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May 2023

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Keywords: ASEAN, Dependence on China; Japan; Supply chain; Trade diversion
JEL Classification: F15; F53

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1. Introduction

In Japan, "China risk" has been a keyword when doing business in China. Although its definition is not necessarily clear, in a broad sense, it includes possible economic damages driven by Chinese factors, such as economic or political conflict between China and foreign countries. Examples include China's sudden halting of exports of rare earth minerals to Japan after the Senkaku/Diaoyu Islands dispute in 2010. Furthermore, Japan's announcement of its intent to purchase part of those islands in 2012 led to calls for a boycott of Japanese goods in China. A more recent example includes the recent U.S.-China trade war and the lockdown of Shanghai in 2022 to combat COVID-19. This lockdown stopped production by not only Japanese affiliates in China but also factories in Japan due to the

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shortage of machinery parts produced in Shanghai. The experience of these economic damages has caused many Japanese firms to seek to reduce their economic exposure to China.

This study empirically investigates how Japan's dependence on China in supply chains has changed during the past decade. Specifically, we focus on Japan's imports from China in machinery industries, including the general machinery, electric machinery, transport equipment, and precision machinery industries. In the next section, we demonstrate that Japan had the highest share of imports of machinery goods from China out of all countries worldwide in 2012. In other words, Japan had the world's greatest dependence on imports from China. In this sense, Japan serves as the best case for examining import dependence on China. Over the past decade, furthermore, Japanese firms have tried to diversify their import sources. In particular, imports have increased from ASEAN countries due to their geographical proximity to Japan and their similar level of economic development to China's. As shown in the next section, ASEAN countries have recently become the second largest exporter of machinery goods to Japan, following China. Against this backdrop, we investigate what kinds of machinery products Japan imports from ASEAN countries more than from China.

In our empirical analysis, we rely on product-level import data in Japan from 2012 to 2021. We first summarize Japan's imports of machinery goods and then show that there is a heavy dependence on China in addition to a gradual increase in imports from ASEAN countries during the study period. Then, we conduct econometric analyses on Japan's shifting of imports from China to ASEAN countries by examining the share of imports from ASEAN countries out of the total imports from ASEAN countries and China. As a result, we find that Japan increased its relative imports from ASEAN countries in machinery goods with greater dependence on China during the earlier study period and in those with higher labor intensity during the later study period. The observed trend is especially strong in imports of machinery parts, in contrast to finished machinery goods. We also show no systematic changes in import prices from ASEAN countries relative to those from China, indicating that the increase of relative imports from ASEAN countries is driven by the change of import quantities.

To our knowledge, this is the first study that empirically examines the diversion of imports from China in the context of "China risk."[1] In contrast to "China risk," there have been many studies on "China shock," which mainly investigate the effect on employment of China's import penetration (e.g., Autor et al., 2013; Acemoglu et al., 2015; 2016; Pierce and Schott, 2016; Bloom et al., 2016; Asquith et al., 2019; Hayakawa et al., 2021). Our study is different from previous studies in that it focuses on the diversion of imports away from China. Although we do not directly examine the role of Japan's political conflicts with China, their effects on Japan's exports to China were explicitly investigated in Du et al. (2017) and

[1] The descriptive analysis is available in Marukawa (2021).

Heilmann (2016). In addition, while our study investigates the time-series changes in import dependence on China, Lafrogne-Joussier et al. (2022) examined the negative effects of the COVID-19 pandemic. They found that French firms relying on Chinese inputs before the beginning of the pandemic experienced a 5% decline in their exports and a 5.5% decline in domestic sales between February and June 2020. Our study adds to the existing literature by presenting the first empirical evidence on the diversion of imports from China.

The remainder of this paper is organized as follows. Section 2 provides an overview of Japan's dependence on China in machinery industries. After explaining our empirical framework in Section 3, we investigate the changing import allocation between China and ASEAN countries in Section 4. Section 5 concludes the study.

2. Overview of Japan's Machinery Imports

This section provides an overview of Japan's dependence on China in machinery industries. Specifically, we focus on Japan's imports in Chapters 84-92 in the Harmonized System (HS) classification. Data are obtained from the Global Trade Atlas (IHS Markit). Before focusing on Japan's imports, we first show that Japan has the world's greatest dependence on imports from China. Figure 1 shows the top 30 countries in terms of the share of machinery imports from China in 2012.[2] Japan had the highest share overall, at more than 40%. This shows that, in machinery imports, Japan was most dependent on China. Pakistan and Ethiopia were the next most dependent on China after Japan. Except for the U.S. and Netherlands, there are no Western countries (e.g., European countries) included in the ranking. Overall, developing countries tended have the highest dependence on China. Neighboring developed economies, namely, South Korea and Taiwan, also had relatively high shares.

=== Figure 1 ===

Next, we focus on Japan's imports. Figure 2 shows the relative shares of machinery imports from each region over the study period. China has continued to be the top exporter of machinery goods to Japan throughout the period. As shown in Figure 1, imports from China accounted for more than 40% of the total in the early 2010s. Although the share slightly declined in the latter half of the 2010s, it again rose to more than 40% in the 2020s.[3] The second highest share can be found in imports from ASEAN countries, but this has

[2] We do not include Hong Kong, which has the highest share.

[3] According to the Basic Survey on Overseas Business Activities by the Ministry of Economy, Trade and Industry in Japan, the share of imports from Japanese affiliates in China out of total imports in machinery industries declined during the study period: It was 49% in 2012 but decreased to 35% in 2019. In other words, Japan has increased imports from non-Japanese firms in China.

consistently been below 20% and much lower than the share of imports from China. Nevertheless, the share of imports from ASEAN countries has shown a gradual increase since the latter half of the 2010s. The figure also indicates that the share of imports from the U.S. has declined slightly while the share of imports from Taiwan has gradually risen.

=== Figure 2 ===

Next, we take a closer look at the import dependence on China. Specifically, Figure 3 depicts the distribution of product-level shares of machinery imports from China compared with other countries. Products are defined at an HS six-digit level. The figure shows the relative distributions in 2012, 2015, 2018, and 2021. For more than half of the products, the share of imports from China is less than 50%. The peaks of the distributions lie near 10%. However, some products had much higher shares, including some with almost 100% shares. In other words, Japan imported those products almost entirely from China. The time-series changes in the distributions are unclear.

=== Figure 3 ===

As shown in Figure 2, we find that the import share from ASEAN countries had risen, making them the second largest source of imports. Thus, in Figure 4, we investigate the import allocation between China and ASEAN countries at the product level. We first compute the share of imports from ASEAN countries out of the total imports from China and ASEAN countries. Then, we take its difference between 2012 and 2016 and between 2016 and 2021, for which the distributions are shown in Figure 4. The figure shows how imports from ASEAN countries relative to those from China change over time, with most products showing very small changes in both periods. Nevertheless, there are some products where imports from ASEAN countries greatly increased or decreased relative to those from China. For example, cathode ray television picture tubes (HS 854012) showed an increase in imports from ASEAN countries relative to China, while nickel-iron electric accumulators (HS 850740) showed a decrease.

=== Figure 4 ===

Lastly, we examine differences in the quality of import products between ASEAN countries and China. To this end, we compute the logarithm of unit import prices from ASEAN countries relative to those from China. The unit import prices from ASEAN countries are computed by dividing the sum of import values from ASEAN countries by the sum of their import quantities. The distributions of unit import price for 2012, 2015, 2018, and 2021 are shown in Figure 5. Positive values indicate that the unit import prices from ASEAN countries are higher than those from China. The figure shows that the distributions seem to be slightly biased to the right, implying that there are relatively many products where import prices from ASEAN countries are higher than those from China. This observation may indicate that, compared with China, ASEAN countries export products with higher quality to Japan. We do not see clear distributional changes over time.

=== Figure 5 ===

3. Empirical Framework

This section describes our empirical framework for investigating the import allocation between China and ASEAN countries in Japan. Specifically, we examine what kinds of machinery products Japan imports from ASEAN countries more than from China. In general, based on utility maximization by consumers or profit maximization by downstream producers, imports are determined by several elements, including exporters' factor prices, exporters' technology, importers' income, and importers' preferences (i.e., weights on specific origins in utility or production function). Since we consider China and ASEAN countries to be exporters, the differences in factor prices and technology between the two play a key role in the import allocation in Japan.

Based on the discussion above, we specify our estimation equation as follows.

$$\begin{aligned}\Delta ASEAN\ Share_{pt} \\ &= \beta_1 CHN\ Share_{pt-1} + \beta_2 Labor\ intensity_p + \beta_3 \Delta ASEAN\ Relative\ Exports_{pt} \\ &+ \epsilon_{pt} \qquad (1)\end{aligned}$$

where

$$\Delta ASEAN\ Share_{pt} \equiv \frac{Imports_{p2021}^{ASEAN}}{Imports_{p2021}^{ASEAN} + Imports_{p2021}^{China}} - \frac{Imports_{pt}^{ASEAN}}{Imports_{pt}^{ASEAN} + Imports_{pt}^{China}},$$

$$CHN\ Share_{pt-1} \equiv \frac{Imports_{pt-1}^{China}}{Imports_{pt-1}^{World}},$$

$$\Delta ASEAN\ Relative\ Exports_{pt} \equiv \frac{ASEAN\ Exports_{p2021}}{CHN\ Exports_{p2021}} - \frac{ASEAN\ Exports_{pt}}{CHN\ Exports_{pt}}.$$

Here, $Imports_{pt}^{r}$ refers to Japan's imports of HS six-digit code p from region r (ASEAN, China, or World) in year t. $ASEAN\ Exports_{pt}$ and $CHN\ Exports_{pt}$ are total exports of product p from ASEAN countries and China worldwide in year t, respectively. The dependent variable ($\Delta ASEAN\ Share_{pt}$) is the change of the share of imports from ASEAN countries from year t to year 2021.

We examine three independent variables. The first is Japan's dependence on China in an initial period, which is represented by the share of Japan's imports from China out of its total imports ($CHN\ Share_{pt-1}$). To decrease the risk of simultaneity bias, we measure this share in year t−1. Japan's relative imports from ASEAN countries may increase more for the products with greater dependence on China. In other words, if preference weights on China decrease over time or those on ASEAN countries increase, Japan will increase imports from ASEAN countries relative to those from China. Second, we examine the role of the labor intensity of imported products ($Labor\ intensity_p$). Rising wages more strongly impact the production costs of more labor-intensive products than those of less labor-intensive products. Therefore, if wages grow more rapidly in China than in ASEAN countries, Japan's increase of relative imports from ASEAN countries will more likely be observed in more labor-intensive products. Indeed, as shown in Table 1, China recorded a higher GDP per capita growth rate than any ASEAN country from 2012 to 2021. Last, the third variable intends to capture the technological changes in ASEAN countries relative to that in China ($\Delta ASEAN\ Relative\ Exports_{pt}$). We use the change in total exports worldwide as a proxy for technological change.[4] Thus, the third variable is represented by the change of worldwide exports from ASEAN countries relative to those from China from year t to year 2021.

=== Table 1 ===

We estimate equation (1) by the ordinary least square (OLS) method. As in the analysis presented in Section 2, the study products are restricted to those in machinery industries (HS 84-92). The year t includes 2013 to 2020. We estimate equation (1) according to year t rather than pool all years in the estimation in order to examine the time-series changes in significant factors. Thus, in our estimation for each year, our empirical identification relies on variation across products. We obtain the data on Japan's imports and China's exports from the Global Trade Atlas. The data on ASEAN countries' exports are drawn from the ASEAN Stats Data Portal.[5] Labor intensity is computed as a share of labor expenses out of total output values, which is obtained from Japan's Input-Output Table in 2015. The basic statistics are provided in the Appendix.

4. Empirical Results

This section reports our estimation results. The baseline results for all machinery products are shown in Table 2. The significant variables differ by period. In the earlier period, the coefficients for dependence on China (i.e., *CHN Share*) are significantly positive and are relatively large. Namely, Japan increased imports from ASEAN countries relative to those from China for products with greater dependence on China. This result may indicate Japanese firms' reaction against the island dispute with China in 2012 based on the

[4] To decrease the risk of simultaneity bias, worldwide exports do not include those to Japan.

[5] https://data.aseanstats.org/

experience of China's halting of exports of rare earth minerals in 2010. In contrast, the coefficients for labor intensity turn out to be significantly positive in the later period. In other words, in the later period, Japan's imports increase for the more labor-intensive goods from ASEAN countries. Export competitiveness in China is attributed to not only lower wages but also the existence of large supporting industries. Our results may indicate that cost increases due to wage hikes begin to outweigh the benefit from the agglomeration of supporting industries for the more labor-intensive goods. The change in ASEAN's exports relative to China's does not have significant coefficients over the entire study period.[6]

=== Table 2 ===

Next, we examine the non-linear effect of the dependence on China. Specifically, we introduce dummy variables for quartiles of *CHN Share* instead of using it as a continuous variable. The first quartile is used as the base case. The results are shown in Table 3. While the coefficients for the second quartile dummy variable are likely not significant, the third and fourth quartile dummy variables have significant positive coefficients. Thus, the relative increase of imports from ASEAN may occur in only the products with relatively greater dependence on China. The coefficients for the fourth quartile dummy variable are slightly larger than those for the third quartile dummy variable. The results for labor intensity and changes in relative exports from ASEAN countries are not very different from those in Table 2.

=== Table 3 ===

We also estimate equation (1) separately for machinery parts and finished machinery goods. We follow the method described by Kimura and Obashi (2010) to identify "parts and components" within the trade flows of the machinery industries.[7] They classify each HS six-digit code into either machinery parts or finished machinery products. The estimation results for finished machinery products and machinery parts are shown in Tables 4 and 5, respectively. For finished machinery products, most coefficients are estimated to be non-significant. The dependence on China has significantly positive coefficients only in the periods 2014-2021 and 2016-2021. The coefficient for *ASEAN Relative Exports* is positive and significant in the period 2016-2021. On the other hand, the results for machinery parts are

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[6] These results are unchanged even if we restrict imports from ASEAN countries to only those from the five major exporters, namely, Indonesia, Malaysia, Singapore, Thailand, and Vietnam. The results are shown in Table A3 in the Appendix.

[7] We did not use the Broad Economic Categories (BEC), which classify products into either capital goods, consumption goods, or intermediate goods (or not classified elsewhere). Machinery parts identified in Kimura and Obashi (2010) include 14% of capital goods, 10% of consumption goods, and 96% of intermediate goods in the BEC. The list in Kimura and Obashi (2010) includes not only intermediate goods but also other types of machinery goods as parts that are traded in the business-to-business market.

similar to those for all products presented in Table 2. That is, Japan increased the relative imports from ASEAN countries for machinery parts that had greater dependence on China during the earlier study period as well as for those with higher labor intensity during the later study period. This contrast between finished machinery products and machinery parts may indicate that there is a large benefit of locating downstream industries in a large consumer market, namely, China. In other words, the export competitiveness of downstream industries may be less likely to fade in China.

=== Tables 4 & 5 ===

Last, we examine the changes of unit import prices from ASEAN countries and China. Specifically, in equation (1), we replace the dependent variable with the following variable:

$$\Delta ASEAN\ Price_{pt} \equiv \ln\left(\frac{Import\ price_{p2021}^{ASEAN}}{Import\ price_{p2021}^{CHN}}\right) - \ln\left(\frac{Import\ price_{pt}^{ASEAN}}{Import\ price_{pt}^{CHN}}\right)$$

Here, $Import\ price_{pt}^{r}$ refers to the unit import price of the HS six-digit code p from region r in year t. That is, we investigate the log difference in the ratio of unit import prices from ASEAN countries to those from China from year t to 2021. The results as estimated by the OLS method are reported in Table 6. Almost all variables have non-significant coefficients, indicating no systematic changes in import prices from ASEAN countries relative to those from China according to our independent variables. The significantly positive coefficient for dependence on China in 2020 would be the effect of the COVID-19 pandemic. In the first half of 2020, China suffered negative effects of the pandemic, which then spread to neighboring countries through supply chains (Hayakawa and Mukunoki, 2021). To mitigate this negative effect, Japan may decide to increase imports from ASEAN countries even if their prices are high. The positive coefficients for labor intensity in recent years indicate that import goods from ASEAN countries comparable to those from China do have higher prices than before, but the change is not significant. In sum, the above results for import values are mainly driven by changes in import quantities, not those in import prices.

=== Table 6 ===

5. Concluding Remarks

This study empirically investigated how Japan's import dependence on China in machinery industries changed from 2012 to 2021. We first showed that Japan was the country with the world's greatest dependence on imports from China as of 2012. We then demonstrated a gradual increase in Japan's imports from ASEAN countries. Next, our econometric analyses indicated that Japan increased its relative imports from ASEAN countries compared with those from China in machinery goods, especially machinery parts, with greater dependence on China during the earlier study period and a higher labor intensity during the later study period. This relative increase of imports from ASEAN countries is mainly driven by import quantities rather than import prices. If wages continue to rise in China, Japan will continue increasing relative imports from ASEAN countries. Lastly, the recent export control measures on semiconductor-related products imposed by the U.S. government may have some impact on Japan's imports from China. It will be interesting to investigate this in future work.

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Table 1. GDP Per Capita in 2012 and 2021 (USD)

	2012	2021	Growth
China	6,301	12,556	99%
Brunei	46,843	31,449	-33%
Cambodia	950	1,625	71%
Indonesia	3,668	4,333	18%
Lao PDR	1,566	2,536	62%
Malaysia	10,602	11,109	5%
Myanmar	1,161	1,210	4%
Philippines	2,672	3,461	30%
Singapore	55,546	72,794	31%
Thailand	5,749	7,066	23%
Vietnam	2,190	3,756	72%

Source: World Development Indicators

Table 2. OLS Estimation Results: All Products

Year *t*	2013	2014	2015	2016	2017	2018	2019	2020
CHN Share (*t*-1)	0.1004***	0.1277***	0.0875***	0.0792***	0.0703**	0.0375	0.0602***	0.0438*
	[0.0305]	[0.0306]	[0.0294]	[0.0274]	[0.0275]	[0.0262]	[0.0218]	[0.0223]
Labor intensity	0.0219	0.1022	0.1973	0.19	0.2096	0.2177*	0.1907**	0.3024***
	[0.1487]	[0.1333]	[0.1358]	[0.1392]	[0.1274]	[0.1219]	[0.0950]	[0.1066]
ΔASEAN Relative Exports	0.0084	0.0039	0.0041	0.0114	0.0017	-0.0138	0.0015	-0.0019
	[0.0091]	[0.0115]	[0.0085]	[0.0086]	[0.0093]	[0.0099]	[0.0088]	[0.0122]
Number of observations	966	971	968	976	974	978	974	983
Adjusted R-squared	0.014	0.019	0.011	0.012	0.008	0.006	0.008	0.011

Source: Author’s estimation.

Notes: This table shows estimation results obtained using the OLS method. The dependent variable is the change of the share of imports from ASEAN countries from year *t* to year 2021. ***, **, and * indicate 1%, 5%, and 10% levels of statistical significance, respectively. Robust standard errors are reported in parentheses.

Table 3. Non-linear Effects: All Products

Year *t*	2013	2014	2015	2016	2017	2018	2019	2020
Q2. CHN Share (*t*-1)	0.0161	0.0716**	0.0228	0.0323	0.0473*	-0.0003	0.0404	0.0118
	[0.0307]	[0.0310]	[0.0296]	[0.0305]	[0.0287]	[0.0288]	[0.0245]	[0.0238]
Q3. CHN Share (*t*-1)	0.0655**	0.0947***	0.0504*	0.0566*	0.0635**	0.0083	0.0381*	0.0216
	[0.0304]	[0.0295]	[0.0293]	[0.0300]	[0.0289]	[0.0269]	[0.0221]	[0.0234]
Q4. CHN Share (*t*-1)	0.0668**	0.1128***	0.0706**	0.0663**	0.0660**	0.0275	0.0546**	0.0354
	[0.0302]	[0.0291]	[0.0289]	[0.0290]	[0.0284]	[0.0276]	[0.0216]	[0.0231]
Labor intensity	-0.0099	0.0495	0.1819	0.1636	0.176	0.2244*	0.1578	0.2989***
	[0.1443]	[0.1318]	[0.1303]	[0.1368]	[0.1249]	[0.1178]	[0.0964]	[0.1045]
ΔASEAN Relative Exports	0.0093	0.0055	0.0044	0.0115	0.0018	-0.0136	0.0024	-0.0025
	[0.0091]	[0.0113]	[0.0085]	[0.0085]	[0.0092]	[0.0099]	[0.0088]	[0.0122]
Number of observations	966	971	968	976	974	978	974	983
Adjusted R-squared	0.012	0.022	0.010	0.012	0.010	0.005	0.009	0.010

Source: Author's estimation.

Notes: This table shows estimation results obtained using the OLS method. The dependent variable is the change of the share of imports from ASEAN countries from year *t* to year 2021. ***, **, and * indicate 1%, 5%, and 10% levels of statistical significance, respectively. Robust standard errors are reported in parentheses.

Table 4. OLS Estimation Results: Finished Goods

Year *t*	2013	2014	2015	2016	2017	2018	2019	2020
CHN Share (*t*-1)	0.0586	0.1072***	0.0574	0.0592*	0.0515	0.0045	0.0434	0.0185
	[0.0378]	[0.0383]	[0.0361]	[0.0342]	[0.0365]	[0.0316]	[0.0272]	[0.0278]
Labor intensity	-0.0593	0.1449	0.0961	0.2152	0.1096	0.0145	-0.0222	0.2517
	[0.2307]	[0.1948]	[0.2054]	[0.2243]	[0.2058]	[0.1796]	[0.1435]	[0.1595]
ΔASEAN Relative Exports	0.0186	0.0104	0.0085	0.0199*	0.002	-0.0124	0.0014	-0.006
	[0.0122]	[0.0161]	[0.0110]	[0.0114]	[0.0119]	[0.0118]	[0.0109]	[0.0142]
Number of observations	562	565	564	572	570	572	570	575
Adjusted R-squared	0.011	0.015	0.003	0.011	-0.001	-0.001	-0.001	0.002

Source: Author's estimation.

Notes: This table shows estimation results obtained using the OLS method. The dependent variable is the change of the share of imports from ASEAN countries from year *t* to year 2021. ***, **, and * indicate 1%, 5%, and 10% levels of statistical significance, respectively. Robust standard errors are reported in parentheses.

Table 5. OLS Estimation Results: Intermediate Goods

Year *t*	2013	2014	2015	2016	2017	2018	2019	2020
CHN Share (*t*-1)	0.1853***	0.1635***	0.1462***	0.1202***	0.1035***	0.1067**	0.0889***	0.0936**
	[0.0501]	[0.0526]	[0.0512]	[0.0451]	[0.0362]	[0.0453]	[0.0336]	[0.0366]
Labor intensity	0.1226	0.051	0.3279**	0.1353	0.3364***	0.4792***	0.4594***	0.3613***
	[0.1658]	[0.1738]	[0.1651]	[0.1378]	[0.1173]	[0.1563]	[0.1128]	[0.1333]
ΔASEAN Relative Exports	-0.0124	-0.0102	-0.0037	-0.0061	0.0015	-0.0164	0.0018	0.016
	[0.0118]	[0.0126]	[0.0128]	[0.0117]	[0.0125]	[0.0160]	[0.0130]	[0.0204]
Number of observations	404	406	404	404	404	406	404	408
Adjusted R-squared	0.036	0.026	0.026	0.018	0.032	0.038	0.051	0.042

Source: Author's estimation.

Notes: This table shows estimation results obtained using the OLS method. The dependent variable is the change of the share of imports from ASEAN countries from year *t* to year 2021. ***, **, and * indicate 1%, 5%, and 10% levels of statistical significance, respectively. Robust standard errors are reported in parentheses.

Table 6. Regression of Import Price Ratios: All Products

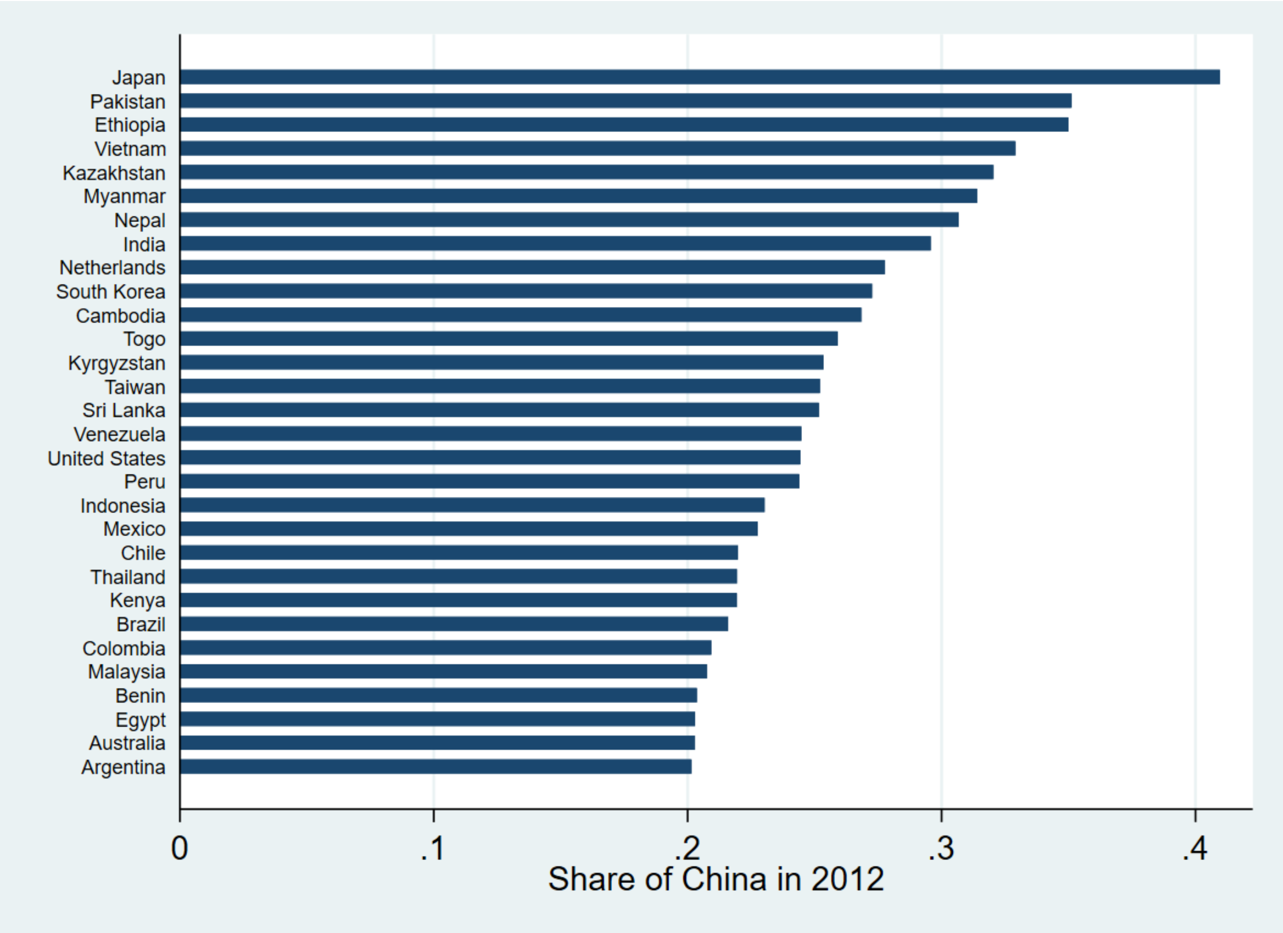
Year *t*	2013	2014	2015	2016	2017	2018	2019	2020
CHN Share (*t*-1)	0.0118	-0.3594	-0.1965	-0.3204	-0.1883	-0.0015	-0.1477	0.3703**
	[0.2173]	[0.2404]	[0.2059]	[0.2480]	[0.2049]	[0.2102]	[0.1890]	[0.1776]
Labor intensity	-0.8805	-0.5395	0.782	0.8884	-0.0873	0.1043	0.4396	0.4646
	[0.7988]	[0.8514]	[0.7510]	[0.8772]	[0.7573]	[0.7943]	[0.6011]	[0.6392]
ΔASEAN Relative Exports	0.0317	-0.0516	-0.0705	0.0201	0.1425	-0.0245	0.0445	0.0613
	[0.0553]	[0.0593]	[0.0602]	[0.0764]	[0.0996]	[0.0958]	[0.0744]	[0.1232]
Number of observations	721	734	732	734	740	740	752	736
Adjusted R-squared	-0.003	0.001	0.001	0.000	0.003	-0.004	-0.002	0.004

Source: Author's estimation.

Notes: This table shows estimation results obtained using the OLS method. The dependent variable is the log difference in the ratio of unit import prices from ASEAN countries to those from China from year *t* to 2021. ***, **, and * indicate 1%, 5%, and 10% levels of statistical significance, respectively. Robust standard errors are reported in parentheses.

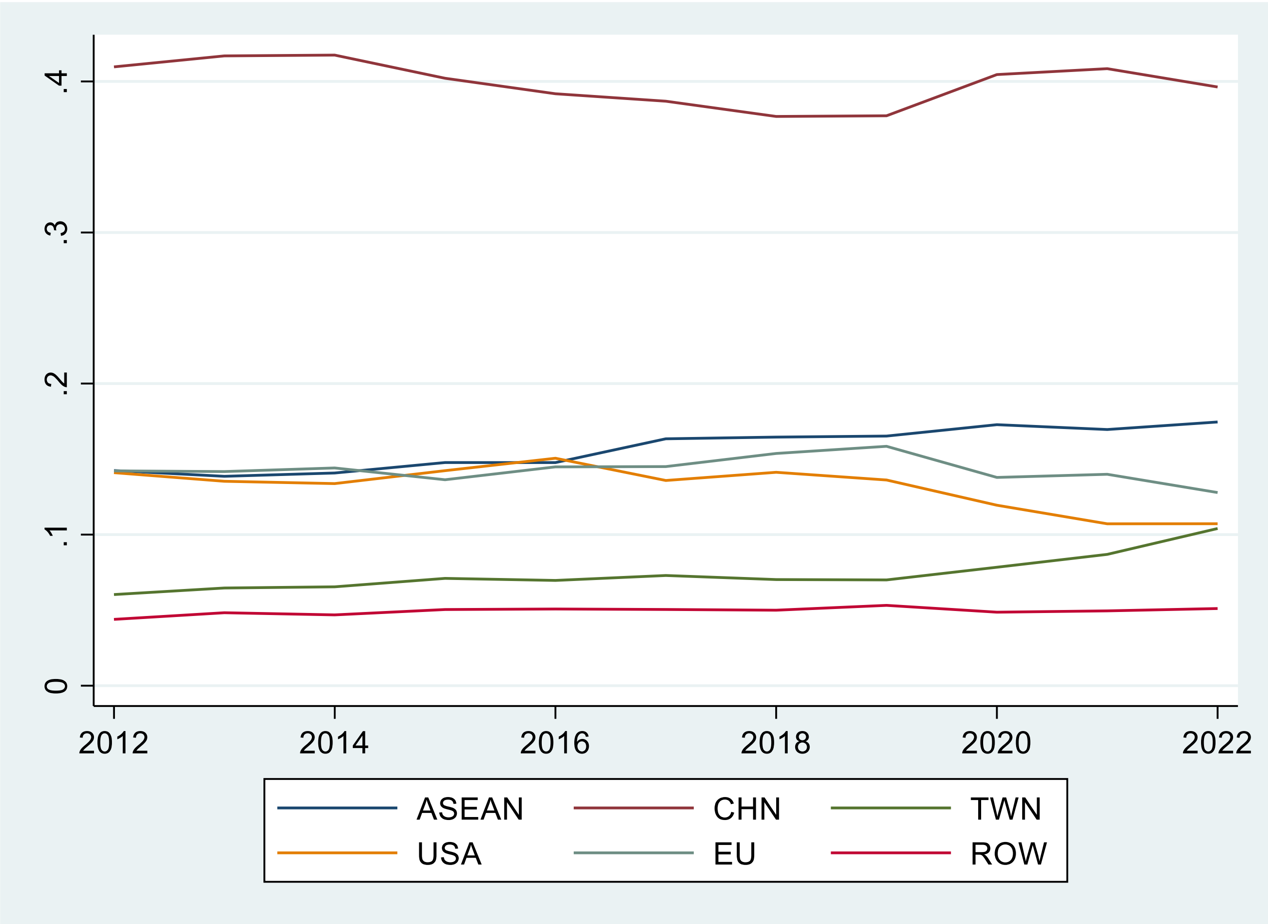
Appendix. Other Tables

Figure 1. Shares of Machinery Imports from China in 2012 (100*%)



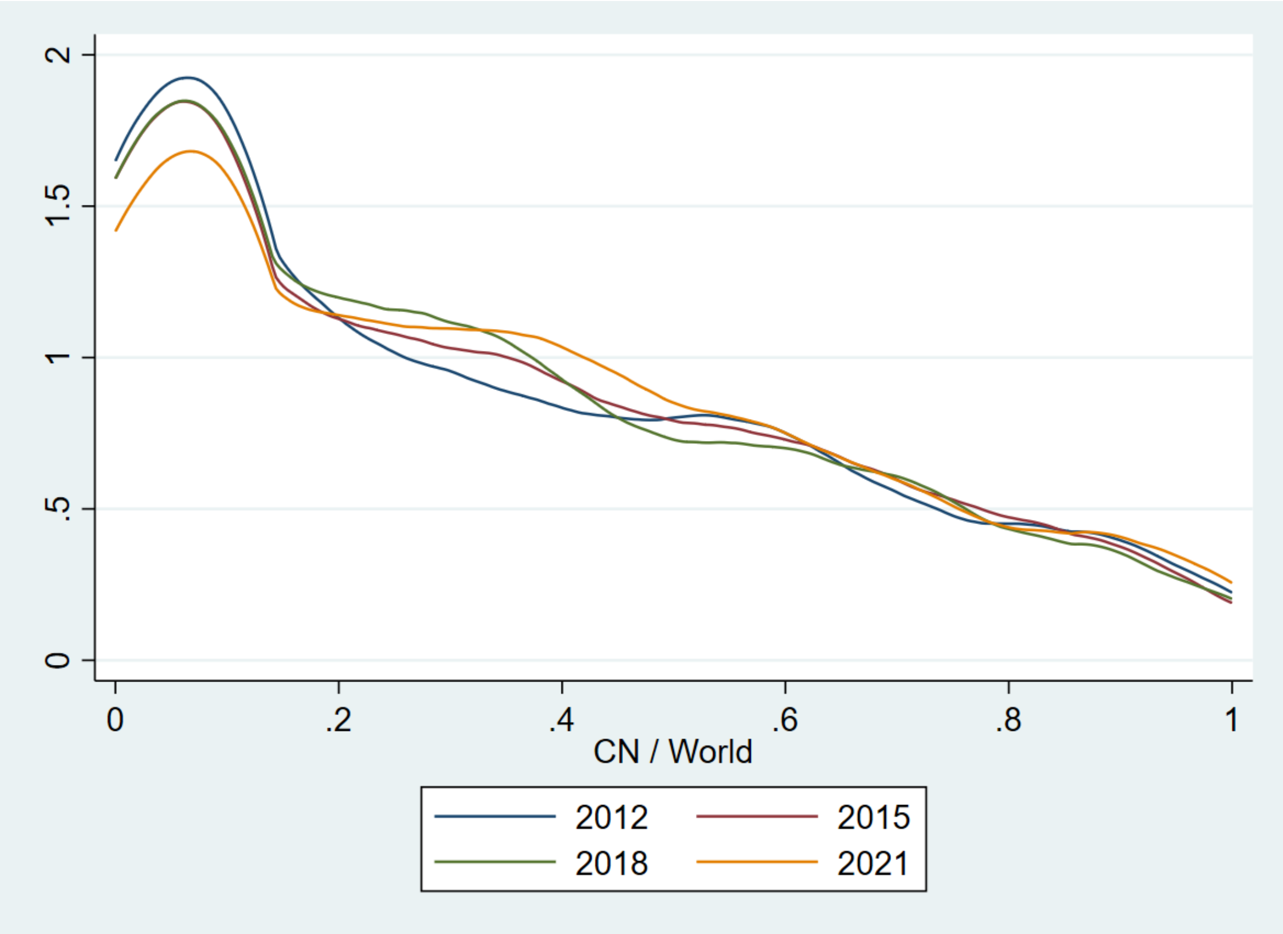
Source: Author's compilation using the Global Trade Atlas.

Figure 2. Shares of Machinery Imports from Each Region in Japan (100*%)



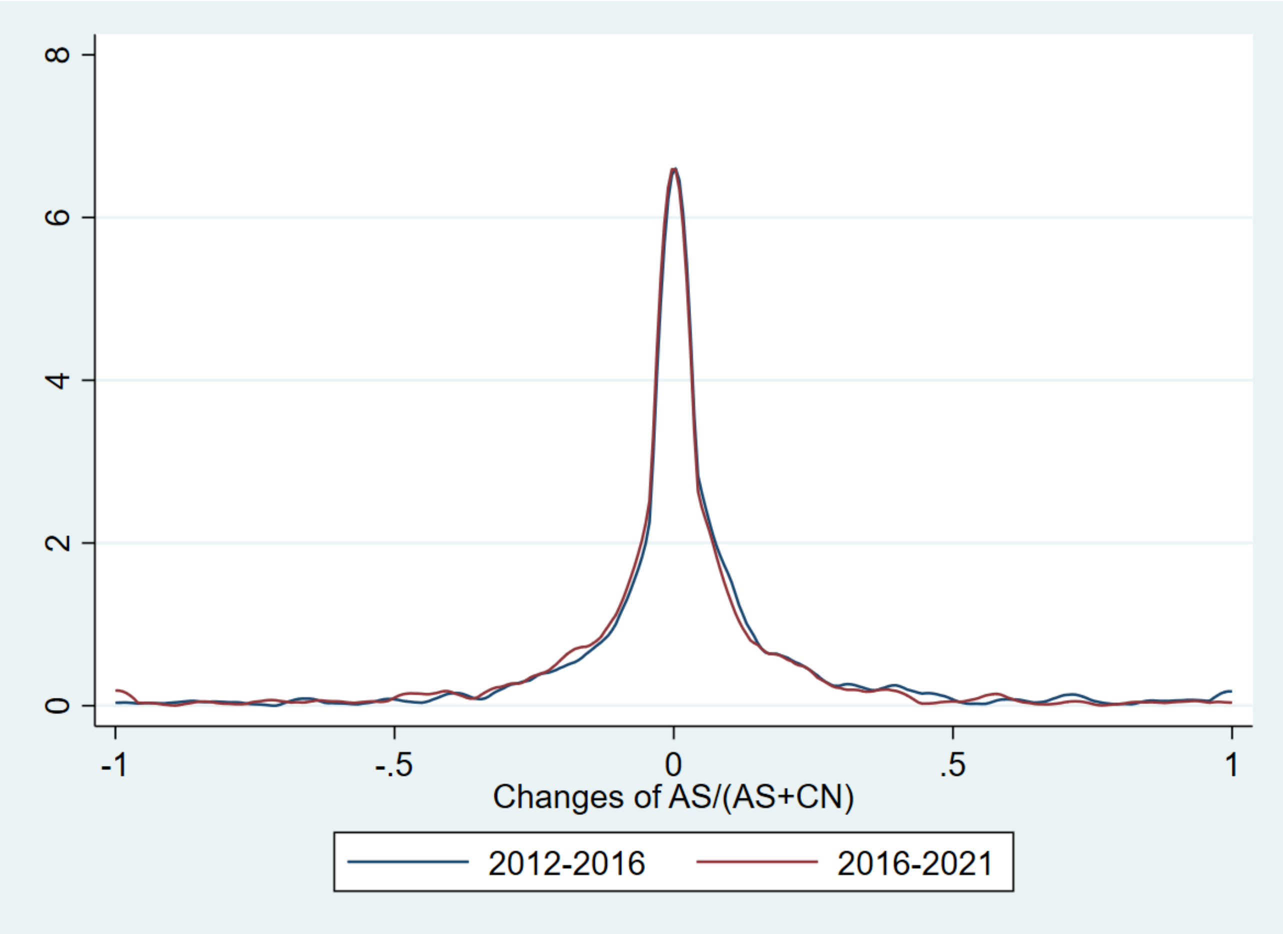
Source: Author's compilation using the Global Trade Atlas.

Figure 3. Distribution of Product-level Shares of Imports from China



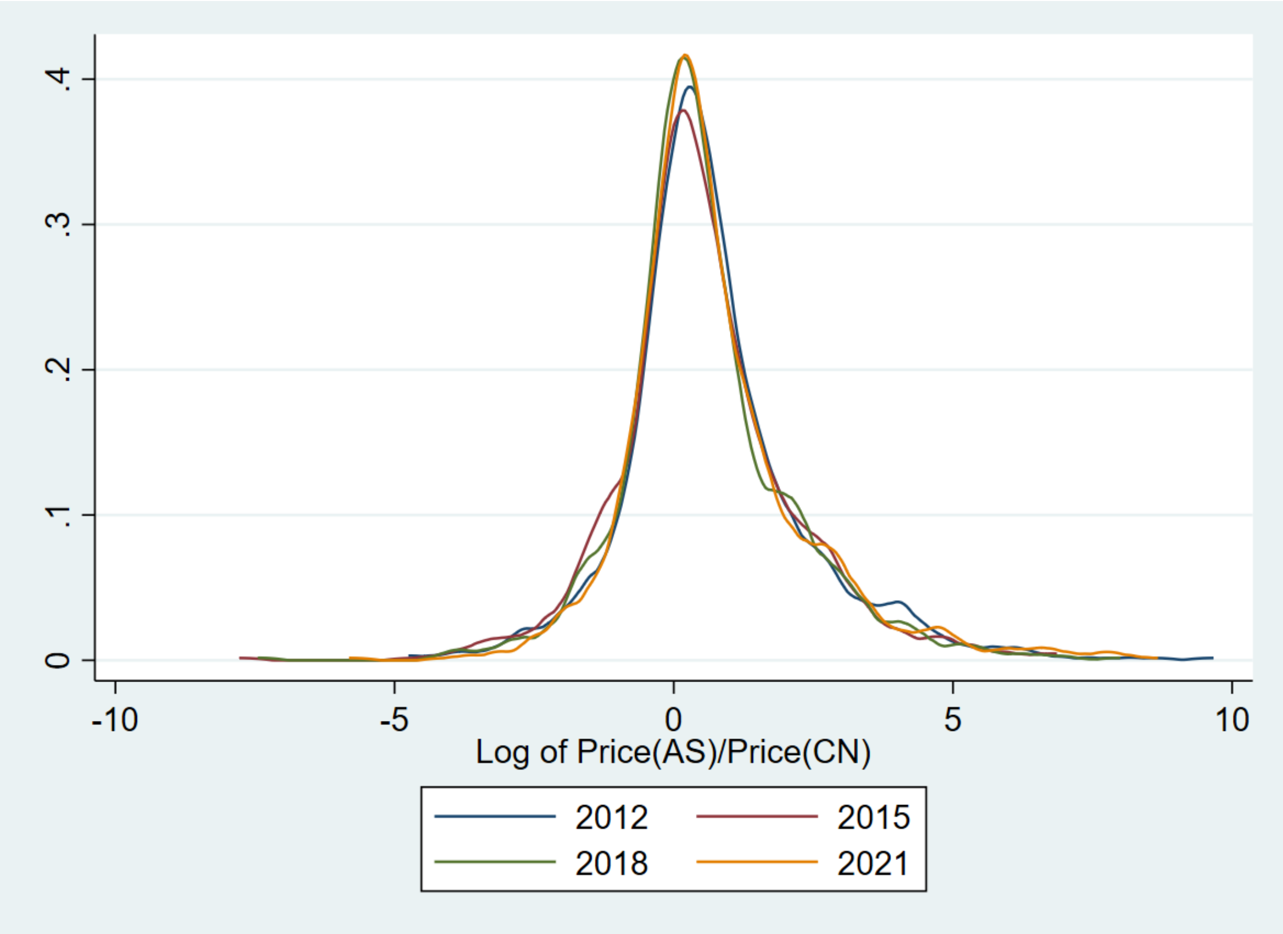
Source: Author's compilation using the Global Trade Atlas.

Figure 4. Distribution of Product-level Shares of Imports from ASEAN Countries



Source: Author's compilation using the Global Trade Atlas.

Figure 5. Distribution of Product-level Relative Import Prices



Source: Author's compilation using the Global Trade Atlas.

Appendix. Other Tables

Table A1. Basic Statistics (2013-2016)

t	Variable	Obs	Mean	Std. Dev.	Min	Max
2013	ΔASEAN Share	966	0.017	0.246	-1.000	1.000
	ΔASEAN Relative Prices	721	-0.021	1.549	-5.073	7.579
	CHN Share (*t*-1)	966	0.345	0.284	0.000	1.000
	Labor intensity	966	0.222	0.058	0.064	0.426
	ΔASEAN Relative Exports	966	-0.370	1.226	-5.637	6.550
2014	ΔASEAN Share	971	0.007	0.244	-1.000	1.000
	ΔASEAN Relative Prices	734	0.100	1.618	-5.971	9.399
	CHN Share (*t*-1)	971	0.343	0.278	0.000	1.000
	Labor intensity	971	0.222	0.058	0.064	0.426
	ΔASEAN Relative Exports	971	-0.295	1.206	-5.106	10.034
2015	ΔASEAN Share	968	0.003	0.227	-1.000	1.000
	ΔASEAN Relative Prices	732	0.139	1.397	-6.793	6.493
	CHN Share (*t*-1)	968	0.342	0.276	0.000	1.000
	Labor intensity	968	0.222	0.058	0.064	0.426
	ΔASEAN Relative Exports	968	-0.266	1.126	-4.972	7.207
2016	ΔASEAN Share	976	-0.005	0.226	-1.000	1.000
	ΔASEAN Relative Prices	734	0.113	1.555	-6.507	7.781
	CHN Share (*t*-1)	976	0.346	0.280	0.000	1.000
	Labor intensity	976	0.222	0.058	0.064	0.426
	ΔASEAN Relative Exports	976	-0.264	1.053	-5.367	8.050

Table A2. Basic Statistics (2017-2020)

t	Variable	Obs	Mean	Std. Dev.	Min	Max
2017	ΔASEAN Share	974	-0.012	0.212	-1.000	1.000
	ΔASEAN Relative Prices	740	0.098	1.395	-7.193	8.219
	CHN Share (*t*-1)	974	0.337	0.273	0.000	1.000
	Labor intensity	974	0.222	0.058	0.064	0.426
	ΔASEAN Relative Exports	974	-0.270	0.998	-5.501	6.358
2018	ΔASEAN Share	978	-0.003	0.203	-1.000	1.000
	ΔASEAN Relative Prices	740	0.140	1.315	-4.300	9.955
	CHN Share (*t*-1)	978	0.337	0.276	0.000	1.000
	Labor intensity	978	0.222	0.058	0.064	0.426
	ΔASEAN Relative Exports	978	-0.205	0.959	-5.318	8.492
2019	ΔASEAN Share	974	-0.010	0.178	-1.000	0.952
	ΔASEAN Relative Prices	752	0.105	1.185	-4.650	5.646
	CHN Share (*t*-1)	974	0.340	0.274	0.000	1.000
	Labor intensity	974	0.222	0.058	0.064	0.426
	ΔASEAN Relative Exports	974	-0.184	0.815	-4.802	6.808
2020	ΔASEAN Share	983	-0.010	0.168	-1.000	1.000
	ΔASEAN Relative Prices	736	0.043	1.119	-5.949	5.149
	CHN Share (*t*-1)	983	0.338	0.271	0.000	1.000
	Labor intensity	983	0.222	0.058	0.064	0.426
	ΔASEAN Relative Exports	983	-0.089	0.718	-6.906	6.259

Table A3. OLS Estimation Results: Restricting Imports to Five Major ASEAN Countries

Year *t*	2013	2014	2015	2016	2017	2018	2019	2020
CHN Share (*t*-1)	0.0825***	0.1113***	0.0766***	0.0701**	0.0633**	0.0278	0.0567***	0.0389*
	[0.0290]	[0.0290]	[0.0288]	[0.0272]	[0.0273]	[0.0254]	[0.0211]	[0.0215]
Labor intensity	-0.0331	0.0308	0.1613	0.1339	0.1698	0.1814	0.1599*	0.2660**
	[0.1442]	[0.1277]	[0.1369]	[0.1387]	[0.1288]	[0.1211]	[0.0903]	[0.1041]
ΔASEAN Relative Exports	0.0098	0.0055	0.0073	0.0113	0.0003	-0.0173*	0.0015	0.0004
	[0.0091]	[0.0108]	[0.0084]	[0.0079]	[0.0095]	[0.0098]	[0.0085]	[0.0126]
Number of observations	966	968	967	975	973	977	973	982
Adjusted R-squared	0.011	0.016	0.009	0.009	0.005	0.007	0.007	0.01

Source: Author's estimation.

Notes: This table shows estimation results obtained using the OLS method. The dependent variable is the change of the share of imports from five ASEAN countries (Indonesia, Malaysia, Singapore, Thailand, and Vietnam) from year *t* to year 2021. ***, **, and * indicate 1%, 5%, and 10% levels of statistical significance, respectively. Robust standard errors are reported in parentheses.