

Research Article

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The Role of Export Credit Agencies in Trade Around the Global Financial Crisis: Evidence from G20 Countries

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Abstract: This study investigates the impact of export credit support provided by export credit agencies (ECAs) on exports among G20 countries before, during, and after the 2008 Global Financial Crisis (GFC). Using an augmented gravity model and the autoregressive distributed lag approach, we analyze trade flows across 17 countries over 61 quarters from 2005 to 2020. The findings reveal that export credit support has a significant influence on long-term trade dynamics, with medium-term instruments having a positive impact, while short-term instruments exhibit negative long-term effects. Notably, during the GFC, total insured export credit instruments had a negative long-term impact but a positive short-term effect. These results highlight the critical role of ECAs in managing trade during periods of economic turbulence and stability. Our study contributes to the literature by offering a dynamic understanding of ECA effectiveness under varying economic conditions and provides valuable insights for policy-makers in shaping strategies for ECAs.

Keywords: trade financing, economic downturn, G20 nations, credit support, international trade.

JEL Classification: F13, F34, G01, O24

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1 Introduction

The 2008 Global Financial Crisis (GFC), widely regarded as the most severe economic downturn since the Great Depression of 1929, had profound implications for the world economy (Tooze, 2018). The crisis triggered sharp contractions in real economic activities, e.g., declines across real GDP, industrial production, export growth, and international trade (Hall, 2010; ITC, 2019; OECD, 2020). According to the Keynesian economic theory, such significant economic disruptions require government intervention to stabilize the economy. Thus, governments and central banks worldwide implemented substantial fiscal stimulus packages in response to this unprecedented macroeconomic event (Pentecote & Rondeau, 2015). These measures aimed to support key financial institutions, enhance societal wealth, and mitigate the crisis's negative impacts (Bussiere et al., 2013). Countries more deeply integrated into global financial markets experienced more significant output losses, highlighting the crisis's impact (Blanchard et al., 2010; Cetorelli & Goldberg, 2011; Laeven et al., 2010).

Stimulus packages encompassed a range of economic measures, including tax cuts, infrastructure spending, and employment measures (Khatiwada, 2009). These measures were primarily deployed by G20 countries, which accounted for nearly 90% of global stimulus efforts during the crisis (Ahrens, 2009; Zhang et al., 2009). The fundamental premise underlying stimulus packages is economic recovery through demand stimulation via spending to increase employment rates and sustain business operations (Makin, 1989). A vital component of these responses was the support from export credit agencies (ECAs) to finance trade activities. G20 countries pledged \$250 billion via ECAs and multilateral development banks after the GFC, which denotes the importance of trade finance in economic recovery (Hickie, 2009).

The crisis led to a sharper decline in exports compared to total output, with trade volumes decreasing by 20% in the 12 months from April 2008, while industrial production fell by 12% (Eichengreen & O'Rourke, 2010). In 2009, global trade volume declined by more than 13%, and with an

approximately 11% drop in unit prices, the decrease in the current trade value reached 23% (UNCTAD, 2010). This collapse in international trade was exceptional in historical terms, surpassing the decline observed in previous postwar recessions, except for 2001 (Levchenko *et al.*, 2010). These developments reveal that trade was a primary channel through which the global crisis spread. Indeed, in 2009, the world GDP contracted by 0.6%, and global growth was 5.8% points lower compared to 2007 (IMF, 2010). While the crisis impacted advanced economies more severely, developing countries showed some decoupling from the global economic cycle (Imbs, 2010).

Despite the significant resources allocated to ECAs during the crisis, there is limited comprehensive research on their effectiveness in supporting exports across major economies during this period. This study aims to address this gap by examining the impact of export credit support provided by ECAs on countries' (G20) exports before, during, and after the 2008 GFC.

We analyze trade flows using a dataset covering 17 countries over 61 quarters, from the second quarter of 2005 to the second quarter of 2020, by employing the augmented gravity model of international trade integrating the autoregressive distributed lag (ARDL) model. The findings show that medium- and short-term ECAs' support significantly impacts long-term trade dynamics, displaying both positive and negative effects, respectively, although these effects are not evident in the short term. During the GFC, total insured instruments of ECAs showed a negative long-term impact but a positive short-term effect, a finding consistent with previous research. About 0.25% deviations from the long-term equilibrium are corrected each quarter, illustrating the gradual adjustment process in trade balances.

This research is important for several reasons. Given the crucial role of international trade in the global economy, assessing how export credit instruments – such as insurance and financing provided by ECAs – support exports during major downturns is essential for informed policy-making. The study provides valuable insights for policymakers preparing for future crises by examining ECA's performance during the financial crisis. Moreover, as countries continue to use ECAs as a tool for export promotion, empirical evidence of their effectiveness may inform the design and implementation of these agencies to contribute to more robust trade policies.

Our paper contributes to the existing literature by comprehensively analyzing the impacts of ECA-backed export credit tools across G20 countries. The findings theoretically contribute to the literature on international trade and economic recovery by explaining how different nations' export capabilities and financial systems adjust in the face of global economic fluctuations. Examining the

impacts of crisis and stable periods allows for a dynamic understanding of ECA effectiveness under different economic conditions. Since ECAs' support mechanisms affected trade during the financial crisis, the analysis of the 2008 period shows the critical role of ECAs in crisis mitigation. Another contribution of this study is to offer a unique feature of the traditional Gravity Model's distance variable – i.e., the average trade route distance between the most populated city in the home country and the most populated cities in partner countries is measured in hours.

The remainder of this study is organized as follows: Section 2 reviews the literature on stimulus packages, financial challenges, exporter support during crises, and the role of ECAs. Section 3 outlines the methodology employed. Section 4 reports and interprets the empirical results. Finally, Section 5 concludes and suggests directions for future research.

2 Literature Review

2.1 Stimulus Packages and Global Trade

Following the 2008 GFC, various countries implemented stimulus packages to mitigate the economic downturn. The rapid escalation of the crisis verified the strong ties of globalization. The scale of this crisis is beyond estimation, and Eichengreen and O'Rourke (2010) compared it to the Great Depression regarding the volume of world trade. Many countries announced massive stimulus measures during the GFC, with global stimulus spending estimated at between 1.7 and 2% of the world's GDP (Khatiwada, 2009). The United States, China, and Japan accounted for 62% of the total stimulus packages implemented in 2009 (ILO, 2011).

During the crisis, G20 nations, representing over 75% of world GDP and 62% of world trade, intervened in markets and trade to a certain extent by implementing national economic stimulus programs. The total stimulus amount provided by G20 countries in 2009 was approximately \$692 billion, equivalent to around 1.4% of their combined GDP. Of this total, 39% was contributed by the United States, 13% by China, and 10% by Japan. The composition and speed of implementing these stimulus packages varied across countries – some focused on tax cuts, while others prioritized increased government spending (Prasad & Sorkin, 2009). Specifically, at the national level, many countries aimed to stimulate their economies through large-scale measures such as infrastructure investments, increased public spending, and

strengthened social welfare. In contrast, at the financial sector and corporate levels, efforts included bank recapitalization, provision of guarantees, corporate restructuring, support for SMEs, and subsidies to preserve employment (Lin et al., 2014). The crisis affected international trade through supply and demand channels, with GDP growth in destination countries being a crucial determinant of export and import demands (Behrens et al., 2013). In response, the G20 pledged \$250 billion to support trade finance through ECAs and multilateral development banks (G20 London Summit, 2009). According to IMF analyses, corporate profitability in both advanced and emerging economies increased significantly following the fiscal stimulus measures implemented in the aftermath of the GFC (Correa-Caro et al., 2018).

2.2 Financial Challenges and Support for Exporters in Crises

Participation in export markets improves the financial health of firms (Greenaway et al., 2007). However, exporters are more reliant on short-term financial liabilities due to higher variable costs, risks, working capital requirements, and sunk costs compared to non-exporters (Maes et al., 2019; Mansilla-Fernández & Milgram-Baleix, 2023; Melitz, 2003). Consequently, any liquidity constraints fundamentally alter exporters' behaviors and may limit or even prevent some firms' ability to export (Chaney, 2016; Manova et al., 2015). This effect was also evident during the GFC. For instance, Maes et al. (2019) suggested that "The strong reliance of exporting firms on short-term (asset-backed) funds to refinance their export activities may serve as an explanation for a trade collapse during credit crunches or in periods of low profitability." Moreover, Chor and Manova (2012) demonstrated that countries with higher credit costs and tighter credit conditions exported less to the United States during the financial crisis.

During the crisis, surveys by the IMF and other organizations indicated that bank-intermediated trade finance declined in value, though not as sharply as merchandise trade (Asmundson et al., 2011). Despite the recognized importance of exports and the vulnerability of exporters, interest in international trade finance was very limited until the 2008–2009 crisis (Auboin & Engemann, 2012). Trade finance is often characterized as both a facilitator of trade and a shock absorber (Irwin & O'Rourke, 2013; WTO, 2016). Inekwe et al. (2018) found that financial distress among US businesses led to a 14% decline in exports, an 11% reduction in investment, and a 9% decrease in GDP growth.

During periods of financial difficulty for exporters, providing financial support for these companies, which act as catalysts of national economies, becomes crucial. Indeed, export-promotion institutions tend to adjust their support based on local and global economic conditions, offering more aid during recessions and less during strong economic growth (Pýcha, 2022). According to the Organization for Economic Cooperation and Development, government institutions or private companies acting on behalf of governments provide officially supported export credits to national exporters. This support includes direct credits to foreign buyers, refinancing, interest-rate support, and insurance or guarantees for credits from private financial institutions, facilitating competition in international markets (OECD, 2024).

2.3 ECAs: Institutional and Financial Structures and Empirical Studies

No uniform structure characterizes ECAs globally since their operational scopes and services vary considerably. Some ECAs restrict their services to providing insurance or guarantees, while others extend their offerings to include loans. In some cases, they provide both services. These agencies are often categorized as either insurers or Eximbanks, depending on their primary functions. Regarding insurance coverage, some agencies specialize exclusively in export credit insurance or investment insurance, whereas the more substantial agencies typically provide both. Furthermore, while some ECAs focus primarily on insuring against political risks, others concentrate on commercial risks, although it is common for larger agencies to manage both risk categories (Stephens, 1999).

Since 1978, the OECD's Arrangement on Guidelines for Officially Supported Export Credits has regulated ECAs to promote fair competition in the export credit sector, although it is not legally binding. The Competitiveness Report (Export-Import Bank of the United States, 2019) revealed that only 34% of all export credits adhere to this OECD Consensus globally. Competing ECAs from various countries strive to offer their exporters the most favorable conditions possible, suggesting that competition among ECAs could be a reason for the weak adherence to the Consensus. However, Agarwal and Wang (2018) found no evidence that financing provided by ECAs of competing countries increased competition in the global market for US exporters. They also claimed that their findings were not influenced by whether the competing countries were members of the OECD Consensus or received EXIM support. Moreover, Dawar (2020)

argued that the current economic slowdown in export growth and the uncontrollable rise in export credit support programs, especially among developed country ECAs, urgently require increased cooperation.

The legal structure, capital source, and risk management frameworks of ECAs are critical to their long-term sustainability. Global best practices recommend that these institutions be structured as agencies under public law and operate independently without relying on government subsidies (Klasen & Janus, 2023). Indeed, most ECAs are either state-owned or under government control. However, their governance structures vary significantly across countries (Pýcha, 2022). Many ECAs face challenges in balancing their mandate to serve government policies with the pressures of operating like a bank, as shifting toward a profit-driven structure risks overlooking their social mission (Groth, 2019).

While ECAs are typically funded through the state budget or receive capital support from the government, some also possess additional capital mechanisms. However, in some countries, operating ECAs at a loss by offering low premium rates to provide exporters with more favorable financing poses a risk regarding the effective and responsible use of public resources (Klasen & Janus, 2023).

Regulations introduced particularly after the GFC have led commercial banks to adopt a more cautious approach toward international lending, thereby increasing the role of ECAs in export financing. Traditionally acting as “lenders of last resort,” ECAs have become more proactive, expanding their financing programs and stepping into roles once dominated by private-sector lenders (Congressional Research Service, 2019). However, since the OECD Arrangement does not cover non-member countries such as China, Brazil, and India, these nations are able to offer financing below market terms. This creates competitive challenges for ECAs in OECD member countries and raises concerns about the overall effectiveness and fairness of the arrangement (Ilias, 2012).

According to recent studies, many countries have increasingly favored the independent public agency model for their ECAs due to its greater flexibility and customer-oriented approach in terms of institutional structure. However, the financial empowerment frameworks of these agencies vary depending on the country’s economic size and export volume (SERV, 2020). Nevertheless, the number of underperforming ECAs remains significant and cannot be overlooked (Yazdi *et al.*, 2019).

Numerous studies support the positive impact of ECAs on countries’ and firms’ exports. Moser *et al.* (2008) conducted a study covering the period from 1991 to 2003 in Germany and documented that public export guarantees had a statistically significant positive impact on exports

(Blackmon, 2016). Badinger and Url (2013) investigated Austrian exporting firms and found that export credit guarantees significantly influenced trade among these entities. Similarly, Choi and Kim (2021) observed in South Korea that short-term export credit insurance mitigated financial constraints for firms, consequently enhancing exports. This effect was notably more pronounced in exports originating from developing countries or smaller firms. In a noteworthy study from a developing country context, Polat and Yeşilyaprak (2017) analyzed Türkiye’s exports to 212 destinations, revealing that a 1% increase in export credit insurance led to a rise in Türkiye’s exports by between 3 and 17%. These findings emphasize the pivotal role of ECAs in bolstering national export volumes. Moreover, they highlight how ECAs can significantly enhance the competitive position of countries on the global stage by demonstrating their importance in international trade dynamics.

It is difficult to assert that ECA facilities positively impact exports, employment, growth, and global welfare. Indeed, Soh (2014) reported that while ECA-backed export credit support positively impacts exports in the long term, its presence in a country does not correlate with higher economic growth or improved employment rates. In contrast, Egger and Url (2006) found that export credit guarantees provided by Austria’s ECA had a significant, albeit modest, short-term effect on exports. Janda *et al.* (2010), in their study on the Czech Export Bank, showed that the credit support provided by the bank had a positive but statistically weak effect on exports. Hur and Yoon (2024), in their study covering South Korean firms for the 2006–2015 period, found that while both export credit and insurance increased exports, only credit support positively affected employment growth. Additionally, concerns have been raised that ECA credits may distort fair competition in international trade, support environmentally harmful activities, and potentially contribute to human rights violations (Darbellay, 2021; Dawar, 2020; Kim, 2020; Linder, 2019; Shearing, 2013).

Studies examining the impact of ECAs during crises between the 1990s and the first decade of the 2000s are almost nonexistent. Because in the 1990s, government-backed ECAs largely withdrew their credit provisions as the private sector began to offer short-term guarantees (Blackmon, 2016). However, private banks rapidly reduced short-term export credit facilities during the GFC. As a result, following the decline in international demand, the contraction in trade finance became the second most significant factor behind the slowdown in global trade (Mora & Powers, 2009). Indeed, in the fourth quarter of 2008, medium- and long-term trade finance transactions declined by approximately 40% (Chauffour *et al.*, 2010). Thus, during the crisis, ECAs proved to be a vital component in “greasing the wheels” of international trade (Blackmon, 2016).

Some of the ECA-related studies focusing on the GFC period are as follows: Utilizing the 2008 Financial Crisis as a dummy variable, Köksal and Genç (2019) reported that in 22 high-income countries, export credit insurance notably increased exports, with a significant impact observed for medium to long-term insurance policies. During the GFC, Felbermayr and Yalcin (2013) found that such a crisis mitigated the decline in German exports. Auboin and Engemann (2014), utilizing data from 91 countries between 2005 and 2011, found that insured commercial credits from ECAs had a strong positive impact on trade in both crisis and non-crisis periods.

A general literature review shows that although ECA-backed financing typically produces positive outcomes at both national and global levels, it also yields weak results for certain macroeconomic variables in some countries. Several prior studies have explored the role of ECAs during periods surrounding the GFC. However, existing studies are either geographically limited or differ from the present study's design. For instance, Moser et al. (2008) and Felbermayr and Yalcin (2013) focus exclusively on Germany. Auboin and Engemann (2014), whose timeframe is more comparable, analyze the period from 2005 to 2011 to examine trade dynamics before, during, and after the crisis. However, their approach differs in two ways: they use an unbalanced panel covering 91 countries and adopt an import-oriented perspective. In contrast, the current study focuses on the G20 countries, which collectively account for approximately 85% of global GDP, 75% of international trade, and two-thirds of the world's population. Moreover, we adopt an export-oriented lens, offering a more targeted and policy-relevant contribution to the literature. This distinction positions our study to fill a clear gap in existing research – namely, the lack of a systematic, comparative analysis of ECA impacts on exports across critical crisis periods within the world's most influential economies. In addition, the study can also be seen as a reflection of the Keynesian approach to financial markets, which aims to compensate for market failures and stimulate aggregate demand during extraordinary times.

3 Research Methodology

3.1 Data Nature and Source

We briefly describe the dataset before moving on to the econometric analysis – to reveal the direct insurance or lending impact of ECAs on the export of G20 countries during the GFC. The sample dataset contains 17 countries (excluding

Saudi Arabia and Indonesia due to missing variables) and spans from 2005:Q2 to 2020:Q2. All variables, except GFC, are transformed into natural logarithmic form to provide reliable and consistent estimates (Table 1). This transformation addresses issues such as heteroscedasticity or non-linearity. Economic and financial data, particularly those related to trade flows, GDP, and exchange rates, often exhibit heteroscedasticity, where the variance of the error terms increases with the magnitude of the variables (Lütkepohl & Xu, 2012). Box et al. (2015) discussed the log transformation as a means to stabilize the residual variance, leading to a more adequate model for forecasting. A potential drawback of using log transformations is that they are undefined for zero or negative values. To mitigate this issue, we carefully examined our dataset and ensured that none of the variables used in the regression analysis contained such problematic values.

3.2 Econometric Model

Currently, one of the cornerstones of empirical trade theory is the gravity equation. Formulated by Jan Tinbergen in 1962, the theory connects the volume of trade between countries to their economic size, geographical distance, and relative trade barriers. Its theoretical foundations were extended by Anderson (1979) and further developed through subsequent contributions by Bergstrand (1985, 1989) and Deardorff (1998). The basic gravity model of Tinbergen (1962) is defined as

$$\ln(\text{Exp}_{ij}) = \beta_0 + \beta_1 \ln(\text{GDP}_i) + \beta_2 \ln(\text{GDP}_j) + \beta_3 \ln(\text{Dist}_{ij}) + \varepsilon_{ij}, \quad (1)$$

where GDP and distance between countries determine the export of i to j , and ε_{ij} refers to the stochastic error term in the model. We measure the distance based on trade routes between the most populous cities of countries, such as New York instead of Washington for the United States, or Istanbul instead of Ankara for Türkiye. Generally, the traditional gravity model considers the distance the airline measures; however, nearly 80% of international trade in goods is carried by sea (UNCTAD, 2022). For this reason, as in the paper of Simdi and Unal (2022), the study uses the distance of the SEARATES platform (SEARATES, 2024) because it provides the total trade route time between cities in hours. The trade route (by taking sea routes and road distances in terms of hours) provides a more precise assessment of the impact of distance on exports. Most traditional gravity models rely on physical linear distance. Consistent with these models, the expected effect of distance remains negative. However, our study aims to enhance awareness regarding the accurate

Table 1: Description of variables and sources

Variable	Description	Source
LNEXPM	Export of country in the related quarter of year t (US\$ million)	Trade Map
LNDIST	The average trade route distance between the most crowded city of the country and the most crowded city of the partner countries in hours	SeaRates
LNGDPU	The gross domestic product per capita of the country in the related quarter of year t (Constant 2010 US\$)	World Bank
LNGDPP	The average gross domestic product per capita of partner countries in the related quarter of year t (Constant 2010 US\$)	World Bank
LNREEXC	Real effective exchange rate, based on the consumer price index in the related quarter of year t	IMF
LNSTECA	Short-term insured export credit exposures (direct insurance or lending) of the export credit agency of the country in the related quarter of year t (US\$ million)	World Bank – Berne Union
LNMLTECA	Medium-term insured export credit exposures (direct insurance or lending) of the export credit agency of the country in the related quarter of year t (US\$ million)	World Bank – Berne Union
TOTECA	Total insured export credit exposures (direct insurance or lending) of the export credit agency of the country in the related quarter of year t (US\$ million)	World Bank – Berne Union
GFC	Dummy variable of GFC, it takes 1 between 2007: Q3 and 2009: Q1*, otherwise zero.	NA

Source: Authors.

*Reserve Bank of Australia notes that the GFC was a period of extreme stress in global financial markets and banking systems between mid-2007 and early 2009. LNEXPM, LNGDPU, LNGDPP, LNSTECA, LNMLTECA, TOTECA (in US\$ million).

measurement of trade routes by incorporating travel time as a distance variable. The GDP and distance variables of our gravity model are calculated by considering the export shares of partner countries. For example, the total export of Germany in 2020Q4 is \$387 billion, and the export share of the top 20 trade partners equals 79%, equaling 100% for each to calculate the “GDP” variable. The same method has been applied for the “Distance” variable (Table 2).

Therefore, the partner country GDP variable for Germany 2020:Q4 is as follows:

$= 11.1\% \times \text{GDP of USA in 2020Q4} + 10.5\% \times \text{GDP of China in 2020Q4} + 9.4\% \times \text{GDP of France in 2020Q4} + \dots$

The study considered the same calculation method for the distance variable as used for Germany 2020:Q4:

$= 11.1\% \times \text{Trade distance between Berlin and New York} + 10.5\% \times \text{Trade distance between Berlin and Shanghai} + 9.4\% \times \text{Trade distance between Berlin and Paris} + \dots$

Complying with the objective of this study, the basic gravity model is augmented with more variables to increase the explanatory power of the regression and is expressed as follows:

$$\begin{aligned} \ln \text{Expm} = & \beta_0 + \beta_1 \text{GFC} + \beta_2 \text{GFCTOTECA} + \beta_3 \ln \text{GDPP} \\ & + \beta_4 \ln \text{GDPU} + \beta_5 \ln \text{MLTECA} + \beta_6 \text{ELn REEXC} \\ & + \beta_7 \ln \text{STECA} + \beta_8 \ln \text{DIS} + \epsilon. \end{aligned} \quad (2)$$

The augmented gravity of the model includes REEXC, GFC, and export credit exposures to explain exports. Changes in exchange rates have been used as an explanatory variable in augmented gravity models (Egger, 2002; Egger &

Pfaffermayr, 2003; Martinez-Zarzoso & Nowak-Lehmann, 2003). An increase in REEXC means the domestic currency is appreciating, which is expected to reduce exports.

The study employs Phillips–Perron (PP) and Harris Tzavalis unit root tests to prevent spurious results, confirming that the variables are either stationary at levels

Table 2: Calculation of partner countries’ weight in export for Germany (2020Q4)

Country	Export share (%)	Weight in calculation
USA	8.8	11.1
China	8.4	10.5
France	7.4	9.4
Netherlands	6.3	7.9
Poland	5.5	7
UK	5.5	6.9
Italy	5.1	6.4
Austria	4.7	6
Switzerland	4.4	5.5
Belgium	3.6	4.6
Czechia	3.3	4.1
Spain	3.2	4
Hungary	2	2.6
Sweden	2	2.5
Türkiye	1.9	2.4
Russia	1.8	2.3
Denmark	1.5	1.9
Japan	1.4	1.8
Korea, Rep.	1.4	1.7
Romania	1.3	1.7

Source: Authors.

($I(0)$) or after first differencing ($I(1)$) (Table A3). Since the sample variables are stationary at $I(0)$ and $I(1)$, we intend to incorporate the ARDL method into the augmented gravity model. Because it is a well-established framework in trade analysis and allows us to integrate key variables relevant to our study – such as ECA support, REER, and the GFC dummy – to better explain export performance during crisis and non-crisis periods. This approach was initially proposed by Charemza and Deadman (1997) and further developed and advocated by Pesaran et al. (1999, 2001) due to its multifaceted advantages, including suitability for small sample sizes, flexibility in accommodating variables integrated of order zero [$I(0)$] and one [$I(1)$], and the ability to specify different lag lengths for different variables (Ali et al., 2017; Rahman & Kashem, 2017).

Based on the ARDL framework, this study constructs an unconstrained error correction model that articulates both long-term and short-term dynamics among the sample variables. To justify it, the Kao Residual Cointegration Test is performed, which confirms the presence of a long-term equilibrium relationship (ADF t -statistic = -7.724326 , P -value = 0.0000). This supports the validity of estimating both long-run coefficients and the error correction term using the Panel ARDL framework. The ARDL equation is formulated as follows:

$$\begin{aligned} \Delta \ln(\text{Exp}_{it}) &= \alpha_i + \phi [\ln(\text{Exp}_{i,t-1}) - \beta_1 \ln(\text{GDPP}_{i,t-1}) \\ &\quad - \beta_2 \ln(\text{GDP}_{i,t-1}) - \beta_3 \ln(\text{MLTECA}_{i,t-1}) \\ &\quad - \beta_4 \ln(\text{REEX}_{i,t-1}) - \beta_5 \ln(\text{STECA}_{i,t-1}) \\ &\quad - \beta_6 \ln(\text{DIS}_{i,t-1}) - \beta_7 \text{GFC}_{t-1} - \beta_8 \text{GFCOTTECA}_{t-1}] \\ &\quad + \sum_{j=1}^p \gamma_{1j} \Delta \ln(\text{Exp}_{i,t-j}) + \sum_{j=1}^p \gamma_{2j} \Delta \ln(\text{GDPP}_{i,t-j}) \\ &\quad + \sum_{j=1}^p \gamma_{3j} \Delta \ln(\text{GDP}_{i,t-j}) + \sum_{j=1}^p \gamma_{4j} \Delta \ln(\text{MLTECA}_{i,t-j}) \\ &\quad + \sum_{j=1}^p \gamma_{5j} \Delta \ln(\text{REEX}_{i,t-j}) + \sum_{j=1}^p \gamma_{6j} \Delta \ln(\text{STECA}_{i,t-j}) \\ &\quad + \sum_{j=1}^p \gamma_{7j} \Delta \ln(\text{DIS}_{i,t-j}) + \sum_{j=1}^p \gamma_{8j} \Delta \text{GFC}_{t-j} \\ &\quad + \sum_{j=1}^p \gamma_{9j} \Delta \text{GFCOTTECA}_{t-j} + \varepsilon_{it}, \end{aligned} \quad (3)$$

where ε_{it} represents the error term assumed to be white noise, Δ denotes the first-order difference operator, and p is the number of lags. The terms in parentheses represent the long-run equilibrium relationship, and the coefficient ϕ is the error correction term, which captures the speed at which the system returns to equilibrium after a shock. The coefficients $\beta_1, \beta_2, \dots, \beta_8$ are the long-run coefficients of

the explanatory variables. The coefficients γ_{ij} (for $i = 1, \dots, 9$, $j = 1, \dots, p$) represent the short-run dynamic effects of changes in the explanatory variables over the lag structure.

3.3 Variables and Model Justification

In this study, the standard gravity model structure is not considered due to specific concerns around the endogeneity of insured trade credits as an explanatory variable (Auboin & Engemann, 2014). This potential source of endogeneity arises from trade credits and trade flows may be determined simultaneously – higher trade volumes could increase demand for trade finance, and higher availability of trade finance could increase trade flows.

Our analysis differs from the standard gravity model approach because of the nature of the sample data. While traditional gravity models usually focus on bilateral trade flows, we considered aggregated short-term insured trade credit data from exporting countries. To account for these data restrictions and better tackle the endogeneity issues stemming from trade finance, this study relies on a modified version of the classical import estimation equation, using trade credit insurance as an additional explanatory variable following Brandi and Schmitz (2015).

In addition, as this study only uses the total amount of export credit instruments provided by ECAs in the exporting country rather than data specific to each bilateral trade flow, the econometric model considers the total exports from the home country as the dependent variable (Auboin & Engemann, 2014). This enables the research to account for the aggregate effects of ECAs providing export finance through support of export performance without breaching data availability restrictions or presenting additional endogeneity concerns related to bilateral trade inconsistencies.

We employed the automatic lag order selection feature to justify the model selection, which selects the best-fitting model based on the Akaike information criterion (AIC). This approach ensures optimal model specification by choosing the lowest AIC score, resulting in the ARDL (4, 4, 4, 4, 4, 4, 4, 4, 4) model. The ARDL framework's ability to estimate both short-run and long-run relationships simultaneously makes it ideal for examining the dynamic impact of ECAs on exports before, during, and after the GFC. Additionally, the study verified that all variables were appropriately tested to avoid including $I(2)$ variables. The appropriate modification of ARDL model orders is sufficient to tackle serial correlation and regression endogeneity problems (Gemmell et al., 2016; Kanas & Kouretas,

2005). An ARDL model with sufficient lags addresses the endogeneity problem, provided that the regressors are not cointegrated among themselves and the primary focus is on the long-run parameters (Pesaran *et al.*, 1999).

4 Results and Discussion

4.1 Results

4.1.1 Descriptive Statistics

The descriptive statistics summary of the variables is presented in Table 3, which shows data from 17 countries for 61 quarters between 2005:Q2 and 2020:Q2, and contains 1,037 observations.

Table 3 shows differences across variables regarding dispersion and distribution shape, which are critical for subsequent econometric modeling. The mean and median values indicate that while export performance exhibits a relatively symmetric distribution, GFC and GFCTOTECA display pronounced right-skewness. Particularly, GFCTOTECA evinces not only extreme positive kurtosis and significant skewness but also a substantial difference between the mean and median, indicating a distribution heavily influenced by outliers. Variables such as LNMLTECA and LNSTECA show moderate variability and standard deviations close to unity, which denotes more stability. However, their kurtosis and skewness values, though less extreme than those of GFCTOTECA or GFC, still deviate from the normal distribution – the likelihood of the presence of outliers or data asymmetry. Because of the diverse

distributional behavior of the dataset, this research considers logarithmic transformations of the dataset. Besides, it employs an ARDL model, which effectively handles these non-normal characteristics through its flexible lag structure to address them for more accurate econometric analysis. In this study, understanding skewness and kurtosis is essential because the ARDL model assumes that errors are normally distributed, especially when making statistical inferences and constructing confidence intervals.

4.1.2 Correlation Matrix

The correlation matrix supports decision-making by quantifying and visualizing the linear relationships among multiple variables. Table 4 presents the degree of relationship between the sample variables in this study.

Table 4 demonstrates relationships among economic indicators that merit a comprehensive evaluation. A strong positive correlation is observed between exports and GDP (home) (0.897) – suggesting that higher GDP is associated with improved export performance, and vice versa. A similar pattern is also seen between export and short-term insured export credit exposures (direct insurance or lending) (0.786); however, the export performance shows an opposite linkage with medium-term insured export credit exposures (direct insurance or lending) (−0.035), as well as with distance (−0.180). Notably, the connection of short-term insured export credit exposures (direct insurance or lending) is positively correlated with GDP (home) (0.783) and negatively with distance (−0.325). The strong correlation between GFC and GFCTOTECA (0.825) indicates that during periods of financial crisis, total

Table 3: Descriptive statistics of variables

Particulars	1	2	3	4	5	6	7	8	9
MEA	25.240	0.164	6.396	23.760	23.090	4.550	27.989	5.772	26.884
MED	25.363	0.000	0.000	23.662	23.243	4.574	27.919	5.867	26.843
STD	0.937	0.370	17.516	0.917	0.958	0.147	0.508	0.443	0.966
SMV	0.877	0.137	306.803	0.840	0.918	0.022	0.258	0.196	0.933
KUR	−0.430	1.308	10.787	−0.157	0.707	1.464	−0.371	−0.817	0.258
SKW	−0.170	1.818	3.226	−0.217	−0.866	−0.793	0.370	−0.465	0.326
RAN	4.223	1.000	104.890	5.636	5.479	0.929	2.455	1.793	4.687
MIN	23.011	0.000	0.000	20.341	19.489	3.951	26.718	4.747	24.635
MAX	27.234	1.000	104.890	25.976	24.968	4.881	29.173	6.540	29.322
Count	1,037	1,037	1,037	1,037	1,037	1,037	1,037	1,037	1,037

Note: Mean (MEA), median (MED), standard error (STE), standard deviation (STD), sample variance (SMV), kurtosis (KUR), skewness (SKW), range (RAN), minimum (MIN), maximum (MAX). LNEXPM = 1, GFC = 2, GFCTOTECA = 3, LNSTECA = 4, LNMLTECA = 5, LNREXC = 6, LNGDPP = 7, LNDIS = 8, LNGDPU = 9. Source: Authors.

Table 4: Correlation matrix

Particulars	1	2	3	4	5	6	7	8	9
LNEXPM	1.000								
GFC	-0.053	1.000							
GFCTOTECA	0.113	0.825	1.000						
LNSTECA	0.786	-0.061	0.145	1.000					
LNMLTECA	-0.035	-0.104	-0.033	0.042	1.000				
LNREEXC	0.409	0.106	0.143	0.264	0.005	1.000			
LNGDPP	0.029	-0.172	-0.243	-0.133	-0.072	-0.210	1.000		
LNDIS	-0.180	-0.035	-0.100	-0.325	0.287	-0.177	0.058	1.000	
LNGDPU	0.897	-0.051	0.128	0.783	0.065	0.369	-0.124	-0.056	1.000

Note: LNEXPM = 1, GFC = 2, GFCTOTECA = 3, LNSTECA = 4, LNMLTECA = 5, LNREEXC = 6, LNGDPP = 7, LNDIS = 8, LNGDPU = 9.

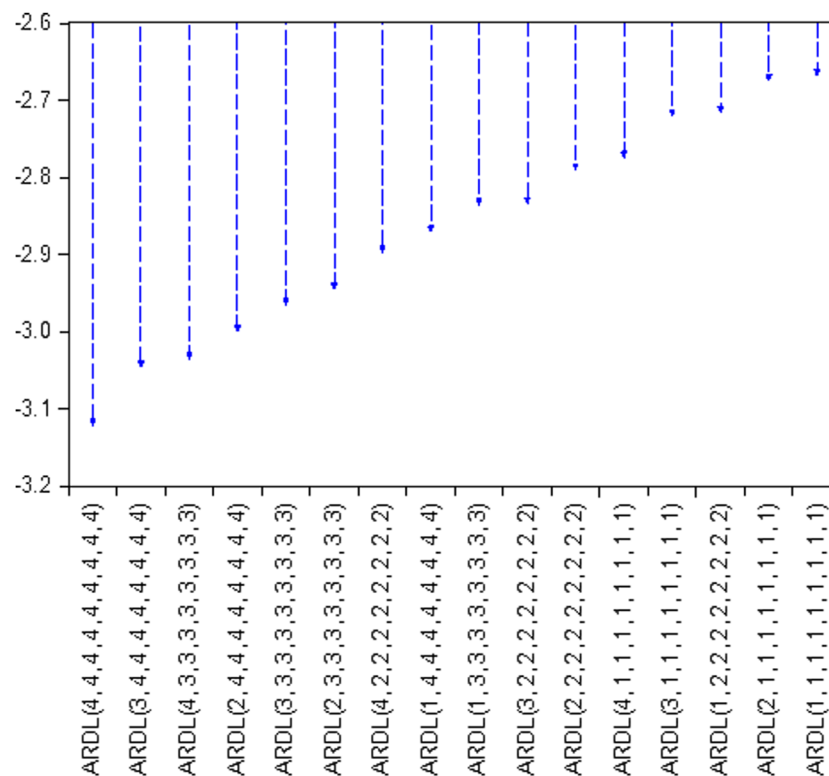
Source: Authors.

insured export credit exposures increased significantly – supporting the inclusion of GFCTOTECA as an interaction term to capture the crisis-specific effects better.

4.1.3 Model Selection Summary

Figure 1 reports the AIC scores for various specifications of an ARDL model. The x -axis represents unique model configurations, numbered from 1 to 16, while the y -axis shows

the corresponding AIC scores, where lower scores indicate a model that effectively balances goodness of fit with simplicity to prevent overfitting. The model with the lowest AIC score (Model 16; ARDL [4, 4, 4, 4, 4, 4, 4, 4, 4]) is the most preferred due to its optimal trade-off between model complexity and fitting accuracy. This is especially relevant due to small to moderate-sized samples of the study, where AIC offers superior predictive accuracy compared to other criteria like BIC, which heavily penalizes models with a larger number of parameters (Burnham & Anderson, 2004).

**Figure 1:** Model selection criteria. Source: Authors.

Unlike BIC, which emphasizes parsimony, AIC focuses more on minimizing information loss, making it more suitable for accurately capturing the dynamic relationships among variables. The highest log likelihood score of 2,146.674432 demonstrates the best data fit among the considered models. Given the parameter estimates, this score also indicates that the model has the most significant probability of generating the observed data. Its superior AIC value of -3.115943 indicates an efficient balance between model accuracy and simplicity (Table A1).

While AIC is prioritized, the model's BIC (0.089610) and HQ (-1.895749) scores are also relatively low, suggesting that the model is not overfitted and remains robust even when penalizing for complexity.

4.1.4 Long- and Short-Term Coefficient Estimation

In applying the ARDL model, the appropriate lag order for the variables is crucial for the accurate estimation of both long-term and short-term coefficients. Given the sample size, the AIC was employed to determine the optimal lag order. The model's coefficients were then estimated with the lag order set at four (4).

Table 5 shows the findings of long- and short-run equations for the ARDL model. In the long-term equation, all independent variables, except the distance (LNDIS), impact (P -value < 0.05) export performance separately. In this model, diverse relationships are observed – i.e., the relationships between ECAs and exports differ depending on the type of ECA support (short-term vs. medium-term) and the analysis period (pre-crisis, during-crisis, and post-crisis). For example, GFC, LNSTECA, and GDPU (home) positively affect export performance, whereas GFCTOTECA, LNMLTECA, GDP (partner), and LNREEXC show an opposite connection with exports. Considering the objective of this study, a 1% increase in short-term insured export credit exposure (LNSTECA) leads to an approximate 0.12% rise in exports across the sample countries; however, the opposite is observed for the medium-term insured export credit exposures (LNMLTECA). If LNMLTECA rises by 1%, export of the sample countries falls by 0.016%, considering other variables fixed. Notably, the LNGDPU emerges as the most influential positive factor, whereas the LNREEXC shows a substantial negative impact.

This interpretation follows standard econometric practice for log–log models – i.e., models in which the dependent and independent variables are expressed in natural logs – where coefficients are interpreted as elasticities (Wooldridge, 2013). The choice of a 1% change is a standard benchmark for interpretation since it provides a

straightforward, unit-free measure of elasticity that is easily comparable across studies. In practical terms, this finding suggests that enhancing short-term ECA support positively correlates with export growth over time, indicating its effectiveness in promoting trade stability and growth. The use of ECAs becomes particularly relevant during economic disruptions, such as the GFC, where trade finance plays a crucial role in mitigating adverse economic impacts.

In the short run, the adjustment mechanisms to deviations from long-term equilibrium are evident through the COINTEQ01 term, which indicates a significant correction process – how quickly the variables converge to long-run equilibrium. A significant and negative coefficient for COINTEQ01 confirms a stable long-term relationship among the variables, indicating that deviations from equilibrium are corrected over time (Pesaran *et al.*, 2001). In our model, the coefficient of COINTEQ01 is negative and statistically significant, suggesting that when exports deviate from their long-term equilibrium due to changes in explanatory variables (e.g., ECAs, GDP, REER), adjustments occur in subsequent periods to restore equilibrium. The significance of individual short-term coefficients reveals the immediate or transitory effects of changes in explanatory variables on exports. The statistical

Table 5: Results of long- and short-term coefficients of ARDL-ECM

Variable	Coefficient	Std. error	t-Statistic	P-value
Long-run equation				
GFC	0.042847	0.020550	2.085053	0.0377
LNFGCTOTECA	−0.002265	0.000409	−5.535563	0.0000
LNMLTECA	−0.015513	0.005681	−2.730569	0.0066
LNSTECA	0.119998	0.019356	6.199571	0.0000
LNGDPP	−0.251820	0.038292	−6.576291	0.0000
LNGDPU	0.811297	0.045598	17.79235	0.0000
LNDIS	−0.039997	0.038015	−1.052129	0.2934
LNREEXC	−0.507363	0.047139	−10.76304	0.0000
Short-run equation				
COINTEQ01	−0.252786	0.096862	−2.609760	0.0094
D(GFC)	−0.265425	0.160689	−1.651798	0.0994
D(LNFGCTOTECA)	0.015174	0.007887	1.924061	0.0551
D(LNMLTECA)	−0.028627	0.033867	−0.845279	0.3985
D(LNSTECA)	−0.030952	0.037961	−0.815374	0.4153
D(LNGDPP)	0.278219	0.121665	2.286760	0.0227
D(LNGDPU)	0.807175	0.214189	3.768525	0.0002
D(LNDIS)	0.188988	0.069018	2.738259	0.0065
D(LNREEXC)	−0.824593	0.199679	−4.129594	0.0000
C	2.629825	1.007281	2.610814	0.0094

Note: dependent variable: D(LNEXPM), maximum dependent lags: 3, model selection method: AIC, dynamic regressors (four lags).

Source: Authors.

significance of short-term coefficients indicates whether changes in the explanatory variables have immediate effects on trade flows. On the other hand, insignificant short-term coefficients suggest that the impact of certain variables may be limited to the long term or require more time to materialize fully.

The coefficient value of -0.252786 means that about 25% of the departure from long-run equilibrium is corrected each period (quarter). Since this coefficient is negative and statistically significant (0.0094 , P -value <0.05), it can be concluded that the variables are jointly cointegrated and eight regressors (independent variables) are mutually Granger cause export performance in the long run. All the variables, except LNMTECA and LNSTECA, significantly influence export performance. Surprisingly, these two insured export credit exposure variables impact export (statistically insignificant, P -value >0.05), which is the opposite in the long-run case. GFC, which positively impacts exports in the long run, has a negative influence in the short run. A similar, but inverse, relationship is observed regarding distance (LNDIS). GDP (home) and GDP (partner) show significant positive adjustments, reflecting their vital role in rapid economic recovery following shocks. Notably, a sharp decline in the LNREEXC significantly affects exports, highlighting the high

sensitivity of export volumes to short-term exchange rate volatility. Furthermore, fixed effects (FE) and Poisson pseudo maximum likelihood (PPML) estimations were employed to assess the robustness of the ARDL estimator. The results from FE and PPML estimations verify the findings of the ARDL estimation (Table A2).

4.1.5 Cross-Section Short-Term Coefficient

The country-wise short-term coefficient is reported in Table 6. In analyzing the impact of predictor variables on the export performance of each country, France, Italy, and Japan show significant influences across all variables. Specifically, in France, two variables affect performance positively and six negatively, while Italy shows an equal distribution, with four variables affecting positively and four negatively. Japan displays a predominantly positive influence.

In contrast, the United Kingdom shows the least influence from these variables. Regarding the impact across countries, GFCTOTTECA emerges as the most influential variable, significantly affecting export performance in 16 countries, whereas GFC shows the weakest impact, influencing only 11 countries. While the total insured export credit exposures during the financial crisis have a positive effect

Table 6: Results of cross-section short-term coefficient

Particulars	C	1	2	3	4	5	6	7	8	T(✓*)
ARG	✓(-)	✗	✗	✓(-)	✓(-)	✓(-)	✓(+)	✓(+)	✓(+)	6(3/3)
AUS	✗	✗	✓(+)	✓(-)	✓(+)	✓(-)	✓(+)	✓(+)	✓(+)	7(5/2)
BRZ	✗	✓(+)	✓(-)	✗	✓(+)	✗	✗	✓(+)	✓(+)	6(4/2)
CAN	✓(-)	✓(-)	✓(+)	✓(-)	✓(+)	✗	✓(+)	✓(+)	✓(+)	7(5/2)
CHI	✗	✗	✓(+)	✓(-)	✓(-)	✓(-)	✓(-)	✗	✓(+)	6(2/4)
FRA	✓(-)	✓(+)	✓(-)	✓(-)	✓(-)	✓(-)	✓(+)	✓(-)	✓(-)	8(2/6)
GER	✓(-)	✗	✓(+)	✓(+)	✓(+)	✓(-)	✓(+)	✓(-)	✗	6(4/2)
IND	✗	✗	✓(-)	✓(+)	✓(+)	✓(-)	✓(-)	✓(-)	✓(+)	7(3/4)
ITA	✓(-)	✓(-)	✓(+)	✓(+)	✓(-)	✓(-)	✓(+)	✓(+)	✓(-)	8(4/4)
JAP	✓(-)	✓(-)	✓(+)	✓(-)	✓(+)	✓(-)	✓(+)	✓(+)	✓(+)	8(5/3)
KOR	✗	✓(-)	✓(+)	✓(-)	✗	✓(-)	✓(-)	✓(+)	✓(+)	7(3/4)
MEX	✓(-)	✓(-)	✓(+)	✓(-)	✓(+)	✓(-)	✓(+)	✗	✓(+)	7(4/3)
RUS	✓(-)	✓(-)	✓(+)	✓(+)	✓(-)	✓(-)	✓(+)	✓(+)	✓(+)	7(5/2)
SAF	✗	✓(-)	✓(+)	✓(+)	✓(-)	✓(+)	✗	✗	✗	5(3/2)
TUR	✓(-)	✗	✓(-)	✓(+)	✓(-)	✓(-)	✗	✗	✓(+)	5(2/3)
UKG	✓(-)	✗	✓(-)	✗	✗	✗	✓(-)	✓(+)	✓(+)	4(2/2)
USA	✓(-)	✓(-)	✓(+)	✓(+)	✓(-)	✗	✗	✗	✓(+)	5(3/2)
T (✓*)	11	11 (2/9)	16 (11/5)	15 (7/8)	15 (7/8)	13 (1/12)	13 (9/4)	13 (9/4)	15 (13/2)	

Note: Dependent variable: D(LNEXPM). If significant (P -value <0.05), then coefficient (positive) = "✓", otherwise, coefficient (negative) "✗". * indicates the sign of the coefficient (positive/negative). COINTEGRATION = C, GFC = 1, GFCTOTTECA = 2, LNSTECA = 3, LNMTECA = 4, LNREEXC = 5, LNGDPP = 6, LNDIS = 7, LNGDPU = 8. ARG = Argentina, AUS = Australia, BRZ = Brazil, CAN = Canada, CHI = China, FRA = France, GER = Germany, IND = India, ITA = Italy, JAP = Japan, KOR = Korea, MEX = Mexico, RUS = Russia, SAF = South Africa, TUR = Türkiye, UKG = United Kingdom, USA = United States.

Source: Authors/.

on the exports of the 11 countries in the short term, the impact is negative for Brazil, France, India, Türkiye, and the United Kingdom. LNMLTECA and LNSTECA also significantly influence the export dynamics in these nations, 15 and 13 countries, respectively. France, Italy, and Japan seem to contribute substantially to the overall model dynamics, as they possess strong financial systems, robust institutional structures, and deep integration into global supply chains as developed economies. These countries are better positioned to leverage financial instruments and policy tools effectively, even in the short run.

Table 7 documents the variables' adjustment speed to long-term equilibrium across sample countries. We rank them based on the magnitude of their cointegration coefficients, which indicates their significant error correction processes. It is seen that France has the highest adjustment speed (1.42%), followed closely by Japan, the United Kingdom, and Russia. Conversely, the United States shows the lowest significant adjustment speed. Countries such as Brazil, South Africa, China, India, and Australia, with statistically insignificant cointegration coefficients, are excluded from detailed consideration in this analysis. This ranking highlights the varying abilities of national economies to correct deviations from long-term stability.

4.2 Discussion

Our findings reveal multifaceted and significant insights into the impact of insured export credit exposures on trade (export). The medium-term and short-term export credit support have both strong positive and negative effects on trade in the long run, respectively, but not in the short run during the sample period (supported by Soh Young (2014)). However, this effect does not vary during the GFC period. Notably, the total insured ECA had a negative impact in the long run and a positive impact in the short run (Köksal and Genç (2019), Auboin and Engemann (2014), and Egger and Url (2006) found a similar result, but not specific to the crisis). Considering the short-run equation, about 0.25% of the departure from the long-run equilibrium is corrected each period (quarter). Several theoretical and conceptual explanations exist for why short-term ECA instruments may negatively affect firms' long-term export performance. Crisis-driven ECA support can trigger sudden export surges, but once withdrawn, exports often decline, revealing weak underlying competitiveness. Echoing Friedman's (1969) "helicopter drop" analogy, indiscriminate ECA credit – especially to inefficient or "zombie" firms – can increase moral hazard and reduce incentives for innovation. Moreover, ECA-backed financing may crowd out

Table 7: Country-wise speed of adjustment of variable to long-term equilibrium

Variable	Rank	Coefficient	Std. error	t-Statistic	P-value
FRA	1	−1.42539	0.05533	−25.76169	0.00010
JAP	2	−0.97148	0.00317	−306.10800	0.00000
UKG	3	−0.61489	0.07743	−7.94085	0.00420
RUS	4	−0.28933	0.01102	−26.25902	0.00010
CAN	5	−0.28776	0.00761	−37.79204	0.00000
GER	6	−0.23301	0.02043	−11.40788	0.00140
TUR	7	−0.20400	0.00375	−54.35442	0.00000
ITA	8	−0.11543	0.00333	−34.70984	0.00010
ARG	9	−0.05752	0.00390	−14.76957	0.00070
MEX	10	−0.05382	0.00442	−12.17650	0.00120
USA	11	−0.03842	0.00290	−13.24427	0.00090
BRZ	12	−0.02469	0.01651	−1.49547	0.23170
CHI	13	−0.00597	0.00313	−1.91019	0.15210
IND	14	−0.00583	0.00483	−1.20649	0.31410
AUS	15	−0.00262	0.00293	−0.89466	0.43690
SAF	16	0.01959	0.01804	1.08619	0.35690
KOR	17	0.01320	0.00519	2.54371	0.08440

Note: The ranking of countries is based on the estimated speed of adjustment (COINTEQ01 term) toward long-term equilibrium. Countries that adjust faster have larger (in absolute value) and more negative COINTEQ01 coefficients, indicating a quicker response to deviations from the long-term equilibrium. The differences in adjustment speeds across countries can be attributed to various factors, such as institutional and economic differences, trade dependence, economic resilience, and ECA support mechanisms. The exclusion of certain countries from the analysis is based on the statistical insignificance of their cointegration coefficients (COINTEQ01). In this context, statistically insignificant coefficients imply that the long-term relationship between the variables is not well-established for these countries at the chosen significance level (e.g., 5%). Noticeably, insignificance does not necessarily indicate the absence of a relationship but rather suggests that the estimated relationship is not reliable enough to draw valid conclusions. ARG = Argentina, AUS = Australia, BRZ = Brazil, CAN = Canada, CHI = China, FRA = France, GER = Germany, IND = India, ITA = Italy, JAP = Japan, KOR = Korea, MEX = Mexico, RUS = Russia, SAF = South Africa, TUR = Türkiye, UKG = United Kingdom, USA = United States.

Source: Authors.

market-based alternatives, weakening firms' exposure to market discipline. In the long run, prolonged or poorly targeted ECA interventions can distort domestic markets and harm global trade efficiency.

During the financial crisis, 11 countries experienced a positive short-term impact on exports. In contrast, Brazil, France, India, Türkiye, and the United Kingdom faced adverse effects, with three of which are developing economies. Chauffour *et al.* (2010) emphasized that developing countries should only rely on ECAs when specific preconditions, such as financial capacity, institutional capability, and governance, are adequately met. This highlights the difficulties developing nations encounter in effectively

utilizing ECAs during times of crisis. Furthermore, Aydemir and Gerni (2011) suggested that ECAs in developing economies may require structural reforms to enhance their effectiveness in managing economic shocks. Therefore, we recommend restructuring ECAs in developing countries to address institutional weaknesses and strengthen their crisis management capacities.

Regarding cross-section short-term analysis, country-wise short-term error correction process reports France's rapid adjustment capability, followed closely by Japan, the United Kingdom, and Russia, indicating robust error correction mechanisms in response to deviations from long-term equilibrium. These results are essential, as they suggest that these countries are highly responsive to economic shocks, potentially due to well-established financial systems or effective economic policies.

Generally, while policymakers often credit ECAs' risk-bearing capacity to their guarantee schemes, the actual acceleration to exports is predominantly driven by direct credit programs. Because direct support mechanisms enable exporters to access financing directly and swiftly, especially in high-risk markets or where intermediary banks are reluctant to provide funding, ECAs offer flexible solutions to promote exports. Additionally, direct support helps reduce financial intermediation costs. However, it is crucial to note the drawbacks associated with these schemes, notably their potential to directly increase public debt and their functional overlap with private financial sector activities. Based on the findings of this research, although ECAs offer significant advantages in managing exporter risks, reliance on direct credit schemes should be carefully evaluated due to their fiscal implications and possible redundancy with existing private solutions.

The OECD's Arrangement on Guidelines for Officially Supported Export Credits also fails to prevent finance-based unfair competition among countries. Establishing more binding and enforceable principles at the global level is critically important.

From the theoretical aspect, the findings of this study contribute to the literature on international trade and economic recovery by explaining how different nations' export capabilities and financial systems adjust in the face of global economic fluctuations. The implications are significant for policymakers and financial institutions. For countries with slower adjustments, targeted reforms in financial regulations or more aggressive monetary and fiscal interventions may be necessary to enhance responsiveness to global economic shifts. Understanding these dynamics for international businesses and investors could guide strategic decisions about where to allocate resources most effectively during economic downturns, enhancing risk management.

5 Conclusions

The 2008 GFC exposed the fragility of international trade and the critical role that policy instruments, such as ECAs, can play in stabilizing exports during economic turbulence. This research provides a comprehensive examination of the impact of export credit instruments provided by ECAs on export performance across G20 countries, particularly during the critical periods surrounding the 2008 GFC. Using the augmented gravity model combined with the ARDL approach, we analyzed trade flows (export) from 2005 to 2020 to assess both short- and long-term effects of ECA-backed support instruments on export performance.

The results reveal a nuanced understanding of ECA effectiveness. In the medium term, ECAs positively influence long-term exports, emphasizing their importance in stabilizing trade flows. However, short-term ECA interventions display a negative long-term impact, which suggests the need for careful strategic planning when employing these instruments. During the GFC, ECAs provided a positive short-term boost to exports, although their long-term effectiveness was more limited. These results align with existing literature on the mixed role of ECAs, highlighting their capacity to mitigate immediate trade disruptions. A key finding is the diverse responses of countries to economic turbulence. For example, France, Japan, the United Kingdom, and Russia demonstrated strong short-term error correction mechanisms, reflecting their well-established financial systems. This contrasts with slower adjustments seen in other countries, particularly developing economies, which points to the necessity of strengthening institutional frameworks and financial governance to improve crisis resilience.

From a policy perspective, our findings suggest that ECAs should be used as a dual-purpose tool – providing immediate support during economic crises while being part of a broader, long-term export strategy. In developing economies, ECAs may require structural reforms to enhance their capacity, addressing governance, financial sustainability, and institutional capability. These reforms are critical to ensuring that ECAs contribute to short-term recovery and sustained trade growth.

Despite these critical contributions, the study has a few limitations. While relevant for major economies, the exclusive focus on G20 countries limits the findings' applicability to smaller or the least developed nations, where ECAs may operate under different institutional and financial conditions. Additionally, the analysis period from 2005 to 2020, though capturing the effects of the GFC, may not reflect more recent economic disruptions, such as the COVID-19 pandemic or evolving trade policies, which could alter the role of ECAs. Furthermore, while the ARDL model effectively captures

short- and long-term dynamics, it may not account for more complex – i.e., nonlinear relationships, particularly during times of global crisis or when analyzing countries separately. These limitations highlight the need for further research, incorporating a broader range of countries, updated data, and alternative econometric approaches to provide a more comprehensive understanding of ECA effectiveness across varying contexts. Also, future research may consider including the duration of customs clearance as an additional component of distance variables within gravity models.

In summary, this study advances our understanding of the complex role ECAs play in international trade. Policymakers should recognize both the short-term benefits and potential long-term drawbacks of ECAs, ensuring that these agencies are deployed to support sustainable, resilient trade growth. The findings contribute to ongoing discussions on trade finance and crisis management, particularly in light of the periodic economic shocks experienced by global economies.

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Conflict of interest: Authors state no conflict of interest.

Data availability statement: The data supporting the findings of this study are available upon request. Potential requests should be directed to the corresponding author, Dr. Rashed Jahangir (rashedjahangir@sakarya.edu.tr), or the co-author, Dr. Halil Simdi (hsimdi@sakarya.edu.tr).

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Appendix

Table A1: Model selection criteria table

Model	LogL	AIC*	BIC	HQ	Specification
16	2,146.674432	−3.115943	0.089610	−1.895749	ARDL (4, 4, 4, 4, 4, 4, 4, 4)
12	2,093.509318	−3.041299	0.078705	−1.853669	ARDL (3, 4, 4, 4, 4, 4, 4, 4)
15	1,969.276926	−3.030499	−0.509335	−2.070817	ARDL (4, 3, 3, 3, 3, 3, 3, 3)
8	2,053.988303	−2.994816	0.039640	−1.839750	ARDL (2, 4, 4, 4, 4, 4, 4, 4)
11	1,918.170225	−2.960104	−0.524487	−2.032986	ARDL (3, 3, 3, 3, 3, 3, 3, 3)
7	1,891.674533	−2.940505	−0.590437	−2.045951	ARDL (2, 3, 3, 3, 3, 3, 3, 3)
14	1,766.221759	−2.892099	−1.055322	−2.192929	ARDL (4, 2, 2, 2, 2, 2, 2, 2)
4	1,974.537924	−2.865919	0.082988	−1.743417	ARDL (1, 4, 4, 4, 4, 4, 4, 4)
3	1,821.481257	−2.830715	−0.566196	−1.968725	ARDL (1, 3, 3, 3, 3, 3, 3, 3)
10	1,718.743789	−2.829193	−1.077964	−2.162587	ARDL (3, 2, 2, 2, 2, 2, 2, 2)
6	1,680.354272	−2.785045	−1.119365	−2.151004	ARDL (2, 2, 2, 2, 2, 2, 2, 2)
13	1,570.737763	−2.769325	−1.616936	−2.330668	ARDL (4, 1, 1, 1, 1, 1, 1, 1)
9	1,527.424660	−2.715015	−1.648175	−2.308922	ARDL (3, 1, 1, 1, 1, 1, 1, 1)
2	1,627.427773	−2.710893	−1.130762	−2.109416	ARDL (1, 2, 2, 2, 2, 2, 2, 2)
5	1,488.442858	−2.669645	−1.688353	−2.296116	ARDL (2, 1, 1, 1, 1, 1, 1, 1)
1	1,468.122542	−2.662792	−1.767048	−2.321827	ARDL (1, 1, 1, 1, 1, 1, 1, 1)

Note: Dependent variable: LNEXPM. Log likelihood (LogL).

Source: Authors.

Table A2: Robustness check

Variable	Fixed effect model				PPML model			
	Coefficient	Std. error	t-Statistic	P-value	Coefficient	Robust std. error	z-Statistic	P-value
GFC	−0.01981	0.02007	−0.99	0.324	0.00095	0.00511	0.19	0.851
LNGFCTOTECA	−0.00047	0.00043	−1.11	0.266	−0.00006	0.00013	−0.52	0.601
LNMLTECA	−0.07349	0.03839	−1.91	0.056	−0.024565	0.00938	−2.62	0.009
LNSTECA	0.05587	0.04666	1.20	0.231	0.00296	0.01305	0.23	0.820
LNGDPP	0.16978	0.05018	3.38	0.001	0.01395	0.01538	0.91	0.365
LNGDPU	0.73259	0.01749	41.87	0.000	0.07532	0.00135	55.47	0.000
LNDIS	−0.11017	0.04662	−2.36	0.018	−0.02804	0.00212	−13.17	0.000
LNREEXC	−0.37716	0.10173	−3.71	0.000	−0.00587	0.03011	−0.20	0.845
Constant	−7,629290	0.53582	−14.24	0.000	0.57028	0.03901	14.62	0.000

Source: Authors.

Table A3: Unit root test results

Variables	Harris Tzavalis				Im Pesaran Shin			
	Stat	P-value	I(1)	P-value	Stat	P-value	I(1)	P-value
LNEXP	0.856	0.000	—	—	−4.8615	0	—	—
GFC	0.88	0.000	—	—	−2.0197	0.0217	—	—
LNGFCTOTECA	0.887	0.000	—	—	−1.7372	0.0412	—	—
LNMLTECA	0.952	0.5391	0.0306	0.000	−0.0266	0.4894	−19.3078	0
LNSTECA	0.936	0.112	0.284	0.000	−2.0771	0.0189	—	—
LNGDPP	0.937	0.122	−0.334	0.000	0.2379	0.594	−21.9945	0
LNGDPU	0.929	0.033	—	—	−3.2413	0.0006	—	—
LNDIS	0.773	0.000	—	—	−6.1924	0	—	—
LNREEXC	0.956	0.659	0.134	0.000	1.3429	0.9103	−16.6655	0