statistically not distinguishable from zero (see columns (1) and (2)). This is confirmed, when I split the sample by type of export credit insurance agency. The estimates on the default variable are almost equal across the samples of ECAs and private insurance companies (compare columns (3) and (5) and columns (4) and (6)). This is reassuring since it indicates that the change in export credit insurance for either type of insurer is about equal.

This exercise thus does not detect a shift from private to public insurance in times of sovereign default. This can be taken as a first indication that there is no subsidization of exports through public ECAs when importing countries default on sovereign debt.

Table 8: Change in insurance following default

Dependent variable:	(1)	(2)	(3)	(4)	(5)	(6)
log(export insurance)	interaction		Public ECAs		Private insurers	
$\log(\text{default})_{dt-1}$	-0.019***	-0.016**	-0.024***	-0.028**	-0.024***	-0.013*
	(0.007)	(0.008)	(0.005)	(0.011)	(0.007)	(0.008)
$\mathbb{1}\{\text{public ECA}\}\times\log(\text{default})_{dt-1}$	-0.005	-0.009				
	(0.008)	(0.014)				
trade agreement	0.069**	0.122**	0.078**	0.105	0.021	0.125*
	(0.033)	(0.053)	(0.038)	(0.083)	(0.069)	(0.066)
log(GDP) destination	0.473***	0.527***	0.624***	0.828**	-0.052	0.159
	(0.076)	(0.190)	(0.090)	(0.376)	(0.154)	(0.141)
log(GDP p.c.) destination	-0.038	-0.100	-0.218**	-0.683*	0.646***	0.453**
	(0.090)	(0.213)	(0.105)	(0.403)	(0.185)	(0.180)
Observations	63428	58358	49785	47345	12104	10349
R^2	0.858	0.955	0.796	0.871	0.952	0.984
Origin-destination-pair FE	Yes	Yes	Yes	Yes	Yes	Yes
Origin-year FE	Yes	Yes	Yes	Yes	Yes	Yes
Estimator	OLS	PPML	OLS	PPML	OLS	PPML

Notes: Clustered standard errors in parentheses, * $p < 0.10$, ** $p < .05$, *** $p < .01$.
Dependent variable is log(export insurance), for linear estimations I include zero observations by the hyperbolic sine transformation. For estimations with PPML R^2 denotes the pseudo-R^2.

While the observation that adjustments of public and private export insurance to sovereign default are about equal on average indicates that no shift towards more public export credit

insurance occurs during sovereign defaults, I cannot exclude that public insurance is exposed to increasing risk whereas private insurance is not. Since public insurance agencies generally operate on riskier markets this could still be the case (Buus et al. 2022).

Likewise, the previous analysis does not allow for any conclusions about changes in the profitability of exports during a sovereign default. If the profitability of exports or the following downstream production steps falls due to a sovereign default and subsequent changes in the real economy of the importing country, decreasing imports would be efficient on the basis of basic economic principles (i.e. profit maximization of firms). Then, any continuation of imports caused by export credit insurance would constitute a market distortion towards inefficient levels.

If indeed profitability of imports were declining on average, one would expect nonpayment on export credit to increase since the revenues of firms that are debtors on the export credit fall. By construction of export credit insurance this would result in increasing payments of the export credit insurance agencies on insured loans. Hence, to study if profitability of imports declines after sovereign default, I utilize information on arrears and claims in the Berne Union data. These values indicate defaults on export credits for which the insurance agency has either built up arrears (and not yet disbursed money to the creditor) or already has disbursed money to the creditor because the debtors defaulted on the loan tied to the export transaction. I regress either the value of arrears and claims on the default variable or its share in the stock of insurance. I repeat these regression by inclusion of the contemporaneous value of default, because nonpayment on trade credits may increase simultaneously to sovereign defaults.

$$\begin{aligned}\ln(\text{arrears \& claims})_{odt} =& \alpha + \beta_1 default_{dt-1} \\ &+ \beta_2 \mathbb{1}\{\text{public ECA}\}_o \times default_{dt-1} \\ &+ \beta_3 \ln(stock\ of\ trade\ insurance)_{odt} + \Gamma + \mathbf{Z'}_{odt}\boldsymbol{\beta} + \varepsilon_{odt}\end{aligned} \tag{10}$$

Results are presented in Table 9. They show that arrears and claims increase somewhat at higher levels of sovereign default or stay constant for public ECAs while they do not change significantly for private insurance companies, if at all, they decline. The effects are persistent at least for the year following the sovereign default (columns (3) and (4)).

Overall, the observed change in claims in the course of sovereign default is economically not very pronounced. Very much in line with the previous literature on the impact of sovereign defaults and declining international trade (e.g. Zymek (2012)) this result indicates that profitability of the real sector does not change significantly and, indeed, imports to the most part only contract because firms lose access to private credit due to the sovereign default. Export credit insurance is able to uphold this and thus mitigates a market failure rather than causes one.

One additional argument for the establishment of ECAs is their supposedly better ability to recover claims on unpaid loans compared to private actors. To also take a stance on this argument, I repeat the previous regression but change the dependent variable to recoveries on claims paid out or their share in the stock of outstanding claims. The data provide information on recoveries on claims paid out by insurance agencies, i.e. delayed payments of debtors on the initial export credit that initially defaulted on their bank credit. Since the insurance agency

Table 9: Sovereign defaults and claims on export credit insurance

Dependent variable: ln(arrears & claims)	(1)	(2)	(3)	(4)
$\log(\text{default})_{dt-1}$	-0.009***	-0.046		
	(0.003)	(0.045)		
$\mathbb{1}\{\text{public ECA}\} \times \log(\text{default})_{dt-1}$	0.011**	0.055		
	(0.004)	(0.052)		
$\log(\text{default})_{dt}$			-0.003	-0.005
			(0.003)	(0.032)
$\mathbb{1}\{\text{public ECA}\} \times \log(\text{default})_{dt}$			0.013***	0.040
			(0.004)	(0.045)
log stock of export insurance	0.018***	-0.062	0.021***	-0.046
	(0.004)	(0.049)	(0.004)	(0.050)
trade agreement	-0.043**	-0.225	-0.039*	-0.172
	(0.022)	(0.287)	(0.020)	(0.271)
log(GDP) destination	0.046	0.423	0.018	0.128
	(0.047)	(0.621)	(0.041)	(0.553)
log(GDP p.c.) destination	-0.119**	-0.964	-0.079*	-0.677
	(0.051)	(0.688)	(0.046)	(0.593)
Observations	63428	38659	72874	42892
R^2	0.630	0.753	0.618	0.750
Origin-destination-pair FE	Yes	Yes	Yes	Yes
Origin-year FE	Yes	Yes	Yes	Yes
Estimator	OLS	PPML	OLS	PPML

Notes: Clustered standard errors in parentheses, * $p < 0.10$, ** $p < .05$, *** $p < .01$.
Dependent variable is log(claims and arrears on export credit insurance), for linear estimations I include zero observations by the hyperbolic sine transformation. For estimations with PPML R^2 denotes the pseudo-R^2.

already reimbursed the bank for their loss, it is subsequently the insurance agency that makes up on its loss.

Results are presented in Table 10. This exercise confirms that public ECAs are better able to recover claims on previously unpaid trade credit during periods of sovereign default. Generally, however, recoveries increase during times of sovereign default. This difference is persistent across contemporaneous default and default in the year prior to default (cf. columns (3) and (4)). Columns (5)-(8) of Table 10 show that recoveries even increase as a share in outstanding claims. Hence, the impact of sovereign default on claims is less strong than the change in recoveries that is associated with sovereign default.

While nonpayment on export loans might be a direct consequence of sovereign default, the positive effect on recoveries may only be indirectly caused by the government default. Usually, countries engage in discussions on debt restructuring, e.g. in the format of the Paris Club, where also ECAs have a seat at the table. It is reasonable to assume that the restructurings are in favor of (public) debt that is covered by export credit insurance which might explain (parts) of the observed positive effect on recoveries made during sovereign default periods. For private debt, this argument does not hold, yet it is predominantly this type of debt that benefits from export credit insurance as shown in the previous section. One argument for why recoveries increase during defaults is that debtors may be generally economically healthy, yet macroeconomic circumstances such as depreciation in the exchange rate lead to nonpayments.

In sum, this section suggests that, while there is no apparent shift of trade credit insurance

from private to public insurance companies during sovereign defaults, ECAs face higher defaults on the trade credit they insure as compared to private insurance agencies. But ECAs are also able to recover more of these issued claims during sovereign defaults. This indicates that ECAs are more efficient in recovering nonpayments and, at the end of the day, do not experience higher losses than private insurance agencies do.

Table 10: Sovereign defaults and recovered claims

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Dependent variable:	log recoveries				log recoveries / stock of claims			
$\log(\text{default})_{dt-1}$	0.004	0.288***			0.023*	1.030*		
	(0.004)	(0.084)			(0.013)	(0.599)		
$\mathbb{1}\{\text{public ECA}\} \times \log(\text{default})_{dt-1}$	0.022***	0.050			0.009	1.960*		
	(0.005)	(0.090)			(0.015)	(1.094)		
$\log(\text{default})_{dt}$			0.002	0.102			0.012	0.540
			(0.003)	(0.081)			(0.009)	(0.819)
$\mathbb{1}\{\text{public ECA}\} \times \log(\text{default})_{dt}$			0.020***	0.083			0.017	1.068
			(0.004)	(0.092)			(0.012)	(1.061)
log stock of export insurance	0.002	-0.028	0.002	-0.023	-0.007	-4.463***	-0.005	-1.243
	(0.004)	(0.048)	(0.004)	(0.062)	(0.008)	(1.514)	(0.009)	(1.409)
trade agreement	-0.010	0.107	0.008	0.593*	-0.039	-9.099	-0.017	-1.008
	(0.014)	(0.469)	(0.013)	(0.338)	(0.038)	(6.238)	(0.037)	(3.653)
log(GDP) destination	0.038	1.514	0.078**	3.164***	0.104	-35.960	0.179*	-31.098
	(0.035)	(1.094)	(0.032)	(0.841)	(0.100)	(40.946)	(0.095)	(72.939)
log(GDP p.c.) destination	-0.025	0.159	-0.078**	-2.359**	-0.106	65.889	-0.212*	27.703
	(0.041)	(1.032)	(0.040)	(0.996)	(0.118)	(48.622)	(0.114)	(69.980)
Observations	63428	28510	72874	31570	17716	14671	19038	15820
R^2	0.560	0.828	0.538	0.824	0.346	0.999	0.337	0.996
Origin-destination-pair FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Origin-year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Estimator	OLS	PPML	OLS	PPML	OLS	PPML	OLS	PPML

Notes: Clustered standard errors in parentheses, * $p < 0.10$, ** $p < .05$, *** $p < .01$.
For linear estimations I include zero observations by the hyperbolic sine transformation. For estimations with PPML R^2 denotes the pseudo-R^2.

6 Conclusion

Recently, the global risk of sovereign default has risen to levels not seen since the Financial Crisis. The Covid-19 pandemic has led to rising levels of government debt around the globe. Currently more than half of the developing countries eligible for the Debt Service Suspension Initiative are at high risk of a sovereign debt default as estimated by World Bank and IMF. If this risk materializes, we do expect, among other things, strong contractions in international trade activity for these countries.

In this paper, I study if and how export credit insurance is able to counteract the decline in international trade for countries that default on their external sovereign debt. I find clear evidence that export credit insurance is able to offset large parts of the decrease in trade when countries default and would even be able to fully counter the decline when used extensively on large shares of exports to defaulting countries.

I dive deeper into the underlying mechanisms and show that it is, in particular, export credit guarantees on short-term debt issued by public export credit agencies to private borrowers that lead to the observed effects. Sovereign defaults appear to affect private firms that regularly engage in international trade transactions by preventing them from accessing financial markets. Because international trade is particularly dependent on external financing, this creates a bottleneck for trade. Export credit insurance can open this bottleneck by transferring (perceived) risk from lending banks to insurance agencies. I observe that public export credit agencies, in particular, are effectively mitigating this market distortion. Yet, their activities appear not to be pure subsidies that shift risks and ultimately losses from private banks to public actors in countries that have trade relations with defaulting countries, rather this paper argues that this mechanism is efficient in the sense that it upholds trade at healthy levels while nonpayment on the underlying trade credit does not increase by a large degree. I further show, that ECAs are better able to recover on claims paid out during periods of sovereign default. This speaks in favor of the argument that ECAs are generally more patient and more powerful in recovering past losses than private actors.

In summary, this paper shows that export credit insurance is important in facilitating trade finance. Even though just about 8-15% of world trade are covered by export credit insurance, it is crucial to mitigate the collapse in trade that would otherwise occur during periods of macroeconomic distress. Since we observe most sovereign defaults in developing countries, export credit insurance is valuable for economic development because developing countries benefit significantly from international trade during their growth process (Singh 2010).

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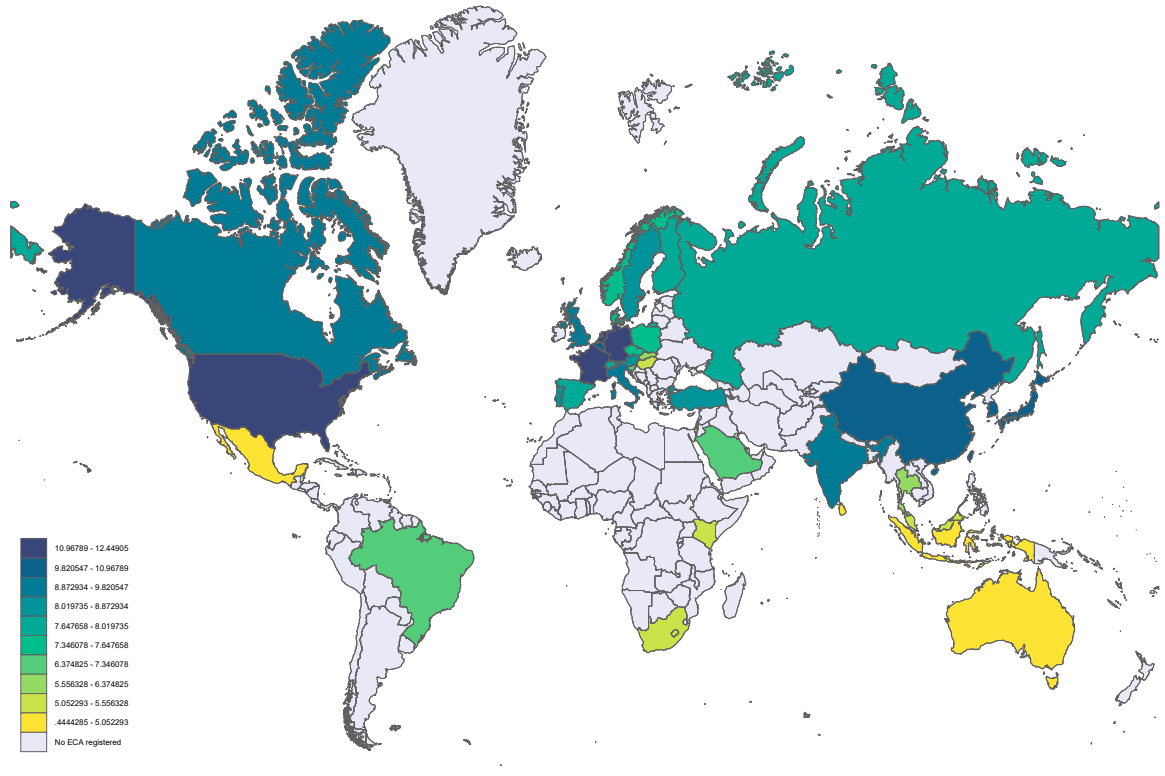
Appendix

A Additional descriptive statistics and gravity evidence on trade and sovereign default



Notes: Data from Berne Union. The figure shows average log guarantees issued over observed years.

Figure A.1: Origin countries of export credit insurance agencies and average insurance values in log-million-USD

Table A.1: Export credit insurance vs. letters-of-credit

	mean	median	sd	min	p10	p90	max
Letters of credit use in imports (in %)	12.0	4.1	17.5	0	.2	35.6	100
Export credit insurance in imports (in %)	13.5	9.1	27.9	0	1.6	20.7	100
Public export credit insurance in imports (in %)	5.7	3.2	12.5	0	.07	10.3	100
Private export credit insurance in imports (in %)	7.7	3.8	24.6	0	.06	13.3	100
Short-term export credit insurance in imports (in %)	9.3	6.9	12.2	0	1	16.3	93.8
Long-term export credit insurance in imports (in %)	2.6	.7	.05	0	0	6.8	27.9

Notes: Table reports summary statistics over country level shares in imports. Data on letters-of-credit from Niepmann & Schmidt-Eisenlohr (2017*a*), Berne Union, and BACI. Data are for 2013.

A.1 Sovereign default and trade

In this section, I present further evidence that indeed trade usually takes a toll once a country defaults on its sovereign debt. I employ the same methodology as Rose (2005), Martinez & Sandleris (2011), and Serfaty (2021) who all rely on a gravity model of trade (see below) in

which they include sovereign defaults as a further proxy for trade costs. I estimate

$$\ln(exports)_{odt} = \alpha + \sum_{l=-4}^{0} \beta_1^l \, default_{dt-l} + \Gamma + \mathbf{Z'}_{odt}\boldsymbol{\beta} + \varepsilon_{odt}, \tag{A.1}$$

where I include up to four years lagged values of $default_{dt-l}$, either an indicator equal to one if a country is in default and zero otherwise or it is a continuous variable measuring the value of debt in default or its share in total debt of a country. Γ comprises a matrix of various origin-, destination-, year-fixed effects or interactions thereof, dependent on specification. $\mathbf{Z}_{odt}$ is the matrix of other control variables including typical gravity variables that control for country-country trade costs. ε_{odt} denotes the error term. I control for the multilateral resistance terms with a set of country and time fixed effects. Whenever origin-destination country fixed effects are included these are allowed to be non-symmetric between two countries i and j dependent on whether i is origin or destination.

Table A.2 presents the results for my data sample. It broadly confirms what previous studies have shown. Sovereign default leads to declines in imports to the defaulting country and default has persistent effects over the years following default. Column (1) reports results on total debt in default and columns (2)-(5) differentiate by creditor. It appears that the impact of default purely on private creditors has the least strong impact on imports, whereas the distinction between only international organizations such as IMF or World Bank, or inclusion of also other sovereign creditors in the group of the Paris Club or China does not deliver different results. Note that statistical significance varies in column (6), which includes default to all creditor types, for reasons of multi-collinearity between the creditor types. These results confirm results of Martinez & Sandleris (2011), and Serfaty (2021), who rely on different data and time periods.

Table A.2: Sovereign defaults and trade

	(1)	(2)	(3)	(4)	(5)	(6)
ln_default	-0.007***					
	(0.001)					
L.ln_default	-0.004***					
	(0.001)					
L2.ln_default	-0.005***					
	(0.001)					
L3.ln_default	-0.003**					
	(0.001)					
L4.ln_default	0.001					
	(0.001)					
ln_internatorg		-0.036***				-0.032***
		(0.004)				(0.005)
L.ln_internatorg		-0.009**				-0.010**
		(0.004)				(0.004)
L2.ln_internatorg		-0.022***				-0.019***
		(0.004)				(0.004)
L3.ln_internatorg		-0.008**				-0.003
		(0.004)				(0.004)
L4.ln_internatorg		-0.001				0.005
		(0.003)				(0.003)
ln_privatecred			-0.003**			-0.002
			(0.001)			(0.002)
L.ln_privatecred			-0.008***			-0.007***
			(0.002)			(0.002)
L2.ln_privatecred			-0.003**			-0.003*
			(0.002)			(0.002)
L3.ln_privatecred			-0.001			0.002
			(0.002)			(0.002)
L4.ln_privatecred			0.002			0.002
			(0.001)			(0.001)
ln_parisclub				-0.023***		-0.010***
				(0.002)		(0.003)
L.ln_parisclub				-0.007***		-0.000
				(0.002)		(0.002)
L2.ln_parisclub				-0.005***		-0.005**
				(0.002)		(0.002)
L3.ln_parisclub				0.001		0.001
				(0.002)		(0.002)
L4.ln_parisclub				0.004***		0.004**
				(0.002)		(0.002)
ln_china					-0.007***	-0.005***
					(0.002)	(0.002)
L.ln_china					-0.011***	-0.009***
					(0.002)	(0.002)
L2.ln_china					-0.003*	-0.001
					(0.002)	(0.002)
L3.ln_china					-0.010***	-0.008***
					(0.002)	(0.002)
L4.ln_china					-0.005**	-0.005**
					(0.002)	(0.002)
log GDP origin	0.258***	0.255***	0.257***	0.256***	0.257***	0.254***
	(0.023)	(0.023)	(0.023)	(0.023)	(0.023)	(0.023)
log GDP destination	-0.060	-0.090**	-0.066	-0.068	-0.088**	-0.091**
	(0.043)	(0.043)	(0.043)	(0.043)	(0.044)	(0.044)
log GDP p.c. destination	0.544***	0.575***	0.564***	0.562***	0.581***	0.567***
	(0.043)	(0.043)	(0.043)	(0.043)	(0.043)	(0.044)
Observations	42586	42586	42586	42586	42586	42586
R^2	0.048	0.049	0.047	0.049	0.047	0.053

Notes: Standard errors in parentheses, * $p < 0.10$, ** $p < .05$, *** $p < .01$.

Table A.3: Sovereign defaults and trade: PPML

	(1)	(2)	(3)	(4)	(5)	(6)
ln_default	-0.000					
	(0.001)					
L.ln_default	0.001					
	(0.001)					
L2.ln_default	0.002					
	(0.001)					
L3.ln_default	0.002					
	(0.001)					
L4.ln_default	0.006***					
	(0.001)					
ln_internatorg		-0.015***				-0.016***
		(0.004)				(0.005)
L.ln_internatorg		-0.002				-0.002
		(0.006)				(0.006)
L2.ln_internatorg		-0.011**				-0.013***
		(0.005)				(0.005)
L3.ln_internatorg		-0.010***				-0.010***
		(0.003)				(0.003)
L4.ln_internatorg		0.002				0.001
		(0.003)				(0.003)
ln_privatecred			0.001			0.001
			(0.002)			(0.002)
L.ln_privatecred			-0.002			-0.001
			(0.002)			(0.002)
L2.ln_privatecred			-0.000			0.000
			(0.002)			(0.002)
L3.ln_privatecred			0.001			0.002
			(0.002)			(0.002)
L4.ln_privatecred			0.001			-0.000
			(0.002)			(0.002)
ln_parisclub				-0.007*		0.001
				(0.004)		(0.004)
L.ln_parisclub				-0.001		0.003
				(0.004)		(0.004)
L2.ln_parisclub				-0.003		-0.002
				(0.003)		(0.003)
L3.ln_parisclub				0.004*		0.007***
				(0.003)		(0.003)
L4.ln_parisclub				0.009***		0.010***
				(0.002)		(0.002)
ln_china					-0.011***	-0.013***
					(0.002)	(0.002)
L.ln_china					-0.013***	-0.016***
					(0.002)	(0.002)
L2.ln_china					-0.009***	-0.011***
					(0.003)	(0.003)
L3.ln_china					-0.007***	-0.007***
					(0.003)	(0.003)
L4.ln_china					-0.001	-0.001
					(0.002)	(0.002)
log GDP origin	0.128**	0.127**	0.128**	0.128**	0.128**	0.127**
	(0.062)	(0.061)	(0.061)	(0.061)	(0.061)	(0.062)
log GDP destination	-0.140	-0.163	-0.151	-0.119	-0.161	-0.122
	(0.101)	(0.100)	(0.100)	(0.102)	(0.101)	(0.103)
log GDP p.c. destination	0.566***	0.583***	0.575***	0.545***	0.581***	0.539***
	(0.104)	(0.102)	(0.102)	(0.104)	(0.103)	(0.105)
Observations	42951	42951	42951	42951	42951	42951
R^2						

Standard errors in parentheses

* $p < 0.10$, ** $p < .05$, *** $p < .01$

Table A.4 reports results of estimation of Equation (4) without the inclusion of origin-destination pair effects which retains more variation than the results reported in the main body of the paper. Estimates increase quite significantly in size and are otherwise consistent in sign as compared to the main results reported.

Table A.4: Sovereign defaults, trade insurance, and trade

	(1)	(2)	(3)	(4)	(5)	(6)
log(total export insurance)	0.186***	0.121***	0.180***	0.120***	0.185***	0.121***
	(0.015)	(0.014)	(0.015)	(0.014)	(0.015)	(0.014)
$\mathbb{1}\{\text{default}\}_{dt-1}$	-0.173***	-0.135**				
	(0.046)	(0.063)				
debt in default / GDP_{dt-1}			-1.500***	-0.939***		
			(0.263)	(0.205)		
$\log(\text{default})_{dt-1}$					-0.030***	-0.027***
					(0.007)	(0.008)
log(distance)	-0.320***	-0.270***	-0.315***	-0.272***	-0.320***	-0.270***
	(0.106)	(0.060)	(0.106)	(0.060)	(0.106)	(0.060)
trade agreement	0.824***	0.679***	0.822***	0.688***	0.818***	0.678***
	(0.112)	(0.069)	(0.112)	(0.070)	(0.112)	(0.070)
common border	1.042***	0.752***	1.056***	0.750***	1.049***	0.754***
	(0.174)	(0.097)	(0.174)	(0.096)	(0.174)	(0.097)
common language	0.481***	0.321***	0.488***	0.322***	0.481***	0.320***
	(0.078)	(0.077)	(0.076)	(0.077)	(0.078)	(0.077)
colonial dependence	0.551***	0.134*	0.558***	0.141*	0.550***	0.135*
	(0.132)	(0.079)	(0.128)	(0.079)	(0.132)	(0.079)
log(GDP) destination	0.758***	0.658***	0.757***	0.662***	0.764***	0.659***
	(0.021)	(0.027)	(0.021)	(0.027)	(0.021)	(0.027)
log(GDP p.c.) destination	-0.121***	0.082**	-0.094***	0.093***	-0.115***	0.085**
	(0.028)	(0.038)	(0.023)	(0.034)	(0.026)	(0.035)
Observations	63939	63464	63528	63053	63939	63464
R^2	0.720	0.881	0.724	0.880	0.720	0.881
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Origin-time FE	Yes	Yes	Yes	Yes	Yes	Yes
Estimator	OLS	PPML	OLS	PPML	OLS	PPML

Notes: Clustered standard errors in parentheses, * $p < 0.10$, ** $p < .05$, *** $p < .01$.
Dependent variable are log(exports), for linear estimations I include zero observations by the hyperbolic sine transformation. For estimations with PPML R^2 denotes the pseudo-R^2.

B Additional results and robustness

In this section, I derive additional results that serve (a) to shed more light on the mitigating role of export credit insurance on the contractions in imports of countries that default on their sovereign debt and (b) as robustness exercises of the main results.

B.1 Main results by country group

Buus et al. (2022) show that export credit insurance intensity in imports differs by country groups. Generally, low income or developing countries exhibit a higher export credit insurance intensity in their imports. Likewise, it is these countries that more regularly default on their

sovereign debt. In fact, in 1996 the international community launched the HIPC program to insure debt sustainability of Heavily Indebted, Poor Countries.

I assess if my main results differ across country types. I make two differentiation of country groups. First, I classify countries by their GDP p.c. level into four income groups as per World Bank definition. Then, I only differentiate by HIPC status. I repeat estimation of Equation (5) and report results in Table B.1. Columns (1)-(4) show results by World Bank income group. Effects do not differ much between income groups of importing countries. This is the case for both the general effect of export credit insurance and the differential effect of export credit insurance during sovereign default. Only exception are low income countries for which I find a strong general effect of export credit insurance but no differential effect during sovereign default periods.[35]

Figure B.1 visualizes the effects in the same manner as in the main body of the paper. Panel (a) shows that marginal effects, expressed as the trade elasticity of export credit insurance, is increasing in sovereign default value for all World Bank country groups with exception of low income countries. Likewise, Panels (b)-(d) show the predicted trade values over sovereign default value and export credit insurance percentiles. These figures reveal in more detail that export credit insurance is especially effective for lower middle and upper middle income countries for which export credit insurance is already at low values able to fully mitigate the negative effects of sovereign default on trade (below the 50th and 75th percentile of the insurance distribution, respectively). Also for high income countries, export credit insurance will be able to offset declining trade as a result of sovereign default but only at high values. For low income countries on the other hand, trade will always decline with increasing levels of sovereign debt in default independent of the level of export credit insurance.

Columns (5)-(8) of Table B.1 report results by HIPC status of the importing country. Again, the general effect of export credit insurance does not differ much between country types but the differential effect during sovereign defaults appears to be only present for non-HIPC countries. As before, Figure B.2 visualizes these results. While the trade elasticity is increasing over sovereign default intensity for both country types (cf. Panel (a)), the differential effects as highlighted by predicted trade values is only present for non-HIPC countries (see Panels (b) and (c)). For HIPC countries trade will always decline at higher levels of sovereign debt in default while for non-HIPC countries these effects are offset for high levels of export credit insurance.

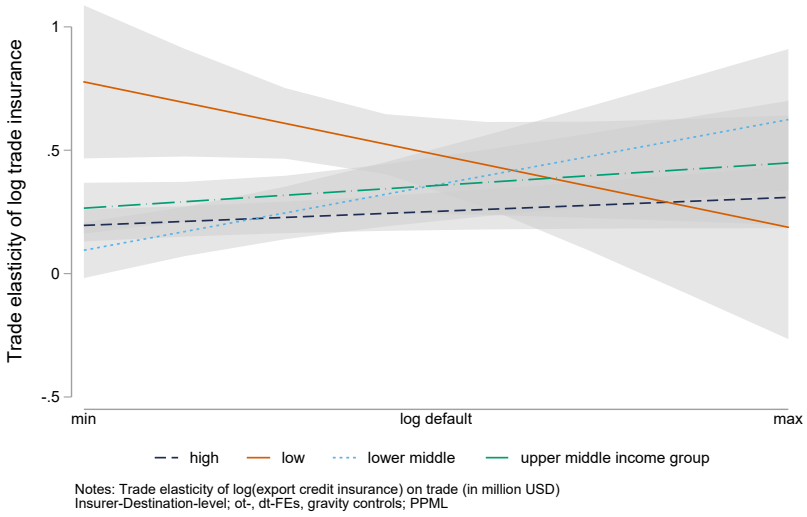
The fact that, in particular, low income and HIPC countries do not experience differential effects of export credit insurance on imports during sovereign defaults may be out of several reasons. Most likely, it is because these countries are of such high risk that even public ECAs are seldom willing to insure export loans to these countries. The findings can also be reconciled with debt restructuring programs for these countries that typically come with covenants that have immediate impact on the real economy.

[35] These results also confirm findings of Felbermayr & Yalcin (2013) for a broader set of export credit insurance agencies.

Table B.1: Split by country groups

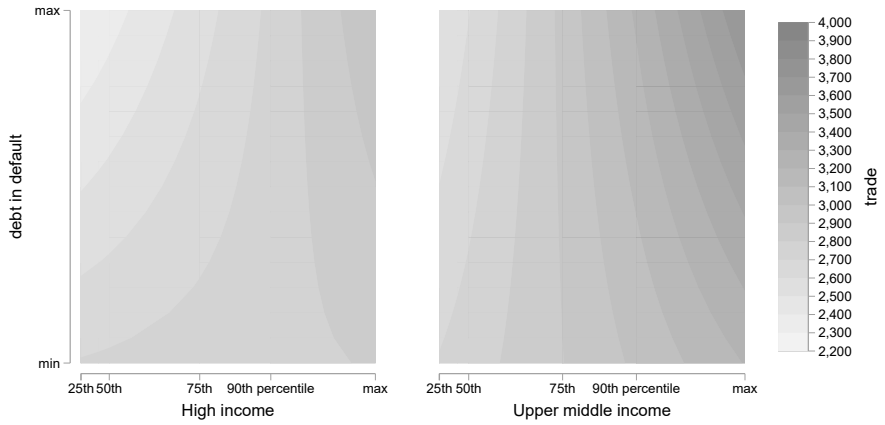
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	WB income groups				HIPC status			
High income × log(total export insurance)	0.085***	-0.006*	0.093***	0.004**				
	(0.018)	(0.004)	(0.016)	(0.002)				
Low income × log(total export insurance)	0.264***	0.028	0.369***	0.019				
	(0.048)	(0.021)	(0.075)	(0.023)				
Lower middle income × log(total export insurance)	0.138***	0.012**	0.045*	0.011**				
	(0.019)	(0.006)	(0.027)	(0.005)				
Upper middle income × log(total export insurance)	0.157***	0.008*	0.126***	0.015***				
	(0.023)	(0.005)	(0.025)	(0.003)				
High income × log(default)$_{dt-1}$ × log(total export insurance)	0.007*	0.001	0.004*	0.001				
	(0.003)	(0.001)	(0.002)	(0.001)				
Low income × log(default)$_{dt-1}$ × log(total export insurance)	-0.003	-0.001	-0.020	-0.002				
	(0.009)	(0.004)	(0.013)	(0.004)				
Lower middle income × log(default)$_{dt-1}$ × log(total export insurance)	0.007**	0.001	0.018***	-0.000				
	(0.003)	(0.001)	(0.006)	(0.001)				
Upper middle income × log(default)$_{dt-1}$ × log(total export insurance)	0.009**	0.002	0.006	0.000				
	(0.004)	(0.001)	(0.005)	(0.001)				
no HIPC × log(total export insurance)					0.105***	-0.001	0.096***	0.006***
					(0.015)	(0.003)	(0.015)	(0.001)
HIPC × log(total export insurance)					0.190***	0.031***	0.121***	0.019**
					(0.025)	(0.009)	(0.024)	(0.007)
no HIPC × log(default)$_{dt-1}$ × log(total export insurance)					0.014***	0.002**	0.008***	0.001
					(0.003)	(0.001)	(0.003)	(0.000)
HIPC × log(default)$_{dt-1}$ × log(total export insurance)					0.004	0.000	0.008	-0.000
					(0.005)	(0.002)	(0.005)	(0.002)
Observations	63889	63377	62999	61995	63930	63416	63040	62022
R^2	0.815	0.978	0.911	0.997	0.815	0.978	0.910	0.997
Origin-destination-pair FE	No	Yes	No	Yes	No	Yes	No	Yes
Origin-year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Destination-year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Estimator	OLS	OLS	PPML	PPML	OLS	OLS	PPML	PPML
Gravity controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Notes: Clustered standard errors in parentheses, * $p < 0.10$, ** $p < .05$, *** $p < .01$. Dependent variable are log(exports), for linear estimations I include zero observations by the hyperbolic sine transformation. For estimations with PPML R^2 denotes the pseudo-R^2. HIPC denotes "heavily indebted, poor countries" as per the corresponding IMF/WB program. Income groups follow the World Bank definition.



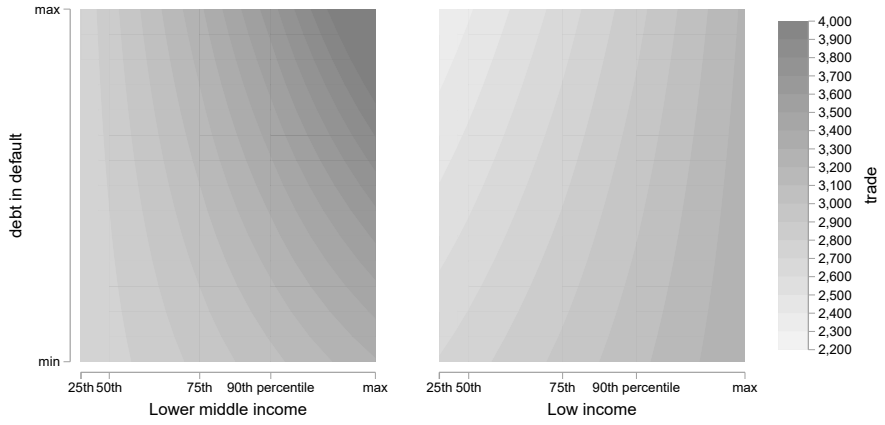
Notes: Trade elasticity of log(export credit insurance) on trade (in million USD)
Insurer-Destination-level; ot-, dt-FEs, gravity controls; PPML

(a) Trade elasticity across default levels by HIPC status



Notes: Predited trade (in million USD) by log(export credit insurance) across log(debt in default)
Insurer-Destination-level; ot-, t-, od-FEs; PPML

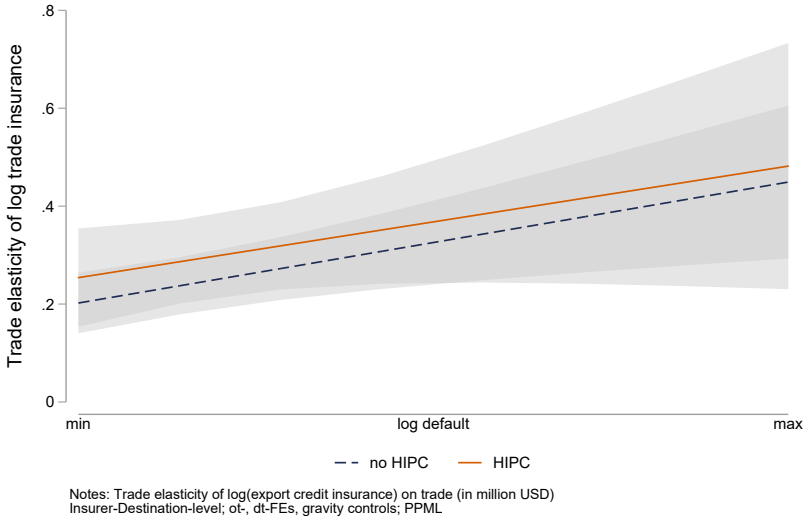
(b) Predicted log trade value across default levels by WB income group



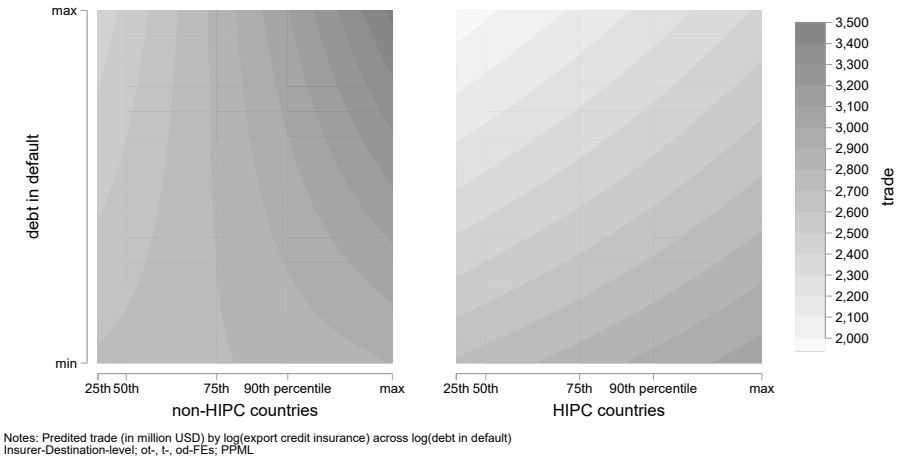
Notes: Predited trade (in million USD) by log(export credit insurance) across log(debt in default)
Insurer-Destination-level; ot-, t-, od-FEs; PPML

(c) Predicted log trade value across default levels by WB income group

Figure B.1: Effects by country income group



(a) Trade elasticity across default levels by HIPC status



(b) Predicted log trade value across default levels by HIPC status

Figure B.2: Effects by country HIPC status

B.2 Currency crisis

As mentioned in the main body of the paper, sovereign default episodes often are concurrent with a currency crisis. Thus, it may be that the devaluation of the domestic currency of the importing country affects changes in trade. To exclude the possibility that this is the channel by which export credit insurance upholds trade during sovereign defaults, I control for changes in the real effective exchange rate (REER). Since I include destination by year fixed effects in all regressions, it is only possible that the effect of export credit insurance works differently by whether the currency de- or appreciates during sovereign defaults. In fact, when I compute changes in the REER, I find a symmetric distribution of appreciating and depreciating currency during sovereign defaults. Thus, the worry that declines in trade are always driven by depreciating exchange rates is not confirmed.

I then estimate

$$\begin{aligned}\ln(exports)_{odt} =& \alpha + \beta_1 default_{dt-1} + \beta_2 \ln(trade\ insurance)_{odt} \\ &+ \beta_3 default_{dt-1} \times \ln(trade\ insurance)_{odt} \\ &+ \beta_4 \ln(trade\ insurance)_{odt} \times \mathbb{1}\{\Delta\text{reer} < 0\}_{dt} \\ &+ \beta_5 default_{dt-1} \times \ln(trade\ insurance)_{odt} \times \mathbb{1}\{\Delta\text{reer} < 0\}_{dt-1} \\ &+ \Gamma + \mathbf{Z'}_{odt}\boldsymbol{\beta} + \varepsilon_{odt},\end{aligned} \tag{B.1}$$

where $\mathbb{1}\{\Delta\text{reer} < 0\}_{dt}$ is an indicator equal to one when the REER of the importing country depreciated between year $t-1$ and year t. Remaining variables are as in the main specifications. Results are presented in Table B.2. I only present results for the variables of interest and for the log value of debt in default. It becomes apparent that changes in the exchange rate do not matter for the effectiveness of export credit insurance on trade in times of sovereign default (see row 4). Interaction effects of the depreciation indicator and export credit insurance are consistently insignificant. Likewise, the triple interaction between depreciation indicator, default value, and export credit insurance is close to zero and statistically insignificant. I thus can exclude that exchange rates or changes thereof are influencing the main results of this paper.

Table B.2: Change in the real effective exchange rate

	(1)	(2)	(3)	(4)
log(total export insurance)	0.117***	0.002	0.099***	0.007***
	(0.014)	(0.003)	(0.015)	(0.001)
$\log(\text{default})_{dt-1} \times \log(\text{total export insurance})$	0.012***	0.002***	0.009***	0.001
	(0.002)	(0.001)	(0.003)	(0.000)
$\mathbb{1}\{\Delta\text{reer} < 0\}_d \times \log(\text{total export insurance})$	-0.016	-0.000	-0.005	-0.001*
	(0.011)	(0.003)	(0.006)	(0.001)
$\mathbb{1}\{\Delta\text{reer} < 0\}_{dt} \times \log(\text{default})_{dt-1} \times \log(\text{total export insurance})$	0.002	-0.000	-0.001	0.000
	(0.002)	(0.001)	(0.002)	(0.000)
Observations	63930	63416	63040	62022
R^2	0.814	0.978	0.910	0.997
Origin-destination-pair FE	No	Yes	No	Yes
Origin-year FE	Yes	Yes	Yes	Yes
Destination-year FE	Yes	Yes	Yes	Yes
Estimator	OLS	OLS	PPML	PPML
Gravity controls	Yes	Yes	Yes	Ye

Standard errors in parentheses
* $p < 0.10$, ** $p < .05$, *** $p < .01$

B.3 Great Recession, Trade Collapse, and Euro Crisis

As final exercise, I control for periods of general distress during which either incidences of sovereign default accumulated or during which financial markets were shaken up and export credit insurance or other risk mitigation tools such as letters of credit were especially effective (Crozet et al. 2022).

I look at the Great Recession of 2007-2009, the Great Trade Collapse in 2009, and the Euro Debt Crisis of 2012-2013. I repeat estimation of Equation (5) where I introduce either two indicator variables for the Great Recession and Trade Collapse years or the Euro Debt Crisis

period. I report results in Table B.3. Columns (1)-(4) report results for Great Recession and Trade Collapse. Since trade only declined substantially in 2009, I identify this year individually. I find that export credit insurance is particularly effective during the Great Recession where financial markets were heavily distorted and access to private credit for firms generally dried out. There, export credit insurance can especially help to overcome the adverse effects on trade of sovereign defaults (see the triple interaction *Great Recession* $\times$ $\log(\textit{default})_{dt-1}$ $\times$ $\log$*(total export insurance)*). However, this effect cannot be confirmed during the trade collapse in 2009 (see the triple interaction *Trade collapse* $\times$ $\log(\textit{default})_{dt-1}$ $\times$ $\log$*(total export insurance)*) for which estimated coefficients can even be negative.

These results are intuitive and can be reconciled with previous studies. Export credit insurance is a tool that helps firms to obtain external financing when the environment is otherwise hostile for bank credit to export transactions (a first adjustment channel within banks to adapt their loan portfolio (Minetti et al. 2022)). Yet, the trade collapse, while triggered by contractions in credit to firms, was amplified through interconnections in Global Value Chains that were largely independent of financial constraints in firms. Thus, export credit insurance is less successful in fostering trade during that period.

Columns (5)-(8) show results for the Euro Crisis differentiation. This has been a period in which several high income countries defaulted on their sovereign debt. One might wonder if export credit insurance works differently for these countries than for countries of low development status where it is more widely applied, generally. I cannot confirm this conjecture. The triple interaction *Euro crisis* $\times$ $\log(\textit{default})_{dt-1}$ $\times$ $\log$*(total export insurance)* does not yield significant results that would indicate any differential effects on top of the amplified effects during sovereign defaults.

In summary, this section alleviates several concerns about effects that would run counter to the main channel discussed and brought forward in the paper.

Table B.3: Great Recession, Trade Collapse, and Euro Crisis

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Great Recession and Trade Collapse				Euro Crisis			
log(total export insurance)	0.107***	0.002	0.098***	0.006***	0.109***	0.001	0.098***	0.006***
	(0.015)	(0.003)	(0.017)	(0.001)	(0.015)	(0.003)	(0.015)	(0.001)
log(default)$_{dt-1}$ × log(total export insurance)	0.013***	0.002***	0.007**	0.001*	0.013***	0.002***	0.009***	0.001
	(0.002)	(0.001)	(0.003)	(0.000)	(0.002)	(0.001)	(0.003)	(0.000)
Trade collapse × log(total export insurance)	0.002	0.003	0.018	0.007***				
	(0.014)	(0.006)	(0.011)	(0.003)				
Trade collapse × log(default)$_{dt-1}$ × log(total export insurance)	-0.001	-0.003*	-0.002	-0.001				
	(0.003)	(0.002)	(0.003)	(0.001)				
Great Recession × log(total export insurance)	0.016	0.002	-0.012	0.000				
	(0.019)	(0.006)	(0.017)	(0.003)				
Great Recession × log(default)$_{dt-1}$ × log(total export insurance)	0.002	0.001	0.007**	-0.000				
	(0.003)	(0.001)	(0.003)	(0.001)				
Euro crisis × log(total export insurance)					0.008	0.005	-0.013	0.002
					(0.013)	(0.005)	(0.009)	(0.002)
Euro crisis × log(default)$_{dt-1}$ × log(total export insurance)					0.003	-0.001	0.001	-0.001
					(0.002)	(0.001)	(0.003)	(0.001)
Observations	63930	63416	63040	62022	63930	63416	63040	62022
R^2	0.814	0.978	0.910	0.997	0.814	0.978	0.910	0.997
Origin-destination-pair FE	No	Yes	No	Yes	No	Yes	No	Yes
Origin-year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Destination-year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Estimator	OLS	OLS	PPML	PPML	OLS	OLS	PPML	PPML
Gravity controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Notes: Clustered standard errors in parentheses, * $p < 0.10$, ** $p < .05$, *** $p < .01$. Dependent variable are log(exports), for linear estimations I include zero observations by the hyperbolic sine transformation. For estimations with PPML R^2 denotes the pseudo-R^2. HIPC denotes "heavily indebted, poor countries" as per the corresponding IMF/WB program. Income groups follow the World Bank definition. Great Recession covers the years 2007-2009, Trade Collapse is in 2009, and Euro Crisis is in 2012, 2013.