



Export survival for Thailand after the COVID-19 pandemic

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Abstract: This paper investigates trend and pattern of export survival in Thailand compared to its competitors in the region during the period of 2000-2020. We found that Thailand has high export survival for total merchandise and its product subcategories and has high level of export diversification. Moreover, the COVID-19 pandemic did not cause significantly export failure for the main exporting market of Thailand. In the econometrics results, economic size of bilateral partnerships, average exports, GPNs products, FTAs, and good business environment can reduce hazard rate of exports. Relating to policy implications, government should improve business environment, especially trade facilitation, for supporting higher export survival in Thailand. Also, doing export diversification is a choice of reducing export failures. However, the decision of doing export diversification should be done by exporters, not government, because government cannot bear the risk of export failure from doing export diversification.

Keywords: Export Survival, International Trade, COVID-19 pandemic

JEL codes: F10, F13, O24

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1. Introduction

The COVID-19 pandemic leads to the new challenge for export survival for developing countries since the COVID-19 significantly slowdown international trade (Padhan & Prabheesh, 2021). Most developing countries experienced with the export contraction in during the COVID-19 pandemic. Thai exports are also affected by the COVID-19 pandemic. Total exports in Thailand drop from 250.1 billion US\$ in 2018 to 245.4, 229.2 billion US\$ in 2019 and 2020, respectively. In other words, Thailand's export contractions in 2019 and 2020 are approximately -2.1% and -8.5% compared to its exports in 2018. This export contraction is not only a decrease in export income, but also become export failure in some product lines.

In fact, Thailand has faced the risk of export survival since 2000 due to the highly competitive international trade after Asian newcomers (China and Vietnam) entering the world market. During the last two decades, China and Vietnam become significantly new crucial exporters in the world. As the results, most FDI inflow tended to concentrate in China and Vietnam. Moreover, some MNEs in Thailand decided to move their factories to Vietnam. This circumstance raises serious concerns over Thailand's export survival in some exported products in the future.

In addition, the COVID-19 pandemic will challenge Thailand' export survival. After the COVID-19 pandemic disappears, we could expect that most countries need to accelerate their economies via more exporting but less importing. Some countries may implement policies of export promotion and trade barrier. Also, world demand may not be recovered quickly. Thus, both factors would drive more and more highly competitive in the world market which would affect Thailand export survival as well.

The latest research on export competitiveness by Daruich, Easterly, and Reshel (2019) found that both developing and developed countries have the instability of export competitiveness all the time. In other words, that most countries could lose their highly specialized exported products rapidly in the short periods. This finding is consistent with the international trade research (Córcoles, Díaz-Mora, & Gandoy (2015); Albornoz, Fanelli, & Hallak, (2016); Besedes & Nitsch (2019) which investigate the trend and determinant of export survival in both developing and developed countries. One finding is that the exported products into the USA market from most countries have a short exporting duration, on average only 2-4 years. In other words, some countries could export their products to the USA market for short period and would stop exporting their products quickly. Thus, the duration of a product being exported in the short period could not guarantee its export survival in the future.

The most important policy debate on export survival during the COVID-19 pandemic is "export diversification policy" which could diversify the exporting risk on existing exported products and could bring export resilience for developing countries. However, this policy is like a policy of picking new potential exported products. Based on the above studies, the big concern is that new exported products have a low export survival rate. Thus, this policy may be appropriate when we trade-off the subsidy cost of new exported product against the uncertain benefit of new exported products.

Thus, this paper aims to examine the trend and pattern of export diversification and export survival in Thailand compared to some Asian developing countries during the period of 2000-2020. Moreover, this paper investigates the determinant of export survival among Thailand and its selected competitor in Asia. The results would suggest the chance of promoting export diversification and the appropriate policy on enhancing export survival.

The rest of the paper is structured as follows. Section 2 discuss the literature review on the trend and determinant of export survival for both developing and developed countries. Section 3 describes the estimation method of measuring the level of export diversification and the export survival rate by adopting the Kaplan-Meier Estimator and then present the results of trend and pattern of export diversification and export survival. Section 4 undertakes an econometric analysis of the determinant of export survival. The final section summarises the findings and makes policy inferences.

2. Literature review

The literature review on the pattern of export survival is of interest to international trade economists because most economists found that there are many exported product lines being zero values and new exported products from developing countries exit the market in the short period. Moreover, some product lines in each country used to export for the long period, but a country stop exporting and never export its product lines again. These trade patterns cause big two research questions. One is that what is the export survival pattern? Another one is that what is the determinant of export survival?

Besedes and Prusa (2006a, 2006b) found that new exported products from both developing and developed countries into the USA market had a short survival period, on average, 2-4 years per products. However, differentiated goods tends to have higher export survival rate compared to homogenous goods. Other previous studies such as Brenton, Pierola, and von Uexkull (2009), Besedes and Blyde (2010), and Brenton, Saborowski, and von Uexkull (2010) also found the short export survival pattern. However, developing countries in Asia have more higher export survival rate than developing countries in Latin America. For example, based on the Kaplan-Meier Estimator (K-M), the first-exporting service in Asian developing countries and Latin American developing countries have the export survival rate of 47.1% and 45.7%, respectively. The export survival rates gradually decrease after the first year of exporting and drop to only 11.8% and 6.9% in the 15th year of exporting, respectively (Besedes & Blyde, 2010).

The studies of export survival in firm level also found that exporting firms experience a decreasing rate of export survival according to the period of exporting services for both developing and developed countries such as Canada (Baldwin, Dupuy, & Richard Gellatly, 2000; Sabuhoro & Gervais, 2006), Spain (Pérez, Llopis, & Llopis, 2004), Chile (Alvarez &

Lopez, 2008), China (Fu & Wu, 2014), Argentina (Albornoz, Fanelli, & Hallak, 2016), and Thailand (Apaitan, Disyata, & Samphantharak, 2019).

In Canada, exporting firms have a chance of stop export in the first 12 months for 42.2% and the median of being exporters is only 20 months (Sabuhoro & Gervais, 2006). For the case of Thailand, exporting firms would stop their exports in the end of the fifth year for 86% of total exporting firms. This finding implies that firm's export survival maintenance is not simple job. Even though exporting firm could overcome barriers to export, this requirement does not guarantee firm's export survival in the longer period.

What is the importance of export survivals? The previous studies found that export survivals in both product level and firm level significantly determine the long-run export growth. Brenton, Pierola, and von Uexkull (2009) and Besedes and Prusa (2011) found that higher export survival rate is correlated with more higher export growth in the future, while product lines of being exported, stopped, and re-exported tend to low export growth. This finding is consistent with the studies of firm level. Eaton, Eslava, Kugler, and Tybout (2009) found that, in Columbia, new exporting firms in 1996 maintained their export survival could have higher exporting income, and their export incomes accounted for almost 50% of total Columbia's export income in the period of 1996-2005.

Moreover, determinant of export duration is main interest of the literature review in the level of firm level and product level. The understanding of export survival determinant is important for explain export survival pattern among countries and for appropriate policy recommendation in the firm level and country level. In the previous studies, there are key determinant factors as follows.

1. Characteristics of exporters – exporting firms can maintain different rate of export survival by their characteristics (heterogenous firms). The firm's characteristics include firm's scale, firm's export ratio, number of exporting destinations, number of exporting products, exporting under global production networks. The previous studies found that big firms can have higher export survival rate compared to small firms (Fu & Wu, 2014; Sabuhoro & Gervais, 2004). Interestingly, exported products under global production network have more higher export survival rate than homogenous products.

2. Asymmetric information between exporters and importers – new exporters hardly access full information on cost of exporting. However, new exporters can realize the cost of exporting when they already exported. Thus, some new exporters may export only one period and stop exporting because of unexpected higher exporting cost (Rauch, 1999). The cost of exporting includes the standard of product quality, the international trade requirement, deliver cost, and others. On the other hand, importers and buyers experience the asymmetric information of exporters, especially the uncertainty of exporter's product quality and high-volume production capacity (Rauch & Watson, 2003). Asymmetric information can result in the lower export survival rate.

3. Exporting experiences – exporters with exporting a product in a country can survive their exports in new exporting markets at highly survival rate (Bernard & Jensen, 2004; Ozler et al., 2009). This finding implies that learning by exporting is important for developing countries. Moreover, the process of sequential exporting exists for developing countries. Mostly, exporters in developing countries export their products in the near region and then use their initial export experience information for their future export in other regions (Albornoz, Pardo, Corcos, & Ornelas, 2012). However, Carrère and Strauss-Kahn (2017) found that the effect of exporting experiences decreases rapidly. This means that market information in the last one or two years may not help exporters to maintain their export survival. In other words, exporters need to search for market information all the time due to the rapid changes in exporting market.

4. Government's export promotion – government can resolve the asymmetric information of international trade via many forms of export promotion such as research grant for domestic firms, exporting advisory, and trade exhibition arrangement. Lederman, Olarreaga, and Zavala (2015) found that government's export promotion can encourage exporters in Latin America to entry to exporting market and maintain higher export survival rate. In contrast, there is no evidence of export promotion can significantly support firm's export survival in the USA (Bernard & Jensen, 2004) and Ireland (Gorg, Henry, & Stobl, 2008).

5. Distance between trade partnership – distance is the key determinant factor in Gravity Model. Distance between trade partnership reflects the level of trade cost. The near distance implies the lower trade cost. Thus, short distance has positive impact on export survival rate (Cadot, Carrère, & Strauss-Kahn, 2011).

6. Other factors – other determinant factors are included in the model of export survival i.e., type of exported products, FTAs, common language, exchange rate, initial export values, and partnership's economy size (Brenton, Pierola, & von Uexkull, 2009; Fugazza & Molina, 2011; Carrère & Strauss-Kahn, 2017; Besedes & Blyde, 2010; Cadot, Carrère, & Strauss-Kahn, 2011). For example, final products are sensitive to exchange rate volatility. However, there is no evidence that exchange rate volatility significantly affects parts and components (Obashi, 2010).

Lastly, the previous studies mostly adopt Cox Proportional Model (Cox, 1972) for investigating the determinant of export survival in both firm level and product level. In this model, there is no assumption on the distribution of export failure. This model allows us to include other factors. Thus, the model is flexible and is used in most studies. In addition, the previous studies are concerned about the process of data cleaning and data arranging because of data mistake. For example, the record of bilateral international trade in some products are too low value such as below than 100US\$ per product in a year. This situation is impossible and there is an error record in bilateral trade.

3. Export Survival

3.1 Methodology and data

3.1.1 Measure of export survival

The methodology of measuring export survival in this paper is adopted by the Kaplan-Meier estimator (K-M) (Kaplan & Meier, 1958) as following formular.

$$S(t_j) = \prod_{j < t} \left(\frac{n_j - d_j}{n_j} \right) \quad (1)$$

where $S(t)$ reflects the rate of export survival for all exported products in a country in the beginning of export relationship in year 1 to the end year t . n is number of existing exported products and d is number of export failures.

Table 1 Export survival pattern at product level

Item	2000	2001	2002	2003	2004	2005	2006	Pattern	
1	X	X	X	O	O	O	O	Left censored	Single Spell
2	O	O	X	X	X	X	X	Right censored	Single Spell
3	O	O	X	X	X	X	O	Completed	Single Spell
4	O	X	X	O	X	X	O	Completed	Multiple Spells
5	O	X	X	O	X	X	X	Non-completed	Multiple Spells

Note: X - year of being exported and O – year of stop exported.

Source: Author.

The pattern of export survival can be showed in Table 1. The pattern is categorized by single spell and multiple spell. The pattern may be left censored, right censored, completed, and non-completed (see Table 1). The vital point is that the left-censored spell must be dropped because we do not know the duration of export. Thus, in table 1, we must drop item 1 from our analysis to avoid the mismeasurement in export survival.

This paper also cut the bilateral trade with its export value below than 1,000 US\$ in each product. This methodology is used in the previous studies. Moreover, we estimate the export survival rates for total exports and its sub-categories including manufacturing exports, GPN exports, and Non-GPN exports.

3.1.2 Data

This paper employs international trade data from UNCOMTRADE between 2000 and 2020 for Thailand and its main competitors (7 countries): China, Cambodia, Indonesia, Malaysia, the Philippines, Vietnam. Based on this sample, we can consider the difference in trend and pattern of export survival and export diversification among Thailand and its main competitors in the long-span period (21 years) including the period of COVID-19 pandemic.

Moreover, the export survival measurement in each country based on the Standard International Trade Classification (SITC) Revision 3 at 5-digit level with having 3,115 product lines and 160 bilateral partnerships. In comparison to the Harmonized System (HS), SITC covers fewer goods than HS with around 5,000 product lines at 6-digit level. However, there are changes in HS codes for some goods among its different revisions between 2000 and 2020. Thus, we choose the SITC international trade data for avoiding mismeasurement in export survival in the case of changes in product codes.

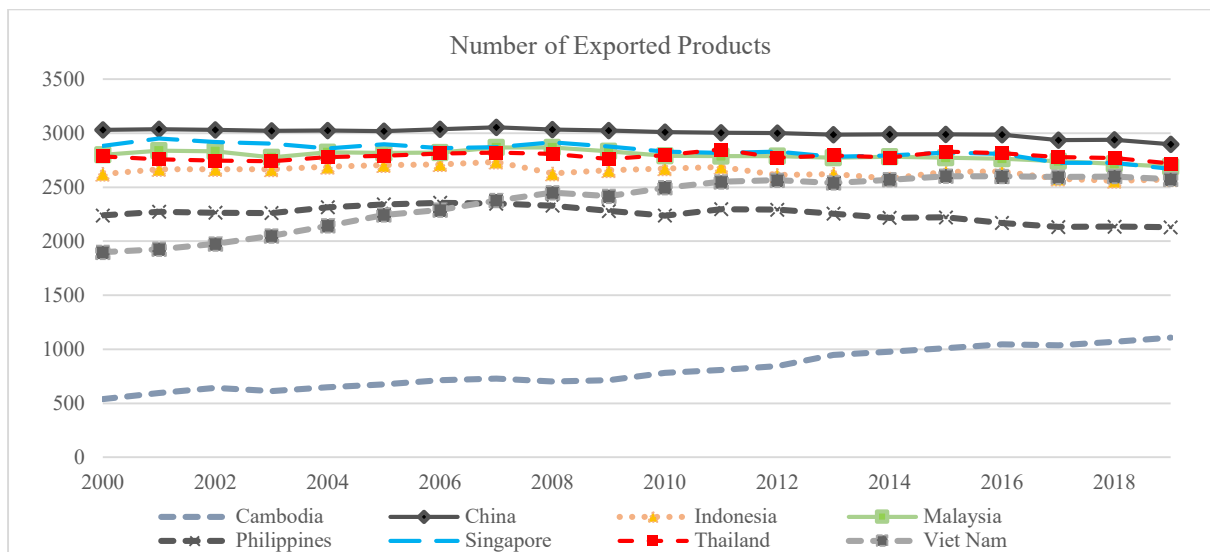
A discrepancy of international trade data is one big concern. There are asymmetries in international merchandise trade statistics, in which reported exports may not be the same as reported imports for any bilateral trade in some products. This problem can arise due to re-exports among bilateral partnerships. For example, country A reexports to country B. Country A might report exports to country B, but country B attributes its imports to a different partner on a country-of-origin basis. This situation could lead to biased results. Thus, this paper relies on the use of mirror trade statistics (imported data) instead of exported data for more accurate bilateral trade data.

3.2 Trend and pattern: export survival

At first glance, China has the highest exported product lines, followed by Thailand, Singapore, Malaysia, and Vietnam between 2000 and 2019. Interestingly, China's exported merchandise goods covers approximately 93 per cent of total SITC product lines (3,115 products). By comparison, number of exported product lines in Thailand was relatively high or accounted for 87 per cent of total SITC product lines in 2019 (Figure 1). In other words, Thailand has highly diversified its export basket in the period of 2000-2019 compared to other countries. This finding is consistent with the previous studies (Jongwanich, 2020; Tanasritunyakul, 2020). Also, this export diversification pattern existed in the rest of our sample, except the Philippines and Cambodia.

Thailand and its vital competitors can successfully maintain their number of exported product lines, even though these countries experienced a slightly decrease in exported product lines after the global economic crisis in 2008. In contrast, Vietnam experienced a massive increase in number of exported product lines (Figure 1). In the case of Thailand, its number of exported product lines dropped from 2,809 products in 2008 to 2,719 products in 2019. This reflected the export failure in Thailand which was mostly from manufactured products. This above situation implies two things. First is that Thailand and its competitors in East Asia diminished slightly their export diversification and moved toward their most specialized products. Second is that the introduction of new exported products might be harder for most ASEAN and China because those countries might reach the stage of export re-concentration and their number of exported product lines could not increase since 2008.

Figure 1 number of exported product lines in 2000-2019



Source: Author's computation using the UN Comtrade database.

In analysis of export survival, we start looking at number of exported products which are categorized by exporting duration (years) and average export value for reflecting the development of export survival and export performance in Thailand and its competitors. Our analysis excludes any exported products with having the left-censored spell (see Table 1). Figure 2 shows the shares of exported products classified by number of exporting years in each country for total merchandise and its subcategories. China is an outstanding case in keeping its export survival compared with other countries because its number of products being continually exported for 20 years accounts for 90 % of total exported products. This figure occurs in the case of total merchandise, manufactured products, GPN products, and non GPN products.

Thailand, Malaysia, and Singapore have the similar share of number of products being exported more than 11 years (more than 70% of total exported products). However, Vietnam, Indonesia, the Philippines, Cambodia experience the lower share of number of products being exported more than 11 years compared to the first group. Cambodia experienced the high risk of export failures compared to other countries. The number of products being exported less than 2 years accounted for 75% of total exported products.

The exported duration of GPN products is higher than non-GPN products. This pattern exists for our sample. For example, number of GPN and non-GPN products being exported for 20 years accounted for 70% and 60%, respectively. One interest is that share of number of exported products with high export survival in Thailand is more than Vietnam (Figure 2). This indicates that Thailand tends to highly involve with global production network rather than Vietnam. Also, Thailand could experience the lower probability of export failure in GPN products.

Figure 2 Number of exported product line categorized by survival years



Source: Author's computation using the UN Comtrade database.

Figure 3 Number of export product line categorized by its exported values (US\$)



Source: Author's computation using the UN Comtrade database.

Figure 3 shows the share of exported products categorized by their average values. China had the highest number of exported products being value of greater than 500,000 US\$ which accounted for 90% of total exported products. The highest value exported products (> 500,000 US\$) became higher in the case of GPNs accounting for 96% of total GPN exported products. We found similar finding in Thailand. The highest value of exported products in Thailand accounted for 40% of total merchandise and 76% of total GPN products. This finding also suggests that GPN products tend to induce higher export income compared to other products.

According to figure 2 and 3, we notice that a country with having high share of number of export survival products leads to higher share of number of high exported value products. In other words, keeping export survival could determine the growth of export income in the future. Cambodia is the opposite example. Cambodia experienced the lowest number of export survival products and the lowest value of exported products; number of exported value of less than 10,000\$ was the highest compared to other countries.

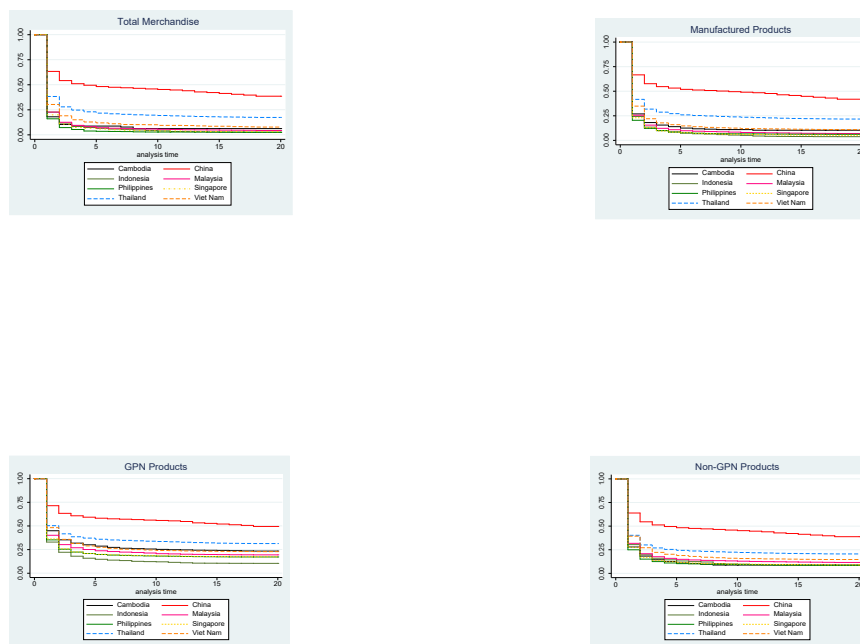
In analysis of export survival by Kaplan-Meier Estimator (K-M) is shown in figure 4. K-M analysis leads to the same results. However, K-M can estimate the export survival rate in any given year. China has the highest rate of export survival, followed by Thailand and Vietnam. Look at total merchandise, at the year 5 of exported service, number of exported products dropped by 50 % of total initial exported products at the first year of exported service in China. In contrast, this figure in Thailand and Vietnam decreased by 25% and 15 of total initial exported products.

One notice is that the K-M results in figure 4 show that any country keeping its export survival for 10 years experienced the constant rate of export survival. In other words, its risk of export failure is lower significantly. This finding suggests that exporters need to accumulate longer exporting experiences to ensure their export survival. In other words, a short time exporting experience does not guarantee the export survival in the future, especially one-two years duration of exporting.

Comparison between GPN products and non-GPN products, the export survival rate in GPN products is higher than that of non-GPN products. This situation occurs among Thailand and other countries (figure 4). Interestingly, we observe that the export survival rates in GPN products among countries are vast different. However, the export survival rates in non-GPN among countries are close to each other, except China. In other words, Thailand and other countries except China tend to experience differ risks of export failure for GPN product. In contrast, Thailand tend to have similar risk of export failure compared to other countries, except China.

In the case of GPN products, China and Thailand have higher rate of export survival rather than other countries. This suggests that the engagement in global supply chain in China and Thailand is very high. In other words, MNEs have accumulated experiences in production skill and technical knowledge in both countries. Thus, MNEs would not decide to move their plants easily from China and Thailand. This finding is consistent with Kohpaiboon and Jongwanich (2021) which found that no evidence of changing in global supply chain in East Asia during the COVID-19 pandemic.

Figure 4 Export survival rates (The Kaplan-Meier Estimator)



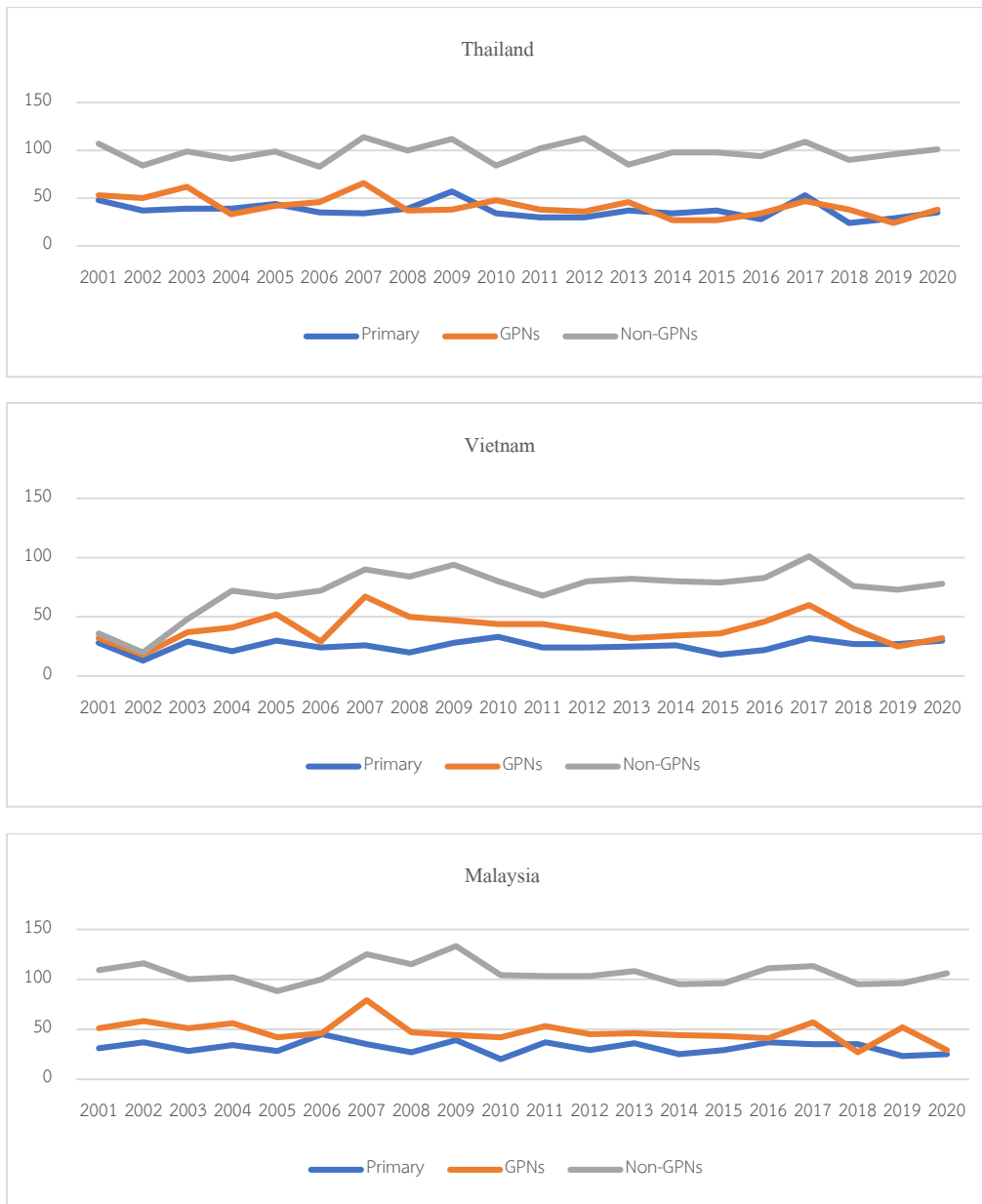
Source: Author's computation using the UN Comtrade database.

However, the effect of COVID-19 pandemic on export survival is interesting point. However, we have limitation of available international trade data during 2020-2021. Thus, the international trade data during 2019-2020 is too short to investigate the overall effect of COVID-19. However, with the data limitation, we may measure the effect of COVID-19 pandemic by changes in number of export failure products in the main imported market such as the US market.

Figure 5 shows number of export failure products in the US market including primary product, GPN products, and non-GPN products. The export failure products at time t are defined as any exported product at the time $t-1$ being non-exported product at time t . In-out market is the nature of exported products for all countries. Thus, export failure products happen at any time. In this paper, we estimate number of export failure products during 2001-202 to compare export failure among Thailand, Vietnam, and Malaysia.

We found that number of export failure products were not different between before and during of COVID-19 pandemic for our sample. However, non-GPN experienced the highest rate of export failure compared to GPN products and primary product. However, the uncertainty of the COVID-19 pandemic results in ambiguous prediction about the effect of COVID-19 on export survival in the next two-three years.

Figure 5 Number of export failure in the USA market



Source: Author's computation using the UN Comtrade database.

4. Determinant of export survival

4.1 The econometric model

This paper employs the Cox Proportional Hazards Models (Cox, 1972) to investigate the determinant factors of export survival among Thailand and other countries. The assumption in this model is that the determinant factors have a constant impact on hazard over time. The hazard function: $h(t)$ is written as follows.

$$h(t) = (h_0(t))e^{\beta X} \quad (2)$$

where $h_0(t)$ is the basic export failure (hazard) rate at time t , X is the vector of export survival determinant factors. β is the coefficients of determinant factors. Note that $h(t)$ is the export failure rate instead of the export survival rate. However, export failure and export survival reflect the same thing. Probability of export failure is 1 minus probability of export survival.

According to the previous studies, Besedes and Prusa (2006a, 2006b), Brenton, Pierola, and von Uexkull (2009) and Obashi (2010) suggest the determinant factor of export survival in the Cox model as follows.

(1) Initial export reflects the initial exporting cost between bilateral partners. Higher initial export value leads to higher export failure.

(2) Average export measures the effect of export expansion on export survival. Higher average export value has the positive impact on export survival.

(3) Distance measures transaction cost between bilateral partners. Longer distance makes the transaction cost higher which leads to lower export survival.

(4) Market size is measured by gross domestic product in trade partner reflecting the level of economic development and the level of purchasing. Bigger market size would give bigger imported goods orders, then the export failure would be lower.

(5) Multiple spells are the bilateral trade pattern being in (being exported) and out (stop exporting). Multiple spells reflect trail exporting experiences. However, this factor could have positive impact or negative impact on export survival. In fact, exporting experience does not guarantee export survival in the future. Look at multiple spells have a negative impact on export survival. This case indicates that exporters could not adjust towards to the market condition. Exporting experience gives market information, but exporter is not still able to respond the market condition. Finally, exporter decided to stop their exporting.

(6) Real effective exchange rate is captured the effect of price and exchange rate on export survival. If real effect exchange rate appreciates, exporter would have lower trade competition and lower export survival. In this paper, real effective exchange rate is measured by difference in real effective exchange rate between initial year of exporting and ending year of exporting.

(7) GPN is a dummy variable which captures the effect of GPN product on export survival. This dummy variable is 1 if exported products are GPN, otherwise is 0.

(8) Business environment measures the effect of laws and regulations in doing business on export survival. This paper employs two indices: starting business index and ease doing business index. This determinant factor is measures by difference in business environment index between initial year of exporting and end year of exporting.

(9) FTA is captured the effect of FTA between bilateral partners on export survival. FTA would encourage the export growth between bilateral partners due to tariff privilege benefit. So, FTA should result in lower export failure.

(10) After the world crisis 2008 is a dummy variable which captures the survival export for new exported products. We believe that new exported products after the world crisis would face lower export survival compared to introductory of exported products before the world crisis.

In analysis of econometric model, we employ panel dataset in the period of 2000-2019 covering Thailand and other competitors which include 160 trade partners. This is because of no available data in 2020 for most trade partners.

Source of dataset in our regression model is as follows. We calculate initial export, average export, and multiple spells from using UNCOMTRADE dataset. Distance between bilateral partners, trade partner's GDP, real effective exchange rate, FTA are from The Centre d'Études Prospectives et d'Informations Internationales (CEPII). In this paper, real effective exchange rate is defined as follows. If a decrease in real effective exchange rate reflects real appreciate effective exchange rate, then a country would have lower competition. Moreover, business environment data (starting business scores and ease doing business scores) is from World Bank. If an increase in starting business scores and ease doing business scores reflects better business environment.

Trade partner's GDP is measured by real GDP in 2010. Also, we consider FTA related to Asian region such as ASEAN, ASEAN-Japan, ASEAN-South Korea, ASEAN-China, ASEAN-Australia, and ASEAN-New Zealand because Thailand and other competitors have high trade integration in these FTAs compared to other FTAs outside Asian region.

4.2 Result of export survival determinant

Our regression results are shown in table 2. The coefficient of determinant factors is Hazard Ratio (HR) denoting the failure rate of exported products. Our interpretation is that a decrease in risk at export failure reflects higher export survival rate. Thus, we can interpret our regression model as follows.

The coefficient of HR is lower than 1, the rate of export survival increases.

The coefficient of HR is 1, there is no impact on the rate of export survival.

The coefficient of HR is greater than 1, the rate of export survival decreases.

In table 2, we found that our determinant factors are statistically significant at 99 %. Thus, the variables in the model can explain the export survival rate. Also, the coefficient signs are consistent with the previous studies.

Our regression results suggest that exporter's market size, trade partner's market size, average export, GPN products, good business environment result in higher export survival. However, starting business score and ease doing business have slightly different magnitude coefficient. In other words, both business environment indices lead to different impact on export survival.

Table 2 Estimation results of export survival model

	Model 1	Model 2	Model 3	Model 4	Model 5
lnGDP_Exporter	0.875*** (0.003)	0.874*** (0.002)	0.872*** (0.002)	0.690*** (0.004)	0.687*** (0.004)
lnGDP_Importer	0.890*** (0.001)	0.888*** (0.001)	0.889*** (0.001)	0.861*** (0.001)	0.860*** (0.001)
lnDistance	1.143*** (0.003)	1.157*** (0.003)	1.157*** (0.003)	1.175*** (0.003)	1.192*** (0.003)
lnInitial Export	1.080*** (0.002)	1.076*** (0.002)	1.075*** (0.002)	1.098*** (0.002)	1.093*** (0.002)
lnAverage Export	0.816*** (0.002)	0.815*** (0.002)	0.815*** (0.002)	0.796*** (0.002)	0.794*** (0.002)
Multiple Spell	1.352*** (0.006)	1.350*** (0.005)	1.345*** (0.005)	1.711*** (0.007)	1.701*** (0.007)
Changes in Real Effective Exchange Rate	1.000*** (0.000)	1.000*** (0.000)	1.000*** (0.000)	1.000 (0.000)	1.000 (0.000)
Changes in Starting Business	0.915*** (0.000)	0.914*** (0.000)	0.914*** (0.000)		
Changes in Ease Doing Business				0.826*** (0.001)	0.825*** (0.001)
GPNS		0.771*** (0.003)	0.771*** (0.004)		0.737*** (0.006)
FTA			0.759*** (0.007)		0.690*** (0.008)
After Crisis 2008			1.043*** (0.004)		
Chi-squared	196,779.240	199,133.750	197747.660	186076.410	183793.92
P-value	0.000	0.000	0.000	0.000	0.000
Robust standard errors	Yes	Yes	Yes	Yes	Yes
Observations	278,831	278,831	278,831	231,843	231,843

Note: *** is significant level at 99% and The standard errors are reported in parentheses.

Source: Author's estimation.

Comparison between exporter market size and trade partner's market size, exporter's market size, reflecting level of economic development, have higher impact on export survival rather than trade partner's market size. However, this finding holds in the case of the regression model with ease doing business (model 4 and 5 in table 2).

The impact of average export on export survival is obvious. If average export increases by 1%, then the rate of export failure decreases by 20%. Moreover, the coefficient of HR in ease doing business is less than that of starting business. This indicates that improving business environment by ease doing business would reduce higher rate of export failure compared to

starting business. Bilateral trade in the same FTA and GPN products have a negative impact on export failure. In case of GPN products, bilateral trade in GPN products could reduce the rate of export failure by 20 – 27 % compared to other exported products.

In contrast, our regression results found that distance, initial export, multiple spells, the dummy variable for after the world economic crisis decrease the rate of export survival because their coefficients (HR) are less than 1. In table 2, multiple spells have the highest negative impact on export survival compared to other variables. This indicates that the experience of trial and error in exporting could not help exporters learn to adjust towards to new trade competition environment. One reason is that the market condition might change rapidly. The purchaser might require higher quality standard, order high volume, and negotiate product's price all the time. Under these conditions, exporters could not adjust themselves and experience export failure in many times.

Distance is still the important transaction cost which determines export survival in East Asia. We found that longer distance would increase the rate of export failure by 14-19%. Moreover, new exported products being launched in the market would experience higher rate of export failure by 4.3% compared to exported products being introduced before the world economic crisis.

Finally, real effective exchange rate has no impact on export survival in all models. In other words, real appreciate exchange rate or real depreciate exchange rate might not affect export survival significantly. The advance in exchange rate insurance system would be one reason which explains no impact of real exchange rate on export survival. Also, real appreciate exchange rate does not only increase price of exported products, but also decrease imported material cost. So, exporters can manage price adjustment appropriately related to any exchange rate situations.

5. Conclusion and policy

This paper investigates the trend of export survival among Thailand and its competitors and estimates the impact of determinant factors on export survival by employing the Cox Proportional Hazard Model covering the period of 2000-2020. We found that Thailand has the higher export survival compared to its competitor except only China because Thailand can highly involve with global production network. This situation is shown by the rate of export survival in GPNs products for Thailand is higher than other countries, except China.

Moreover, the COVID-19 pandemic did not cause significantly export failure for the main exporting market of Thailand. In the econometrics results, economic size of bilateral partnerships, average exports, GPNs products, FTAs, and good business environment can reduce hazard rate of exports. Relating to policy implications, government should improve business environment, especially trade facilitation, for supporting higher export survival in Thailand. Also, doing export diversification is a choice of reducing export failures. However, the decision of doing export diversification should be done by exporters, not government, because government cannot bear the risk of export failure from doing export diversification. According to Thailand's highly export diversification level, doing export diversification would be difficult for Thailand exporters because its number of exported product lines was around 2,700 products in 2019 compared to 3,100 products based on HS Code at 5-digit level.

References

- Albornoz, F., Fanelli, S., & Hallak, J. C. (2016). Survival in export markets. *Journal of International Economics*, 102, 262-281.
- Albornoz, F., Pardo, H. F. C., Corcos, G., & Ornelas, E. (2012). Sequential exporting. *Journal of International Economics*, 88(1), 17-31.
- Alvarez, R., & López, R. A. (2008). Entry and exit in international markets: Evidence from Chilean data. *Review of International Economics*, 16(4), 692-708.
- Apaitan, T., Disyatat, P., & Samphantharak, K. (2019). Dissecting Thailand's International Trade: Evidence from 88 Million Export and Import Entries. *Asian Development Review*, 36(1), 20-53.
- Athukorala, P. (2014). Global production sharing & trade patterns in East Asia. In I. Kaur, & N. Shin (Eds.), *Oxford Handbook of Pacific Rim Economies* (pp. 334-360). New York: Oxford University Press.
- Athukorala, P. (2019). Joining global production networks: Experience and prospects of India. *Asian Economic Policy Review*, 14(1), 123-143.
- Baldwin, J. R. B., Dupuy, L., & Richard Gellatly, G. (2000). Failure Rates for New Canadian Firms: New Perspectives on Entry and Exit, Statistics Canada Mimeograph (2000).
- Bandick, R. (2020). Global sourcing, firm size and export survival. *Economics: The Open-Assessment E-Journal*, 14(2020-18): 1-29.
- Bernard, A. B., & Jensen, J. B. (2004). Why some firms export. *Review of economics and Statistics*, 86(2), 561-569.
- Besedes, T., & Blyde, J. (2010). What drives export survival? An analysis of export duration in Latin America. Inter-American Development Bank, mimeo, 1, 1-43.
- Besedes, T., & Nitsch, V. (2019). *Disrupted Economic Relationships: Disasters, Sanctions, Dissolutions*. MIT Press.
- Besedes, T., & Prusa, T. J. (2006a). Ins, outs, and the duration of trade. *Canadian Journal of Economics/Revue Canadienne D'économique*, 39(1), 266-295.
- Besedes, T., & Prusa, T. J. (2006b). Product differentiation and duration of US import trade. *Journal of international Economics*, 70(2), 339-358.
- Besedes, T., & Prusa, T. J. (2011). The role of extensive and intensive margins and export growth. *Journal of Development Economics*, 96(2), 371-379.
- Brenton, P., Saborowski, C., & Von Uexkull, E. (2010). What explains the low survival rate of developing country export flows?. *The World Bank Economic Review*, 24(3), 474-499.
- Cadot, O., Carrère, C., & Strauss-Kahn, V. (2011). Export diversification: what's behind the hump?. *Review of Economics and Statistics*, 93(2), 590-605.
- Carrère, C., & Strauss-Kahn, V. (2017). Export survival and the dynamics of experience. *Review of World Economics*, 153(2), 271-300.

- Córcoles, D., Díaz-Mora, C., & Gandoy, R. (2015). Export survival in global production chains. *The World Economy*, 38(10), 1526-1554.
- Cox, D. R. (1972). Regression models and life tables. *Journal of the Royal Statistical Society: Series B (Methodological)*, 34(2), 187-202.
- Daruich, D., Easterly, W., & Reshef, A. (2019). The surprising instability of export specializations. *Journal of Development Economics*, 137, 36-65.
- Eaton, J., Eslava, M., Kugler, M., & Tybout, J. R. (2009). 8. Export Dynamics in Colombia: Firm-Level Evidence (pp. 231-272). Harvard University Press.
- Fu, D., & Wu, Y. (2014). Export survival pattern and its determinants: an empirical study of Chinese manufacturing firms. *Asian-Pacific Economic Literature*, 28(1), 161-177.
- Fugazza, M and A.C.Molina (2011) "On the Determinants of Export Survival," Policy Issues in International Trade and Commodities Study Series No.46. UNCTAD.
- Görg, H., Henry, M., & Strobl, E. (2008). Grant support and exporting activity. *The review of economics and statistics*, 90(1), 168-174.
- Jongwanich, J. (2020). Export diversification, margins and economic growth at industrial level: Evidence from Thailand. *The World Economy*, 43(10), 2674-2722.
- Kaplan, E. L., & Meier, P. (1958). Nonparametric estimation from incomplete observations. *Journal of the American statistical association*, 53(282), 457-481.
- Kohpaiboon, A., & Jongwanich, J. (2021). The Effect of the COVID-19 Pandemic on Global Production Sharing in East Asia (No. ERIA-DP-2021-03).
- Lederman, D., Olarreaga, M., & Zavala, L. (2016). Export promotion and firm entry into and survival in export markets. *Canadian Journal of Development Studies/Revue canadienne d'études du développement*, 37(2), 142-158.
- Obashi, A. (2010). Stability of production networks in East Asia: Duration and survival of trade. *Japan and the World Economy*, 22(1), 21-30.
- Özler, Ş., Taymaz, E., & Yilmaz, K. (2009). History matters for the export decision: Plant-level evidence from Turkish manufacturing industry. *World Development*, 37(2), 479-488.
- Padhan, R., & Prabheesh, K. P. (2021). The economics of COVID-19 pandemic: A survey. *Economic analysis and policy*, 70, 220-237.
- Pérez, S. E., Llopis, A. S., & Llopis, J. A. S. (2004). The determinants of survival of Spanish manufacturing firms. *Review of Industrial Organization*, 25(3), 251-273.
- Rauch, J. E. (1999). Networks versus markets in international trade. *Journal of international Economics*, 48(1), 7-35.
- Rauch, J. E., & Watson, J. (2003). Starting small in an unfamiliar environment. *International Journal of industrial organization*, 21(7), 1021-1042.
- Sabuhoro, B. J., Larue, B., & Gervais, Y. (2006). Factors determining the success or failure of Canadian establishments on foreign markets: A survival analysis approach. *The International Trade Journal*, 20(1), 33-73.
- Tanasritunyakul, A. (2020). Asian Export Performance: Diversification, Product Variety, and Productivity, PhD Thesis, Australian National University.