# Global economic sanctions and export survival: Evidence from cross-country data

**Ha Thanh Le**

| A B S T R A C T |
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| **Objective:** The aim of the article is to study the relationship between global economic sanctions and export survival. We also investigate the moderating roles of international linkages in the nexus of sanctions and export survival. |
| **Research Design & Methods:** While we employ the new data base of the Global Sanctions Data Base introduced by Felbermayr *et- al.* (2020), export survival rate is defined as the ratio of the number of survivors to the entrants. We apply the structural gravity model combining the dyad panel dataset of 66 countries during the 1997-2014 period. |
| **Findings:** We find the adverse effects of global economic sanctions on export survival. The marginal effects of sanctions become more sizable if there is a longer distance between the sender and the target country. By contrast, the adverse effects of global sanctions can be alleviated if the target country participates in global value chains or global bank linkages. |
| **Implications & Recommendations:** The findings of our study provide vital insights to help policy makers to improve the export performance of countries facing global sanctions. |
| **Contribution & Value Added:** This article is the first to investigate the effects of economic sanctions on export survival. The moderating roles of international linkages in this nexus are described in this study. |
| **Article type:**      research article |
| **Keywords:**      global economic sanctions; export survival; global value chains; global bank linkages |
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## INTRODUCTION

Current international trade is characterized by a low rate of export survival (Besedes & Prusa, 2006a, 2006b, 2011; Brenton *et al.,* 2009). As starting export, export performance and maintaining export relationships are all important issues in the international trade, it is imperative to explore the driving forces of this low survival rate. Prior scholars indicate that factors such as trade credit, global value chains (Díaz-Mora *et al.*, 2018; Turkan, 2019) and others significantly determine nation's export survival rate. However, the literature has remained silent on the association between global economic sanctions (GESs) and export survival thus far. A strong interdependency between countries for military assistance, foreign direct investment (FDI), trade inflows or financial reserves (IMF, 2009) further fuels highly integrated international environments. This puts domestic economies at a high risk of adverse macroeconomic policies, for example a reduction in FDI or aid. As a result, these economies are exposed as being vulnerable in the increasingly integrated world. The network of international interdependencies and the vulnerability of less developed nations result in the application of "sanctions." Since GESs have become increasingly used over time (Felbermayr *et al.*, 2020), there is a call for research on the relationship between GESs and export survival.

As Felbermayr *et al.* (2020) and Folch (2010) revealed, GESs take various forms, such as the withdrawal of arms and military assistance, trade restrictions (*i.e.* partial, or total embargoes), financial or economic blockades (*i.e.* asset freeze), and travel bans. These are triggered by a wide variety of economic, political, and environmental policies or they serve multiple purposes (proactive, punitive or demonstrative). According to Folch (2010), the actions or specific methods of intervention are based on coercive measures (threats) against a sanctioned party (a target country) by one country (a sanctioning country or a sender, *e.g.* the United States), a coalition of countries (*e.g.* the European Union), or international organisations (*e.g.* the United Nations). The primary goal of GESs is to punish or change a specific policy or behaviour of the target country.

Since the GESs serve as a means of dispute settlement for peaceful conflict resolution, they receive substantial appreciation in the context of international negotiation. However, there has been a serious warning against GESs and the way they are used to fulfil the original purposes. Many scholars are concerned about the consequences of GESs, such as their negative effect on life expectancy and infant mortality (Ali Mohamed & Shah, 2000; Daponte & Garfield, 2000), on human rights and democracy levels (Peksen & Drury, 2010), the availability of food and drinking water (Cortright & Lopez, 2000), and the access to health care and medicine (Garfield, 2002). In addition to their social consequences, the economic consequences of GESs have also gained attention from scholars. Very few studies demonstrate the adverse effects of GESs on the flow of FDI (Barry & Kleinberg, 2015). Our study contributes to the extant literature by investigating the relationship between GESs and export survival.

In this article, we apply a modified gravity model to examine the association between GESs and export survival rate. To the best of our knowledge, this article is the first to study this issue. While the interdependence between nations through international trade is one of the bases for the application of GESs, it is important to analyse the impacts of GESs on the probability that a target country will remain in foreign markets as a way to evaluate the effectiveness of GESs. Moreover, our study advances the literature by indicating a channel through which sanctioned states can attenuate the adverse effects of GESs. For this purpose, we test the moderating role of international linkage participation in this relationship. To perform these tests, we employ the dyad panel dataset covering 66 countries from 1997 to 2014 and the new database from Felbermayr *et al.* (2020). The findings of this paper are expected to provide insightful lessons for policymakers in both the sanctioning and sanctioned state. Regarding the senders, our study provides important policy implications that could be used to improve the success rate of GESs in punishing the target country's international trade. Regarding the target country, this research indicates a strategic way to help a country to improve its export performance and survive longer in foreign markets.

The rest of the paper proceeds as follows. Section two will provide a review of the relevant literature and develops the hypotheses. Section three will present the model, data, and estimation method. Section four will outline the empirical results and discussion. Section five will conclude the paper.

## LITERATURE REVIEW

In this article, we investigate the drivers of export survival rate. Our main focus is on the effects of GESs. Hence, this article is closely related to two strands of the literature. The first strand consists of papers studying the relationship between GESs and export survival, and the second is papers explaining the moderating roles of global linkage participation on the association between GESs and export survival.

### Global Economic Sanctions and Export Survival

We contend that the trade between the source and target country may be affected by the GESs through their impact on factor endowments. Therefore, the export survival rate is expected to be influenced by the GESs. The reasons are as follows. Firstly, based on the Heckscher-Ohlin model of international trade, countries should trade more if there are larger differences in their factor endowment (Ghosh & Yamarik, 2005; Debaere, 2003; Romalis, 2004). It is most likely that senders imposing economic sanctions on other countries are developed countries, while the target countries are less developed. The GESs further expand the "distance" between senders and target countries in terms of factor

endowments. In particular, the mobility of natural resources between these countries may be disrupted by trade sanctions, such as trade barriers, tariffs, or trading bans. Similarly, financial sanctions hinder the capital inflows of the target country by restricting the provision of certain financial services or access to credit. Therefore, these sanctions expand the distance between the sender and the target country, discourage firms from participating in global trade, or reduce their probability of remaining in international markets. Secondly, we contend that the GESs create difficulties for both the exports and imports of senders and the target countries. According to Hufbauer *et al.* (2009), the commercial and financial ties between the sender and target country are disrupted due to the penalties against targeted states through either trade or financial sanctions.

Furthermore, physical capital plays a critical role in the success of a country's exports. The government uses the budget to invest in public infrastructure, for example roads and transport infrastructures, or information and communications technology (ICT) infrastructures, which may reduce trade costs and improve supply capacity. These advantages enhance a country's participation and success in foreign markets. For many countries, FDI is regarded as the main financial source of these investments. Moreover, FDI helps receiving countries to enhance their comparative advantages through technology transfers. However, GESs potentially restrict future economic access to the target country, making speculation about current and future investment opportunities there gloomy. In turn, the risk disincentivises global investors (Jensen, 2008; Li, 2009; Biglaiser & Staats, 2010), thus reducing the inward flows of FDI into the target states (Janeba, 2002). Accordingly, GESs potentially create disadvantages for the sanctioned country's exports.

Based on our discussion, we posit that:

**H1:** Being sanctioned in the previous year reduces the probability of export survival in the current year.

### Moderating Roles of Global Linkage Participation

In this article, we contend that participation in global linkages such global supply chains (GVCs) and global bank linkages (GBLs) may help countries to attenuate the adverse effects of GESs. There are reasons to support our belief. Firstly, joining global supply chains by trading parts and components creates long-lived relationships and leads to higher survival rates (Obashi, 2010; Corcoles *et al.*, 2015). Deep participation in the GVC helps firms to obtain a more stable trade relationship (Díaz-Mora *et al.*, 2018), which reduces uncertainty and enhances the trust and reliability of trade partners. Moreover, a positive extension of export duration stems from product quality, product diversity, and investment in asset-pricing improvements for firms integrated into the GVC (Zhu *et al.*, 2019). These raise a country's survivability when exploring the international markets, even if it faces a GES or any difficulties created by GES. Secondly, joining global bank linkages mitigates the export risk from information asymmetries or difficulties in payment enforcement (Hale *et al.*, 2013). As revealed by Olsen (2013) and Niepmann and Schmidt-Eisenlohr (2017), cross-border bank linkages can also enforce or guarantee payments. Furthermore, information on creditworthiness can be passed from banks in the sanctioning country to other banks in the target country, which are connected. Then this information may be passed to exporting firms. Hence, the information asymmetries leading to export risks can reduce, and this can improve the export survival rate. Thirdly, the global linkages also help countries to promote the inward flows of FDI. Hale (2012) and Poelhekke (2015) provide empirical evidence on the positive association between global linkages and the FDI flow. The global linkages reduce information asymmetries, which makes FDI investors more confident in their investments. As a consequence, the adverse impacts of GESs on FDI flows can be mitigated, and therefore the target countries are more likely to enjoy the benefits and comparative advantages of FDI. These countries can then compete with each other and survive better in foreign markets. By studying the effects of foreign value added within GVCs on wage, Partekka and Wolszczak-Derlacz (2017) also highlight the importance of global linkage participation.

Based on our discussion, we posit that:

**H2:** The effects of global economic sanctions on export survival are weaker if a country joins international linkages.

To the best of our knowledge, there is no article exploring the nexus of sanction and export survival, especially across countries. Recently, a few studies have investigated the influences of sanctions on firm performance (Ahn & Ludema, 2020) or the exporting behaviour of firms (Crozet *et al.*, 2021). Other studies, such as Bellora and Fontagné (2020) and Mao and Görg (2020), explore the impacts of the recent US-China trade war on the GVC, but their country-specific research only focuses on a typical form of sanction. Our paper contributes to the current literature in the following dimensions. Firstly, we are the first to investigate the direct effects of sanctions on export survival probability of firms by using cross-country data. Secondly, Peksen (2019) argues that the success of sanctions relies on the international relationship between sanctioning and sanctioned states, but there is no paper incorporating the moderating effects of international linkages on the association between sanctions and export survival. Therefore, we explore the moderating roles of international linkages on the sanction-export survival nexus.

## RESEARCH METHODOLOGY

We specify the following model to examine the impacts of GESs on export survival:

$$SUR_{ijt}^{p} = \beta_0 + \beta_1 Sanction_{i,t-1} + \beta_2 CONTROL_{ij,t-1} + v_t + \lambda_i + \gamma_j + \varepsilon_{ijt} \qquad (1)$$

in which superscripts *i* and *j* denote the source and target country, and *t* denotes year while $v_t$, $\lambda_i$, and $\gamma_j$ capture year, source-country-fixed and target-country-fixed, respectively. Moreover, $\varepsilon_{ijt}$ is the error term. The dependent variable, $SUR^{p}$, is an export survival rate measure. We denote *FSUR, SSUR,* and *TSUR* as the ratio of the numbers of first-year, second-year and third-year survivors to the number of entrants in year t, respectively. The detailed measures of *FSUR, SSUR,* and *TSUR* are provided in Appendix A. The key variable, $Sanction_{ijt}$, captures all bilateral sanctions of country *i* imposed on country *j* in year *t.* We employ the Global Sanctions Data Base introduced by Felbermayr *et al.* (2020). This dataset classifies sanctions into different types (*i.e.* trade versus financial sanctions) and only concentrates on effective sanctions (excluding threats). $Sanction_{ijt}$ takes a value of one if there are any type of sanctions between country *i* and *j*, and 0 otherwise.

In addition to the sanction variable, we also incorporate a set of other control variables, *CONTROL*. In particular, the GVC plays a critical role in the probability of export survival. While trade in parts and components generates a longer-lived relationship and better survival rates (Corcoles *et al.,* 2015), Turkan (2016) provides empirical evidence to advocate the role of GVC in export survival in Turkey. We follow Koopman *et al.* (2010) to classify GVC participation by the source of the value added incorporated in exports, looking both backward and forward from the view of a reference country (country A). Backward participation (*Backward*) is the value added of country B, contained in exports from country A to country B; forward participation (*Forward*) is the value added of country A, which is embodied as intermediate goods that support the production of exports from country B to country C. The sum of both *Backward* and *Forward* is the total GVC (*GVCtotal*). The GVC participation data is taken from the OECD TiVA database. The variable $GDP_i$ is the gross domestic product of recipient country *j*. This variable is available from the World Bank database. As contended by Brenton *et al.* (2009), the market size captured by this variable is anticipated to determine export survival. The bilateral distance between the home and host country (*lnD*) is also added into the model. According to Stirbat *et al.* (2015), this variable may be negatively associated with export survival since trading over long distance may lead to impediments such transportation costs. This variable is taken from the Centre d'Études Prospectives et d'Informations Internationales (CEPII). The dummy variable *FTA* takes the value of one if country *i* and *j* belong to the same FTA and 0 otherwise. The Herfindahl-Hirschman index (HHI), which measures the market concentration in the destination market. The HHI is a measure of diversification and it takes any value between 0 and 1, with higher values representing a greater concentration in the destination market. Export survival may be negatively affected by *HHI*, as argued by Corcoles *et al.* (2015). The variables *Value* and *Share* are respectively the export value per entrant and the share of new products in the total export value of incumbents. Besedes and Prusa (2006) reveal that the former, which captures firms' confidence level, may impact their trade survival as the greater the confidence level, the more durable the relationship is. The latter reflects experience with a product. As contended by Stirbat

*et al.* (2015), the survival rate could be dampened by this variable because exporting subsequent products is less costly and risky than exporting new products. We collect the data for variables *SUR*, *HHI*, *Value*, and *Share* from Exporter Dynamics Database of The World Bank at country-destination-year level. The choice of explanatory variables is based on the literature on export survival and the availability of data. In this article, we attempt to incorporate as many explanatory variables as possible, based on the data availability in the structural gravity model.

After merging and cleaning the data, the sample contains roughly 5500 country-year observations from 66 countries[1] during the period of 1997-2014. The reasons for our sample selection are as follows. Our key explanatory variable, Sanction, is sourced from the new database of the Global Sanctions Data Base introduced by Felbermayr *et al.* (2020). However, the data on economic sanctions are only available from 1950 to 2016. The other sanction data are not suitable for use in the gravity model due to their lack of continuity and completeness. The lack of data on sanctions is the biggest challenge for researchers who wish to explore the impacts of sanctions. Furthermore, one of our main concerns is examining the moderating roles of international linkages such as GVCs and global bank linkage in the nexus between sanctions and export survival. These variables are only available until 2014. Some gravity variables face the same challenge. After cleaning and merging all the sources of data, our database covers 66 countries during the 1997–2014 period. The statistical descriptions of all the included variables are presented in Table 1. As shown in the table, the average survival rate of firms in their first year of exporting is roughly 40% and this diminishes to 24% and 17% in the second and third year, respectively. The average number of bilateral sanctions implemented is quite small (roughly 3%) in our sample.

**Table 1. Statistical summary**

| Variable | Obs | Mean | Std. Dev. | Min | Max |
|---|---|---|---|---|---|
| FSUR | 5495 | 0.40 | 0.12 | 0.00 | 1.00 |
| SSUR | 4506 | 0.24 | 0.11 | 0.00 | 1.00 |
| TSUR | 3715 | 0.17 | 0.09 | 0.00 | 1.00 |
| Sanction | 97756 | 0.02 | 0.15 | 0.00 | 1.00 |
| GVCtotal | 6646 | 0.62 | 1.11 | 0.00 | 17.98 |
| Backward | 6646 | 0.36 | 0.83 | 0.00 | 15.16 |
| Forward | 6646 | 0.25 | 0.51 | 0.00 | 5.90 |
| Link | 97732 | 0.10 | 0.41 | 0.00 | 5.31 |
| GDP | 6646 | 26.64 | 1.52 | 23.27 | 30.45 |
| lnD | 6646 | 8.61 | 0.96 | 5.08 | 9.88 |
| FTA | 6646 | 0.47 | 0.50 | 0.00 | 1.00 |
| HHI | 6625 | 0.14 | 0.18 | 0.00 | 1.00 |
| lnValue | 6309 | 0.23 | 0.46 | 0.00 | 11.18 |
| Share | 6306 | 0.17 | 0.10 | 0.00 | 1.00 |

Source: own study.

The correlations between explanatory variables are summarised in Table 2. Since the correlation coefficients are all lower than 0.8, there should be no problem of multicollinearity in our regressions.

We firstly regress the set of export survival probability on *Sanction* and the control variables. To examine the moderating roles of global linkages in the relationship between sanctions and export survival probability, we suggest the following model:

$$SUR_{ijt}^p = \varphi_0 + \varphi_1 Sanction_{i,t-1} + \varphi_2 CONTROL_{ij,t-1} + \varphi_3 GL_{i,t-1} + \varphi_4 GL_{i,t-1} * {} \atop {} * Sanction_{i,t-1} + v_t + \lambda_i + \gamma_j + \varepsilon_{ijt}$$

(2)

in which $GL_{i,t}$ denotes the global linkages, which are either GVCs or GBLs. The sign and magnitude of the interactions between $GL_{i,t}$ and $Sanction_{i,t}$ reflect the moderating roles of global linkages.

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[1] A description of the countries included in the sample is provided in Table A.1 in the Appendix.

**Table 2. Correlation matrix**

| Variable | Sanction | GVCtotal | GDP | lnD | FTA | HHI | Value | Share |
|----------|----------|----------|-----|-----|-----|-----|-------|-------|
| Sanction | 1 | | | | | | | |
| GVCtotal | 0.0413 | 1 | | | | | | |
| GDP | 0.140 | 0.332 | 1 | | | | | |
| lnD | 0.0379 | -0.445 | 0.0971 | 1 | | | | |
| FTA | -0.0799 | 0.225 | -0.146 | -0.637 | 1 | | | |
| HHI | -0.0360 | -0.251 | -0.200 | 0.308 | -0.184 | 1 | | |
| lnValue | -0.00210 | 0.167 | 0.115 | -0.0111 | 0.00434 | 0.0933 | 1 | |
| Share | 0.103 | 0.00806 | 0.130 | -0.0129 | -0.00750 | -0.0825 | -0.138 | 1 |

Source: own study.

## RESULTS AND DISCUSSION

### Baseline Results

We report the estimation results of Equation (1) in Table 3, to examine the effects of GES in year *t-1* on the export survival in year t. The standard errors are clustered on country-pair and both country and year fixed effects are considered in all models. The main findings will be conveyed in this section. Firstly, the coefficients of *Sanction* are statistically significant and negative, as expected. The results imply that the GES decreases the survival probability of export firms in the target country. Our empirical results are consistent with the argument of Felbermayr *et al.* (2020) that economic sanctions adversely affect the exporting value of a country. Moreover, Chen and Garcia (2016) reveal that importing activities decrease under the impacts of sanctions. Our study emphasises that sanctioned states are more likely to leave foreign markets than non-sanctioned ones. Secondly, the results indicate that the effects of GES become less sizable after one year and two years of survival, at 1% level of significance, as reported in Columns 1 to 3 of Table 3. In other words, the impacts of sanctions decline over time for exporting firms with experience and success in foreign markets. There are plausible explanations for this finding. The success of exporting in the first year may boost trust and reliability between exporting firms and their training partners (Chaney, 2014), thus reinforcing their relationship and increasing the probability of surviving in foreign markets in the following years.

Regarding the other control variables, our study confirms that the distance between sender and target country is negatively associated with the survival rate of exporters in the target country. The literature demonstrates that exporting firms may leave foreign markets due to the high transaction costs created by the long distances between two trading partners. By contrast, this risk of failure can reduce through the proximity and share of commons (Petersen & Rajan, 2002). To conduct a robustness check on the effects of distance, we consider different types of distance, including both physical and "soft" distances and investigating how the distance moderates the association between GES and export survival. To perform this, we add the interactions between this type of distance and the sanction variable in Equation (1) and report the results in Table 4. The four types of distance are the distance in financial market development and tax system, and cultural and physical distance. Regarding distance in financial market development, we employ a composite index of financial market development based on nine components, which capture the stability, depth and efficiency of financial systems, and financial access (as in Donaubauer *et al.*, 2020). We measure the distance in the tax system by using the data from the World Tax Database augmented by data published by the Heritage Foundation. Regarding the cultural distance, we base it on Schwartz's (2006) method of measuring cultural distance for different waves of the World Value Surveys. Our results demonstrate the statistically significant and negative coefficients of these interactions. The risk of failure in foreign markets can be accelerated by the distance. The distance also signifies the marginal effects of sanctions on the probably of survival. In other words, the effects of GES become stronger for firms operating in a country that has a long "distance" from its trading partners.

**Table 3. Baseline results**

| VARIABLES | First-year Survivor | Second-year Survivor | Third-year Survivor |
|---|---|---|---|
| | (1) | (3) | (5) |
| Sanction | -0.0440*** | -0.0370*** | -0.0350*** |
| | (0.0134) | (0.0143) | (0.0131) |
| GVCtotal | 0.00286 | 0.00471 | 0.00564* |
| | (0.00303) | (0.00313) | (0.00308) |
| GDP | 0.00255 | 0.00667 | -0.0161 |
| | (0.0100) | (0.0103) | (0.0123) |
| lnD | -0.0431*** | -0.0383*** | -0.0335*** |
| | (0.00416) | (0.00380) | (0.00357) |
| FTA | 3.10e-05 | 0.0122** | 0.0120** |
| | (0.00624) | (0.00574) | (0.00486) |
| HHI | -0.0259* | -0.0131 | 0.00226 |
| | (0.0157) | (0.0148) | (0.0134) |
| lnValue | 0.0144*** | 0.0110*** | 0.00686 |
| | (0.00331) | (0.00392) | (0.00427) |
| Share | -0.168*** | -0.154*** | -0.109** |
| | (0.0428) | (0.0432) | (0.0501) |
| Constant | 0.727** | 0.400 | 0.972*** |
| | (0.304) | (0.314) | (0.377) |
| Observations | 5 445 | 4 464 | 3 683 |
| Country FE | YES | YES | YES |
| Year FE | YES | YES | YES |
| R2 | 0.412 | 0.474 | 0.480 |

Robust standard errors in parentheses; *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.
Source: own study.

We also find that exporters are more likely to survive longer if there are preferential trade agreements. According to Caporale *et al.* (2009) and Hannan (2016), FTA provides incentives and advantages to trading partners, thus helping exporting firms to secure more export gains and compete with others in foreign markets. The estimation of Equation (1) also reveals the negative effect of the HHI on survival rate. The finding implies that firms' export performance can be improved if they enter into transactions with different trading partners (Funke & Ruhwedel, 2001). Diversification of trading partners can reduce the risk and help firms to survive longer in foreign markets. However, this variable is only statistically significant for the sample of first-year survivors; we do not find similar evidence for the sample of second-year and third-year survivors. This fact suggests the further implications that new and young exporters should diversify their trading partners, while firms that have existed for a long time in the market should focus on developing their relationships with their strategic partners.

Regarding the remaining variables, our results are aligned with those of prior works. In particular, initial trust in counterparts and in the sustainability of their trade relationships, captured by the initial export value of the entrant (ln*Value*), enhances the probability of surviving in foreign markets. The positive sign of *lnValue* is consistent with Besedes (2008) and Impulliti *et al.* (2013). Similarly, we also find a negative association between the share of new products in the total export value of surviving entrants (*Share*) and export survival, as in Esteve-Pérez *et al.* (2013).

**Table 4. The distance in financial market development, tax system, cultural and physical distance**

| VARIABLES | First-year Survivor | | | | Second-year Survivor | | | | Third-year Survivor | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Financial Development | Tax System | Culture | Physical Distance | Financial Development | Tax System | Culture | Physical Distance | Financial Development | Tax System | Culture | Physical Distance |
| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) | (9) | (10) | (11) | (12) |
| Sanction | -0.0113 | 0.0906 | 0.0176 | 0.0842* | -0.0161 | 0.0392 | -0.0697 | 0.122*** | -0.0191 | 0.0186 | -0.0750 | 0.0441 |
| | (0.0154) | (0.0559) | (0.0841) | (0.0468) | (0.0171) | (0.0489) | (0.188) | (0.0427) | (0.0160) | (0.0582) | (0.112) | (0.0532) |
| Difference | 0.0110*** | 0.000479 | -0.0754 | 0.00723*** | 0.0118*** | 0.000274 | -0.112** | 0.00549*** | 0.00934*** | 0.000552 | -0.0585 | 0.00488*** |
| | (0.00340) | (0.000671) | (0.0495) | (0.00113) | (0.00317) | (0.000586) | (0.0458) | (0.00119) | (0.00341) | (0.000615) | (0.0434) | (0.00121) |
| Sanction*Difference | -0.0157** | -0.00432* | -0.293 | -0.0123** | -0.0133** | -0.00217 | 0.254 | -0.0165*** | -0.0148* | -0.00132 | 0.314 | -0.00823 |
| | (0.00638) | (0.00232) | (0.660) | (0.00523) | (0.00558) | (0.00184) | (1.327) | (0.00454) | (0.00872) | (0.00223) | (0.803) | (0.00568) |
| GVCtotal | 0.00261 | 0.00310 | 0.00136 | -0.000612 | 0.00442 | 0.00425 | 0.00168 | 0.00143 | 0.00788*** | 0.00714** | 0.00137 | 0.00255 |
| | (0.00303) | (0.00320) | (0.00195) | (0.00260) | (0.00326) | (0.00319) | (-0.00239) | (0.00303) | (0.00279) | (0.00283) | (0.00418) | (0.00370) |
| GDP | -0.00145 | -0.00283 | -0.0163 | -0.00207 | -0.0108 | -0.0159 | -0.00280 | -0.00444 | -0.0177** | -0.0288* | -0.00847 | -0.0214* |
| | (0.00887) | (0.0102) | (0.0137) | (0.00909) | (0.00830) | (0.0110) | (0.0132) | (0.0101) | (0.00896) | (0.0150) | (0.0121) | (0.0127) |
| lnD | -0.0425*** | -0.0430*** | -0.0165*** | -0.0759*** | -0.0382*** | -0.0365*** | -0.0144*** | -0.0632*** | -0.0314*** | -0.0300*** | -0.0118** | -0.0556*** |
| | (0.00430) | (0.00449) | (0.00568) | (0.00662) | (0.00406) | (0.00404) | (0.00522) | (0.00662) | (0.00365) | (0.00365) | (0.00488) | (0.00704) |
| FTA | -0.000432 | 0.00503 | 0.00443 | 0.00188 | 0.0153*** | 0.0186*** | 0.0126** | 0.0119** | 0.0138*** | 0.0145*** | 0.0129** | 0.0120** |
| | (0.00619) | (0.00724) | (0.00677) | (0.00575) | (0.00587) | (0.00597) | (0.00637) | (0.00542) | (0.00524) | (0.00540) | (0.00558) | (0.00486) |
| HHI | -0.0499*** | -0.0504*** | -0.0405 | -0.0388*** | -0.0239* | -0.0303** | -0.0150 | -0.0334** | -0.00548 | -0.0122 | 0.00833 | -0.0297** |
| | (0.0158) | (0.0172) | (0.0280) | (0.0149) | (0.0133) | (0.0144) | (0.0269) | (0.0144) | (0.0145) | (0.0152) | (0.0231) | (0.0137) |
| lnValue | 0.0138*** | 0.0129*** | 0.00816** | 0.0114*** | 0.0146*** | 0.0193*** | 0.00665 | 0.0115** | 0.00828* | 0.0169*** | 0.000341 | 0.00760 |
| | (0.00446) | (0.00422) | (0.00360) | (0.00394) | (0.00433) | (0.00338) | (0.00581) | (0.00475) | (0.00430) | (0.00490) | (0.00416) | (0.00603) |
| Share | -0.351*** | -0.320*** | -0.100* | -0.211*** | -0.281*** | -0.266*** | -0.0459 | -0.199*** | -0.239*** | -0.241*** | -0.0809* | -0.107 |
| | (0.0420) | (0.0440) | (0.0555) | (0.0571) | (0.0322) | (0.0338) | (0.0459) | (0.0646) | (0.0319) | (0.0344) | (0.0430) | (0.0861) |
| Observations | 3 990 | 3 675 | 2 210 | 4 565 | 3 260 | 3 055 | 1 860 | 3 713 | 2 677 | 2 483 | 1 571 | 3 053 |
| Country FE | YES | YES | YES | YES | YES | YES | YES | YES | YES | YES | YES | YES |
| Year FE | YES | YES | YES | YES | YES | YES | YES | YES | YES | YES | YES | YES |
| R2 | 0.602 | 0.590 | 0.361 | 0.529 | 0.644 | 0.640 | 0.399 | 0.571 | 0.647 | 0.643 | 0.368 | 0.567 |

Robust standard errors in parentheses; *** p < 0.01, ** p < 0.05, * p < 0.1.

Source: own study.

## Moderating Roles of Global Value Chains and Global Bank Linkages

### Global Value Chains

In the previous analysis, we mostly concentrate on factors that signify the marginal effects of GES. In this section, we argue that there are channels that exporters can use to reduce the harmful effects of GES. The first channel is participation in GVCs. To investigate our belief, we follow Koopman *et al.* (2010) to classify GVCs into *Backward* and *Forward,* and we add their interactions and GES into Equation (1). The results are displayed in Table 5. Firstly, *Backward, Forward,* and *GVCtotal* (the sum of *Backward* and *Forward*) are statistically significant and have the expected positive sign as presented in Columns (2), (4), (5) and (8). Our findings are consistent with Díaz-Mora *et al.* (2018). However, Díaz-Mora *et al.* (2018) provide empirical evidence for a more important role for the forward dimension than for the backward one. More importantly, the coefficient of an interaction between *Backward* and *Sanction* is statistically significant and positive for the sample of the first-year and second-year survivors. Our finding provides the empirical evidence to support our argument that GVCs (*Backward type)* can be considered as an effective channel to help exporting firms alleviate the impacts of sanctions. The findings of our study advocate the argument of Peterson (2020) that a better connection to international networks makes the consequences of sanctions less severe.

### Global Bank Linkages

Another channel through which the adverse effects of GES can be attenuated is global bank linkage (GBL). The effects of risk can be mitigated by a higher share of trade finance in a given country (Niepmann & Schmidt-Eisenlohr, 2017). In this article, we contend that the adverse effects of GES can be alleviated due to the information advantage about the home and host-country firms. Therefore, exporting firms are more likely to survive in foreign markets. To investigate our prediction, we incorporate an interaction between GBL and GES. The GBL, *LINK,* measures the aggregate number of bank linkages of country $i$ in country $j$ and this is simply the sum of bank pairs in which banks in country $i$ lend to those in country $j$. The bank linkages are computed based on syndicated bank loans from Dealogic's Loan Analysis,[2] and then rescaled by dividing by 100. The results are summarised in Table 6. The coefficients of interaction in all models are statistically significant and have the expected positive sign. The findings suggest that GBLs play an essential role in mitigating the adverse impacts of GES on export performance. Our emphasis on the moderating role of GBL on the sanction-export survival nexus supports Peterson's discussion.

### Endogeneity Issue

Up to now, we have abstracted the endogeneity issue that possibly stems from the reverse causality between GES and export survival, and omitted variables. Concerning reverse causality, as contended by Wagner (1988), a country that survives longer in foreign markets can maintain its international relationships, thus it climbs to a higher position in the global trade network. While sanctions express a country's bargaining power, a better position in the global trade network implies a strong bargaining power, and therefore influences sanction actions. Furthermore, the levels of vulnerability and leverage, which also depend on the position in the global trade network, determine the type of sanction behaviour such as unilateral or multilateral sanctions (Peterson, 2018). Concerning the omitted variables, the existence of unobservable factors such as export-oriented policies that influence both firms' survival and sanctions can lead to biased estimation.

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[2] We thank Caballero *et al.* (2018) for sharing the data.

**Table 5. Interaction between sanctions and global value chains**

| VARIABLES | First-year Survivor | | | Second-year Survivor | | | Third-year Survivor | | |
|---|---|---|---|---|---|---|---|---|---|
| | Total GVC | Backward | Forward | Total GVC | Backward | Forward | Total GVC | Backward | Forward |
| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) | (9) |
| Sanction | -0.0402 | -0.0443*** | -0.0324 | -0.0466* | -0.0313* | -0.00407 | -0.0139 | -0.0518*** | -0.0224 |
| | (0.0330) | (0.0144) | (0.0340) | (0.0248) | (0.0167) | (0.0562) | (0.0200) | (0.0193) | (0.0370) |
| GVC | 0.00306 | 0.0147*** | 0.00543 | 0.00634* | 0.00964*** | 0.00345 | 0.00467 | 0.00882** | 0.00321 |
| | (0.00310) | (0.00326) | (0.00360) | (0.00334) | (0.00289) | (0.00322) | (0.00292) | (0.00404) | (0.00305) |
| Sanction*GVC | 0.00317 | 0.0628*** | 0.00313 | 0.0186 | 0.0397* | -0.0350 | -0.0157 | 0.284* | -0.00752 |
| | (0.0235) | (0.0163) | (0.0515) | (0.0146) | (0.0255) | (0.0931) | (0.0201) | (0.166) | (0.0838) |
| GDP | -0.00544 | -0.00305 | -0.00561 | -0.00108 | 0.00113 | -0.000489 | -0.0320** | -0.0307** | -0.0316** |
| | (0.0120) | (0.0119) | (0.0119) | (0.0121) | (0.0121) | (0.0121) | (0.0139) | (0.0139) | (0.0139) |
| lnD | -0.0424*** | -0.0386*** | -0.0430*** | -0.0366*** | -0.0373*** | -0.0400*** | -0.0324*** | -0.0329*** | -0.0346*** |
| | (0.00439) | (0.00404) | (0.00389) | (0.00386) | (0.00359) | (0.00346) | (0.00353) | (0.00337) | (0.00326) |
| FTA | -0.00125 | -0.000415 | -0.00203 | 0.0129** | 0.0128** | 0.0120* | 0.0134** | 0.0133** | 0.0129** |
| | (0.00664) | (0.00655) | (0.00671) | (0.00604) | (0.00604) | (0.00614) | (0.00524) | (0.00523) | (0.00531) |
| HHI | -0.0223 | -0.0252 | -0.0226 | -0.0149 | -0.0159 | -0.0143 | -0.00423 | -0.00479 | -0.00405 |
| | (0.0170) | (0.0169) | (0.0170) | (0.0157) | (0.0156) | (0.0156) | (0.0138) | (0.0138) | (0.0138) |
| lnValue | 0.0141*** | 0.0143*** | 0.0142*** | 0.0116*** | 0.0121*** | 0.0121*** | 0.00756* | 0.00794** | 0.00783** |
| | (0.00308) | (0.00312) | (0.00310) | (0.00352) | (0.00359) | (0.00357) | (0.00389) | (0.00395) | (0.00391) |
| Share | -0.163*** | -0.168*** | -0.164*** | -0.209*** | -0.212*** | -0.210*** | -0.192*** | -0.194*** | -0.192*** |
| | (0.0471) | (0.0472) | (0.0473) | (0.0352) | (0.0352) | (0.0353) | (0.0263) | (0.0263) | (0.0264) |
| Observations | 4 705 | 4 705 | 4 705 | 3 828 | 3 828 | 3 828 | 3 104 | 3 104 | 3 104 |
| Number of pair | 839 | 839 | 839 | 736 | 736 | 736 | 685 | 685 | 685 |
| Country FE | YES | YES | YES | YES | YES | YES | YES | YES | YES |
| Year FE | YES | YES | YES | YES | YES | YES | YES | YES | YES |
| R2 | 0.420 | 0.423 | 0.420 | 0.504 | 0.504 | 0.502 | 0.510 | 0.511 | 0.509 |

Robust standard errors in parentheses; *** p < 0.01, ** p < 0.05, * p < 0.1.

Source: own study.

**Table 6. Interaction between sanctions and global bank linkages**

| VARIABLES | First-year Survivor (1) | Second-year Survivor (2) | Third-year Survivor (3) |
|---|---|---|---|
| Sanction | -0.0474*** (0.0129) | -0.0391*** (0.0143) | -0.0365*** (0.0125) |
| Link | -0.00276 (0.00218) | -0.00166 (0.00202) | -0.00202 (0.00183) |
| Sanction*Link | 0.0476*** (0.0104) | 0.0218* (0.0131) | 0.0203*** (0.00457) |
| GVCtotal | 0.00289 (0.00304) | 0.00472 (0.00314) | 0.00570* (0.00307) |
| GDP | 0.00316 (0.0101) | 0.00712 (0.0104) | -0.0155 (0.0125) |
| lnD | -0.0432*** (0.00416) | -0.0383*** (0.00381) | -0.0335*** (0.00357) |
| FTA | 9.62e-05 (0.00624) | 0.0123** (0.00575) | 0.0121** (0.00485) |
| HHI | -0.0258 (0.0157) | -0.0130 (0.0148) | 0.00235 (0.0134) |
| lnValue | 0.0144*** (0.00331) | 0.0110*** (0.00392) | 0.00687 (0.00428) |
| Share | -0.167*** (0.0428) | -0.154*** (0.0432) | -0.108** (0.0501) |
| Constant | 0.713** (0.305) | 0.389 (0.316) | 0.956** (0.381) |
| Observations | 5 445 | 4 464 | 3 683 |
| Country FE | YES | YES | YES |
| Year FE | YES | YES | YES |
| R2 | 0.413 | 0.474 | 0.480 |

Robust standard errors in parentheses; *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.
Source: own study.

The above discussions suggest that there is potential for the endogeneity issue, which may bias our estimation results. To address this issue, we apply the instrumental variable (IVs) method. We apply the location average approach proposed by Fisman and Svensson (2007). In this article, we employ the average sanction level applied to a target country by all sender countries as an instrumental variable. As revealed by Baldwin and Jaimovich (2012), this instrument is well built in the standard domino effect of tariff liberalisation. Moreover, the location average approach can minimise omitted unobservable errors related to sanction intensity (Ha *et al.*, 2021). We also used the Global Peace Index (GPI) taken from the Institute for Economics and Peace as another instrument. Cox and Drury (2006) reveal the relationship between sanction and demographic peace. To check the validity of the instrumental variables, we conducted various endogeneity tests and report them to Table 7. All tests demonstrate that our instruments are valid and appropriate. The IV estimation results are then outlined in Table 8. It can be seen that the effects of GES on export survival become more pronounced when the endogeneity issue is controlled.

**Table 7. Endogeneity test**

| Sanction (First stage model) | Coefficient | | |
|---|---|---|---|
| | First-year Survivor | Second-year Survivor | Third-year Survivor |
| Sargan $\chi^2$ statistics (Over-identification test) | 3.41 (0.64) | 0.07 (0.783) | 1.47 (0.225) |
| Anderson Canon.Corr. LM statistic (Under-identification test) | 2312.17 (0.000) | 1814.08 (0.000) | 1363.71 (0.000) |
| Cragg-Donald Wald F-statistic | 4891.20 (0.000) | 3958.58 (0.000) | 3243.57 (0.000) |

Source: own study.

**Table 8. IV estimation**

| VARIABLES | First-year Survivor | Second-year Survivor | Third-year Survivor |
|---|---|---|---|
| | (1) | (2) | (3) |
| Sanction | -0.0644*** (0.0242) | -0.0556** (0.0220) | -0.0413** (0.0205) |
| GVCtotal | 0.00691* (0.00395) | 0.00795** (0.00334) | 0.00790*** (0.00283) |
| GDP | -0.00533 (0.0146) | 0.00537 (0.0138) | -0.0195 (0.0152) |
| lnD | -0.0368*** (0.00476) | -0.0329*** (0.00415) | -0.0278*** (0.00368) |
| FTA | 0.00363 (0.00809) | 0.0104 (0.00744) | 0.0111* (0.00620) |
| HHI | -0.0462** (0.0191) | -0.0379** (0.0170) | -0.0396** (0.0162) |
| lnValue | 0.0164*** (0.00394) | 0.0116*** (0.00341) | 0.00953** (0.00383) |
| Share | -0.304*** (0.0430) | -0.335*** (0.0343) | -0.315*** (0.0290) |
| Constant | 0.939** (0.442) | 0.439 (0.420) | 1.078** (0.461) |
| Observations | 3 588 | 2 916 | 2 290 |
| Country FE | YES | YES | YES |
| Year FE | YES | YES | YES |
| R2 | 0.424 | 0.490 | 0.530 |

Robust standard errors in parentheses; *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.
Source: own study.

## CONCLUSIONS

This article uses a database of 66 countries during the 1997-2014 period to investigate the association between global sanctions and export survival. By employing the structural gravity model, we indicate the adverse effects of global sanctions on export survival. The marginal effects of sanctions become stronger if there is a longer physical or "soft" distance between the sender and target country. By contrast, our study suggests two channels, GVCs and GBLs, through which exporters in target countries can alleviate the harmful effects of sanctions.

Our empirical findings are expected to provide some vital implications for both economists and policy makers to help exporters survive better and maintain international trade when confronting the threat of economic sanctions. Our findings show that being a part of global linkages makes the consequence of sanctions less significant. Regarding the sanctioning states, our findings provide implications to improve the success of economic sanctions, especially if the target countries have a good connection

with others through trade and capital investments. In particular, other policies that aim to disrupt global linkages such as global supply chains, global banking networks and global investments, should be implemented simultaneously with economic sanctions. In this spirit, the combination of different policies could make economic sanctions more effective. Regarding the sanctioned states, these countries should become more involved in global linkages to alleviate economic hardship due to economic sanctions. In addition, the governments of target countries should encourage firms to indirectly invest in the senders through their partners and subsidiaries. These policies could be considered as a way to ease tensions between sanctioning and sanctioned countries.

Although we do our best to control all the potential issues, our study still contains limitations that need to be improved upon in further research. Firstly, we only focus on the direct effects of sanctions on the target countries, while their spillover effects on third parties that are either non-embargoed products or non-sanctioning countries, as suggested by Crozet and Hinz (2017), suggest more interesting policy implications. Secondly, other channels through which the impacts of economic sanctions may be mitigated should be considered. Thirdly, the effects of sanctions on other types of international transactions such as the formation of global investment and banking networks, or on other dimensions like welfare and entrepreneurship in the target countries should be investigated. Future research should take these issues into account to shed more light on the effects of sanctions.

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## Appendix: Definition of export survival rate

- Entrant$_t$: a firm that does not export in year t-1 but exports in year t.
- Survivor$_t$: a firm that does not export in year t-1 but exports in both years t and t+1.
- 2-Year Survivor$_t$: a firm that does not export in year t-1 but exports in years t, t+1 and t+2.
- 3-Year Survivor$_t$: a firm that does not export in year t-1 but exports in years t, t+1, t+2 and t+3.

$FSUR_t = Survivor_t/Entrant_t$
$SSUR_t = \text{2-Year Survivor}_t/Entrant_t$
$FSUR_t = \text{3-Year Survivor}_t/Entrant_t$

**Table A.1. Countries in the sample**

| Country | % | Country | % | Country | % | Country | % |
|---|---|---|---|---|---|---|---|
| United Arab Emirates | 1.50 | Chile | 1.58 | Spain | 1.97 | India | 1.79 |
| Argentina | 1.62 | China | 1.86 | Estonia | 1.33 | Ireland | 1.71 |
| Australia | 1.79 | Colombia | 1.23 | Finland | 1.46 | Iceland | 0.65 |
| Austria | 1.68 | Costa Rica | 0.96 | France | 2.24 | Israel | 1.08 |
| Belgium | 2.02 | Czechia | 1.68 | United Kingdom | 2.07 | Italy | 1.99 |
| Bulgaria | 1.54 | Germany | 2.11 | Greece | 1.44 | Japan | 1.85 |
| Bahamas | 1.05 | Denmark | 1.81 | Hong Kong | 1.89 | Korea | 1.67 |
| Brazil | 1.94 | Dominican Republic | 0.82 | Honduras | 0.47 | Lithuania | 1.15 |
| Canada | 2.03 | Ecuador | 0.88 | Hungary | 1.74 | Luxembourg | 1.88 |
| Switzerland | 1.90 | Egypt | 1.32 | Indonesia | 1.48 | Latvia | 1.25 |
| **Country** | **%** | **Country** | **%** | **Country** | **%** | | |
| Morocco | 1.00 | Poland | 1.67 | Turkey | 1.47 | | |
| Mexico | 1.59 | Portugal | 1.71 | Ukraine | 1.15 | | |
| Malaysia | 1.61 | Romania | 1.50 | Uruguay | 1.35 | | |
| Netherlands | 2.30 | Russian Federation | 1.71 | United States | 2.33 | | |
| Norway | 1.71 | Singapore | 1.75 | Venezuela | 1.33 | | |
| New Zealand | 1.17 | El Salvador | 0.55 | South Africa | 1.71 | | |
| Pakistan | 0.87 | Slovenia | 1.06 | | | | |
| Panama | 1.48 | Sweden | 1.60 | | | | |
| Peru | 1.50 | Thailand | 1.64 | | | | |
| Philippines | 1.25 | Trinidad and Tobago | 0.55 | | | | |

Source: own study.

| **Author** |
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**Le Thanh Ha**
PhD in Policy Analysis from National Graduate Institute for Policy Studies. He is currently a lecturer at the Faculty of Economics, National Economics University. His main research areas are macroeconomic analysis, international economics, financial stability, and corporate performance analysis.
**Correspondence to:** Dr. Le Thanh Ha, National Economic University, Faculty of Economics, 207 Giai Phong, Hanoi, Vietnam. e-mail: halethanh.kt@gmail.com
**ORCID** ⓘ http://orcid.org/0000-0002-4517-9097

| **Conflict of Interest** |
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