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Trade Continuity Effects of the Flexible Customs Declaration Scheme: Evidence from Two Typhoons*

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1 Introduction

In response to rapid changes in the trade environment, various institutional reforms have been implemented. One such reform in Japan is the introduction of the Flexible Declaration Scheme, enacted on October 8, 2017, allowing exporters and importers to declare international transactions at a customs office separate from where their shipments are stored. A similar reform has been implemented in the EU, and these reforms are expected to reduce administrative costs for trading firms and customs (JETRO, 2023; European Commission, 2024a). Another aspect of rapid changes in the trade environment is climate change, which could alter the frequency and intensity of natural disasters such as typhoons, potentially disrupting domestic infrastructure like ports and airports (Verschuur et al., 2023; Tian et al., 2024).

The goal of this paper is to examine the effects of a sudden closure or operational restrictions of particular airports on the utilization rate of the Flexible Declaration Scheme to quantitatively evaluate the reform's lesser-known benefit in supporting business continuity plans. To do so, we use two natural disasters as natural experiments: the closure of Kansai Airport (hereafter KIX) due to Typhoon Jebi in 2018 and the power outage and shipment delays at Narita Airport (hereafter NRT) due to Typhoon Faxai in 2019. Using transaction-level export and import declaration data from Japan, we analyze changes in the utilization rate of the scheme in response to these natural disasters and show that the scheme helped facilitate business continuity plans.

Our results show that, in the case of KIX closure in 2018, the share of exports processed under the Flexible Declaration Scheme–calculated as the export value using the scheme divided by total export value (hereafter the "utilization rate")–increased by about 30 percentage points in the week the typhoon struck. This elevated utilization rate remained at a higher level for approximately eight weeks. For imports, the utilization rate increased by approximately 18 percentage points in the week that the typhoon hit and remained elevated for about eight weeks. Since no similar changes were observed at NRT or Haneda Airport (HND) during this period, these fluctuations can be attributed to the KIX closure due to typhoon damage.

For NRT in 2019, we compare utilization rates between the South area, which faced prolonged power outages, and the Non-South area. In the South area, export utilization increased by 1.2 percentage points after the outage and remained elevated until the end of the year, while the Non-South area showed no significant change. Compared to KIX, the increase at NRT was smaller but lasted longer, suggesting that while few firms adopted the scheme, those that did may have made a long-term shift in their declaration patterns.

For the KIX case in 2018, where a significant increase in the utilization rate was observed, we further investigate whether the magnitude of the increase varies by partner country distance and sector. The results

show that, for exports, the increase in the utilization rate was larger for nearby countries, whereas for imports, the increase was more pronounced for distant countries. Additionally, the increase in the utilization rate was particularly large for products such as textiles and chemicals.

The rise in the utilization rate immediately after the typhoon suggests two key points: (1) When an airport was closed or its usage was restricted due to a natural disaster, exports and imports were diverted to other airports; (2) Even after diverting to another airport, firms continued to submit export and import declarations at the customs offices they normally used before the disaster.

This study contributes to the literature on the effects of customs process reforms on international trade. Previous studies have shown that reducing customs clearance time led to increased exports in Uruguay (Volpe Martincus et al., 2015) and increased imports in Albania (Fernandes et al., 2021), whereas no statistically significant effects were observed for imports in Serbia or food imports in North Macedonia (Fernandes et al., 2016; Fernandes et al., 2017). Additionally, the introduction of IT systems for customs procedures in Costa Rica led to an increase in both the number of export products (extensive margin) and the export value of individual products (intensive margin) (Carballo et al., 2016). A study using firm-level data from France finds that customs process efficiency improvements boosted exports primarily for large firms (Fontagné et al., 2020). Using the Japan customs data and focusing on the KIX closure in 2018, Otsuka et al. (2023) show that utilizing the Flexible Declaration Scheme helped mitigate the decline in import declarations.[1]

These studies suggest that streamlining customs procedures can, in some cases, facilitate international trade. While this study does not directly estimate the impact on trade, it indicates that during the disasters, more firms began utilizing the Flexible Declaration Scheme, which helped avoid a decline in exports and imports and facilitated international trade.

This study also contributes to the literature highlighting the importance of time in international trade, as it shows that some exporters and importers continued submitting declarations at the customs office rather than halting their shipments. Previous studies have shown that time costs on international trade exist (e.g., Djankov et al., 2010; Hummels and Schaur, 2013; Hornok and Koren, 2015; Li, 2019; Hendy and Zaki, 2021; Oberhofer et al., 2021).[2]

[1] Otsuka et al. (2023) classified importers into two groups: those that used the Flexible Declaration Scheme ("flexible declaration users") and those that did not ("non-users"). They applied a difference-in-differences approach to compare changes in the number of declarations before and after the KIX closure between the two groups. However, their analysis did not account for the possibility that firms could switch between groups or that the same firm could submit both flexible and regular declarations (i.e., belong to both treatment and control groups), undermining their results. This study addresses these issues by comparing KIX with other airports, NRT and HND. Additionally, this study examines the effects of the NRT power outage, which is not analyzed by Otsuka et al. (2023).

[2] Djankov et al. (2010) use bilateral trade flow data from 98 countries along with data on trade-related time costs and find that a one-day delay in transportation reduces trade volume by more than 1%. Hummels and Schaur (2013), using U.S. import data, estimate that an additional day required for imports imposes a cost equivalent to 0.6–2.1% of the imported good's price. Hornok and Koren (2015), analyzing Spanish data, demonstrated that streamlining customs procedures to reduce per-shipment costs by 50% has a trade-creating effect equivalent to a 9% reduction in tariff rates. Hendy and Zaki (2021) use firm-level data from Egypt and showed that the number of days from export to arrival in the destination country significantly negatively impacts export volume.

Our findings suggest that firms that changed their storage customs office during the emergency continued to file their declarations at their usual customs office. This indicates that firms find it easier to file at their regular office rather than switching. This result suggests that consolidating declaration offices could help streamline operations and improve the efficiency of firms' administrative tasks related to trade declarations.

The rest of the paper is organized as follows. Section 2 provides an overview of the Flexible Declaration Scheme and discusses the typhoons that directly affected KIX in 2018 and NRT in 2019, setting the background for the analysis. Section 3 presents the baseline regression analysis and discusses the results. Section 4 examines differences in the effects across country distance groups and sectors. Section 5 concludes the paper. Additional analyses and data details are presented in the Appendix.

2 Background

2.1 The Flexible Declaration Scheme

The Flexible Declaration Scheme, introduced in 2017, allows export and import declarations to be processed at customs offices other than the storage customs office. Traditionally, declarations and storage had to be handled at the same customs office to ensure proper customs inspection and examination. However, with the introduction of the Flexible Declaration Scheme, declarations and storage can now be managed at separate customs offices. The scheme is available to exporters, importers, and customs brokers approved as Authorized Economic Operators (AEOs).[3] Since its implementation in 2017, the scheme has been smoothly utilized by customs authorities and businesses.

Similar schemes have been introduced in other countries. For example, in the EU, customs procedures were traditionally required to be conducted at the customs office where the goods were physically located. However, the first phase of the Centralised Clearance for Import System (CCI) began in July 2024 (European Commission, 2024c). Under this system, AEO-certified entities importing goods from other EU countries are able to complete customs procedures centrally at their own national supervisory customs office (European Commission, 2024b).

The benefits of CCI include: (1) improving customs administrative efficiency in processing declarations, (2) reducing administrative interactions between businesses and customs authorities, thereby streamlining procedures, (3) ensuring transparency in customs processes, (4) optimizing logistics flows across the EU

Oberhofer et al. (2021) estimate a gravity model using trade flow data from multiple countries and found that each additional day required for exports or imports increases costs by approximately 0.4% of the price. Wilson et al. (2003) and Wilson et al. (2005) use country-level data to show that greater transparency in customs procedures and lower costs for declaration increase imports.

[3] An Authorized Economic Operator (AEO) is a business entity with a structured system for cargo security management and legal compliance (Japan Customs, 2024). Matsumoto (2023) conducted a survey and found that 85.8% of AEO customs brokers use the Flexible Declaration Scheme. Additionally, it revealed that 44.4% of AEO importers and 39.0% of AEO exporters utilize the scheme. For more details on the Flexible Declaration Scheme and its background, see Otsuka et al. (2023).

(JETRO, 2023; European Commission, 2024a).

Thus, similar schemes are being adopted internationally, as seen in Japan. This study examines how firms adjusted their export and import declaration behavior during disasters in two relatively early cases after the scheme's introduction–the KIX closure caused by Typhoon Jebi in 2018 and the NRT power outage caused by Typhoon Faxai in 2019–and provides insights into the utilization of such systems under emergency.

2.2 Typhoon Jebi in 2018

This section outlines the timelines and damages related to Typhoon Jebi, which struck KIX on September 4, 2018.[4] Typhoon Jebi caused severe damage across the Kansai region, leading to flooding at KIX, which resulted in the shutdown of runways and partial power outages at the passenger terminal.[5] Additionally, strong winds pushed a tanker that had been anchored in Osaka Bay into the airport's access bridge, cutting off ground transportation. Due to these disruptions, the airport was forced to close.

Three days after the closure, on September 7, partial operations resumed at some terminals, but it took ten days for the first terminal to resume operations and another seven days for all flights and shops to reopen (Sankei News, 2018). Although train operations resumed on September 18th, due to the damage to the bridge connecting the airport and the mainland, only one lane was used for buses and cargo transportation (Sankei News, 2018). It took over a month for the international shipment section to fully resume operations (Daily Cargo, 2018).

Due to the KIX closure, shipments were diverted to nearby international airports, including NRT and HND (Daily Cargo, 2018; Okubo and Sasahara, 2025). Figure 1 Panel A shows the locations of these two airports, which are included as comparisons in this study.

2.3 Typhoon Faxai in 2019

Typhoon Faxai made landfall near Chiba City at midnight on September 8, 2019, causing power outages due to fallen trees and debris that damaged the power distribution equipment, resulting in large-scale blackouts in the greater Tokyo area and surrounding regions.[6] At NRT, although the airport facilities did not sustain significant physical damage, power outages occurred in the southern part of the airport storage areas (hereafter the "South area"), significantly impacting logistics operations (Takebayashi et al., 2020; Daily

[4]The explanation of the typhoon damage at KIX is based on Cabinet Office (2019b), Cabinet Office (2019a), Sankei News (2018), and Daily Cargo (2018).

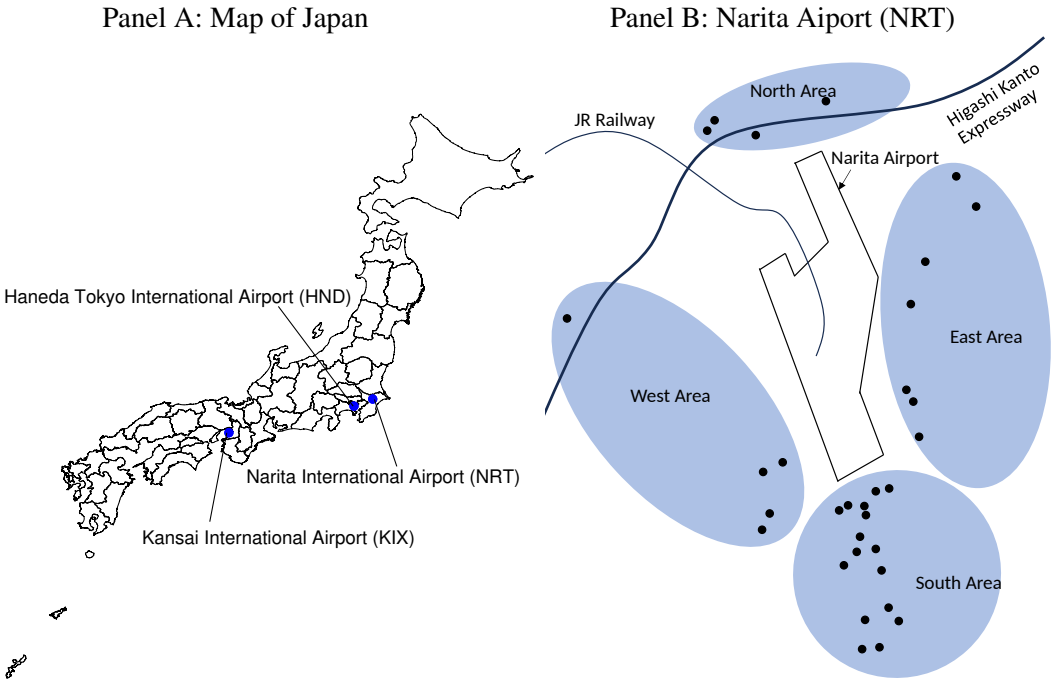
[5]According to Cabinet Office (2019a), this typhoon caused 14 fatalities, 46 serious injuries, and 965 minor injuries, 59 houses were completely destroyed, 627 were partially destroyed, and 85,715 sustained partial damage.

[6]The explanation of the typhoon damage at NRT is based on sources from Cabinet Office (2020), Takebayashi et al. (2020), and Daily Cargo (2019).

Cargo, 2019). Specifically, functions such as the computer system managing cargo, cargo handling facilities, and refrigerated storage were lost, and operations in the South area were restricted for approximately 10 days (Maruyama, 2020).

This study identified whether the customs bonded areas belonged to the South area or to the other areas (east, north, or west, hereafter the "Non-South area") and examined the differences in the impact on export and import declaration behavior. For the locations of the South and Non-South areas, see Figure 1 Panel B.

FIGURE 1: Maps



Note: Panel B was created with reference to the map on page 70 of Narita International Airport (2019).

2.4 Differences between the 2018 KIX Closure and the 2019 NRT Power Outage

The major differences between the typhoon damage at KIX in 2018 and NRT in 2019 lie in whether airport operations were completely halted and whether access to the airport was blocked. Regarding the first point, at KIX, flooding and the resulting power outages completely halted aircraft departures and arrivals. In contrast, at NRT, aircraft departures and arrivals continued even during the landfall of the typhoon. Regarding the second point, in the case of KIX, the access bridge was closed, completely blocking access to the airport, while at NRT, despite a large-scale power outage, access to both airport facilities and surrounding areas was maintained (Ministry of Land, Infrastructure, Transport and Tourism, 2021).

The differences in the degree of impact on logistics are likely a significant reason for the differing effects on the utilization rate of the Flexible Declaration Scheme caused by the typhoon disasters at KIX in 2018 and NRT in 2019.

3 Analysis

3.1 Setup

This section describes the structure of the data and the analysis methodology. First, it explains the structure of the data used to analyze the impact of the KIX closure caused by Typhoon Jebi in 2018 on exports.[7] The data is from export and import declaration records for the year 2018. The time series starts with the first week of the year, beginning on January 2, and includes up to the 52nd week of the year. The day when Typhoon Jebi directly hit KIX, September 4, is the first day of week 36.

We define the day of Typhoon Jebi hitting KIX, September 4, 2018, as the first day of "Week 1" (the 36th week of 2018). We estimate the impact of the KIX closure from Week -5 (the 30th week of 2018) to Week 16 (the 51st week of 2018). Exporters who exported from any airport for 20 weeks or more between the 1st week of 2018 (the week starting on January 2) and the 28th week of 2018 (the week starting on July 10) were defined as "frequent exporters," and other exporters were excluded from the sample.[8] The data are organized along four dimensions: exporter, sector, 'partner country group', and week.

The sectoral classification is based on the Export Statistics Classification, and for imports, it is based on the Customs Tariff Schedule, with some products merged to form the following 15 sectors: (1) animal and animal products, (2) vegetable products, (3) prepared food products, (4) mineral products, (5) chemical products, (6) leather and fur (7) wood and pulp, (8) textiles, (9) footwear, hats, umbrellas, artificial flowers, etc., (10) stone, plaster, cement, pearls, etc., (11) non-ferrous metals (iron and steel), (12) machinery, (13) transport equipment, (14) optical equipment, and (15) miscellaneous products and artwork.[9] The partner country groups are based on the distance from Japan to trading partner countries and are classified into five groups: (1) within 2,500 km, (2) 2,500–5,000 km, (3) 5,000–7,500 km, (4) 7,500–10,000 km, and (5) over 10,000 km.[10]

3.2 Baseline Regression Model

The dependent variable is the utilization rate of the Flexible Declaration Scheme for exports from KIX for exporter i, sector s, and partner country group d in week t, denoted as: $y_{isdt} = \frac{EX_{isdt}^{KIX,\text{Flex}}}{EX_{isdt}^{KIX}}$ where

[7] The export and import declaration data from the Japan Customs–in particular, the general export declaration rather than the manifest export declaration including small transactions–has also been used in Otsuka et al. (2023), Ito et al. (2025), and Okubo and Sasahara (2025).

[8] Limiting the sample to "frequent exporters" is necessary because including exporters who do not export frequently (e.g., those who only export before the typhoon or only after the typhoon) would make it impossible to examine changes in behavior before and after the typhoon. We define "frequent exporters" based on their export behavior between Week 1 and week 28 to rule out the influence of expectations about the approaching typhoon might influence their export behavior, thus affecting the endogenous classification of exporters into "frequent" and "non-frequent" exporters.

[9] The sectoral classification was based on the first two digits of the NACCS code. For the definition of the sector classification, see Table A12.

[10] For the distance from Japan to major trading partner countries, please refer to Table A13.

EX_{isdt}^{KIX} is the total export value declared by exporter i in week t for exports of sector s's items to partner country group d at KIX, and $EX_{isdt}^{KIX,\text{Flex}}$ is the export value utilizing the Flexible Declaration Scheme at KIX. In this context, the meaning of *flexible declaration* is that the declaration office is at KIX, while the storage office is at another airport.[11] The following regression equation is estimated:

$$y_{isdt} = \sum_{t=-5}^{17} \alpha_t D_t + \varphi_{isd} + u_{isdt} \tag{1}$$

where D_t is the week dummy variable, and α_t is the coefficient for the week dummy variable, φ_{isd} is the fixed effect for the "exporter-sector-partner country group," and u_{isdt} is the error term.[12]

Since the sample used for estimation is restricted to Week -7 (the 28th week of 2018) and later, the coefficients of the week dummies measure whether the utilization rate of the scheme changed compared to the average utilization rate between Week -7 (the 28th week of 2018) and Week -6 (the 29th week of 2018). Since the damage caused by the typhoon to KIX alone is considered an exogenous shock that exporters could not have anticipated, we employ OLS.[13] A similar regression equation is estimated for imports.

The primary focus is on the change in the utilization rate of the Flexible Declaration Scheme at KIX, which was temporarily closed due to the typhoon. To verify the change in the utilization rate of the scheme at other airports that were not closed, as a placebo, we re-estimate equation (1) by replacing the dependent variable with $\frac{EX_{isdt}^{HND,\text{Flex}}}{EX_{isdt}^{HND}}$ (the utilization rate in HND) and $\frac{EX_{isdt}^{NRT,\text{Flex}}}{EX_{isdt}^{NRT}}$ (the utilization rate in NRT), respectively. Since this variable cannot be computed for exporter-week pairs with zero exports, the data structure turns out to be an "unbalanced panel data" format. We also estimate the regression equation for changes in the utilization rate for imports by replacing the dependent variables with $\frac{IM_{isdt}^{KIX,\text{Flex}}}{IM_{isdt}^{KIX}}$, $\frac{IM_{isdt}^{HND,\text{Flex}}}{IM_{isdt}^{HND}}$, and $\frac{IM_{isdt}^{NRT,\text{Flex}}}{IM_{isdt}^{NRT}}$, where IM denotes import values rather than export values.

Although Otsuka et al. (2023) conduct a difference-in-differences (DID) analysis, the typhoon hit was a macro shock that affected all firms, making it difficult to divide them into treatment and control groups. Therefore, it is unlikely that DID was an appropriate approach. For example, if there were firms that were unable to use the Flexible Declaration Scheme throughout the sample period, DID estimation would provide a meaningful estimate. However, the decision to use Flexible Declaration Scheme is an endogenous choice

[11] It is unlikely that goods would be stored at KIX and declared at another customs office after the disaster, so the analysis focuses on the utilization of the Flexible Declaration Scheme where goods are declared at the KIX customs office and stored at another airport (port) customs office. In other words, the utilization of the Flexible Declaration Scheme where goods are declared at another airport (port) customs office and stored at KIX customs office is excluded from the analysis.

[12] We include the week dummies up to Week 17–the last week of the year. However, the coefficient from Week 17 is not presented.

[13] Although the typhoon had been developing in the South Pacific Ocean for several weeks, making its arrival potentially predictable, predicting that only KIX would be affected among all airports and ports was difficult. Even if KIX's damage had been anticipated, this study uses an event study methodology to estimate the impact on the dependent variable from six weeks before the typhoon's arrival, showing no statistically significant fluctuations before the typhoon. It suggests that it was difficult to predict that only KIX would be affected. While preparations for flexible declarations may have been made in anticipation of the typhoon, such action should be considered part of the impact on the utilization of the Flexible Declaration Scheme.

by firms, and it is plausible that some firms started using the Flexible Declaration Scheme as a result of the typhoon. Given these concerns, this study does not divide importers and exporters into treatment and control groups. Instead, it runs an event study type regression, focusing on KIX—which experienced closure due to the typhoon in September 2018—versus HND and NRT—which did not experience closure, serving as a placebo, to examine the effects on the Flexible Declaration Scheme's utilization rate. Similarly, Section 3.4 applies the same method to estimate the impact of 2019 Typhoon Faxai, comparing the South Area of NRT—which suffered power outages due to the typhoon—with the Non-South Area of NRT (placebo).

Summary statistics of the utilization rate for 2018 are shown in Table 1. The utilization rate is higher for exports than for imports, with the average for exports through HND at 52% and the average for exports through NRT at 14%, which are relatively high. Regarding the distribution, for exports and imports through KIX, the average values at the 0th to 95th percentiles are zero, suggesting that the utilization of the scheme is concentrated among a few specific "exporter-sector" pairs.

TABLE 1: Summary Statistics of the Utilization Rate of the Flexible Declaration Scheme for the Sample used in Regressions for the KIX 2018 Case

	Exports			Imports		
	KIX	NRT	HND	KIX	NRT	HND
Mean	0.042	0.140	0.521	0.021	0.083	0.134
Standard deviation	0.193	0.335	0.491	0.139	0.259	0.334
Mean of 0-5th percentiles	0	0	0	0	0	0
Mean of 5-10th percentiles	0	0	0	0	0	0
Mean of 10-25th percentiles	0	0	0	0	0	0
Mean of 25-50th percentiles	0	0	0.09	0	0	0
Mean of 50-75th percentiles	0	0	1.00	0	0	0
Mean of 75-90th percentiles	0	0	1.00	0	0.01	0.22
Mean of 90-95th percentiles	0	0.26		0	0.63	1.00
Mean of 95-100th percentiles	0.84	1.00		0.42	1.00	1.00
*Mean of 90-100th percentiles			1.00			
Sample size	80,202	105,604	10,225	174,258	173,942	25,615
N. of exporters (or importers)	2,139	3,159	441	8,071	8,586	3,215

Note: The summary statistics are based on the firm-sector-'country group'-week level data. The average of the "90th–100th percentiles" (rather than 95-100th percentiles) for HND is shown to meet the disclosure requirements following the guidelines of the Japan customs data.

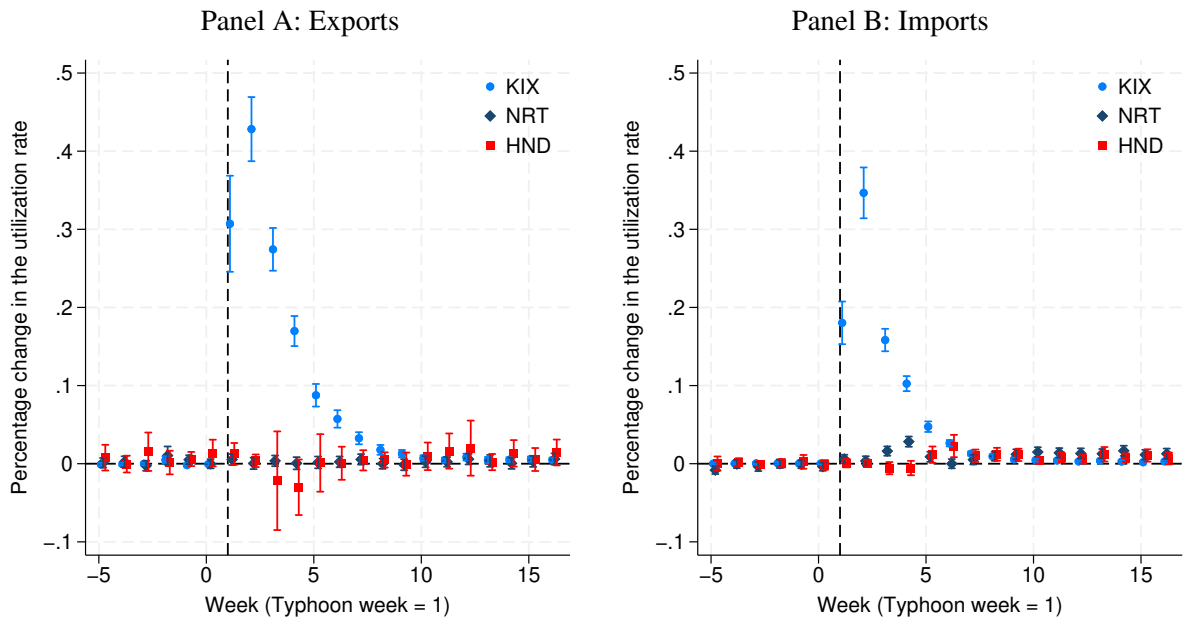
3.3 Baseline Results regarding the Effects of the 2018 KIX Closure

Figure 2 Panel A plots the estimated coefficients for the impact on the utilization rate for exports. The utilization rate at KIX before the typhoon (Week -5 to Week 0) was at a similar level to the period with no typhoon impact. However, in the week of the typhoon's landfall (Week 1), the rate significantly increased, and from Week 3 to Week 17, the coefficient remained statistically significant and gradually decreased. It suggests that the impact of the typhoon on the utilization rate lasted for several weeks after the typhoon's landfall. On the other hand, the utilization rate for NRT or HND shows no significant change before and

after the typhoon. It indicates that the increase in the utilization rate at KIX after the typhoon's landfall can be attributed to the impact of Typhoon Jebi.

Figure 2 Panel B plots the estimated results for imports. Similar to exports, the utilization rate at KIX before the typhoon (Week -5 to Week 0) was at a similar level to the period with no typhoon impact. However, in the week of the typhoon's landfall (Week 1), the rate significantly increased, and starting Week 3, the coefficient gradually decreased. On the other hand, no changes were observed at NRT and HND before and after the typhoon, indicating that the response at KIX can be attributed to the impact of the typhoon.

FIGURE 2: The 2018 KIX Closure and Utilization of the Flexible Declaration Scheme



Note: The sample size used for the estimation in Panel A is 80,202 (KIX), 105,604 (NRT), and 10,225 (HND). The sample size used for the estimation in Panel B is 174,258 (KIX), 173,942 (NRT), and 25,615 (HND). The point estimates and 95% confidence intervals are shown. Robust standard errors clustered at the exporter (importer) level are used. Since the sample is restricted to Week -7 (the 28th week of 2018) and later, the coefficients of the week dummies measure the changes in the utilization rate of the flexible declaration scheme compared to the average of "Week -7 to Week -6." For the regression tables corresponding to this figure, see Table A1.

3.4 Setup to Analyze the Effects of the 2019 NRT Power Outage

We take the same steps to examine the impact of Typhoon Faxai, which caused large-scale and prolonged power outages in the South area of NRT for 10 days starting September 8, 2019. This section explains the steps to construct the export data, with the same steps applying to the import data. The data is extracted from the 2019 export declaration data.

We define the day of the landfall date of Typhoon Faxi, September 8, 2019, as the first day of Week 1

(the 36th week of 2019). As a result, the first day of Week -34 (the 1st week of 2019) is set on January 6. As in the KIX case, we estimate the impact of the NRT power outage on the utilization rate from Week -5 (the 30th week of 2018) to Week 16 (the 51st week of 2018), relative to the average of the rate between Week -7 and Week -6. For the cross-section, only exporters who exported from any airport for 20 weeks or more between the 1st week of 2019 (the week starting on January 6) and the 28th week of 2019 (the week starting on July 14) are included in the sample.

We estimate equation (1) by replacing the dependent variable with $y_{idst} = \frac{EX_{isdt}^{NRT,South,\text{Flex}}}{EX_{isdt}^{NRT,South}}$ where the denominator represents the total export value declared by exporter i in week t for exports of sector s items to partner country group d at the South area of NRT, and the numerator represents the export value utilizing the Flexible Declaration Scheme for the same export (i.e., the value of exports where the declaration office is at the South area of NRT, while the storage office is at another airport). Since there were no large-scale or prolonged power outages in areas other than the South area, a placebo regression is also estimated by replacing the dependent variable with the utilization rate at the Non-South area: $\frac{EX_{isdt}^{NRT,NonSouth,\text{Flex}}}{EX_{isdt}^{NRT,NonSouth}}$.

Summary statistics of the utilization rate for 2019 are shown in Table 2. For exports, the utilization rate is higher in the South area (15%) than in the Non-South area. For imports, the utilization rate is higher in the Non-South area (10.3%) than in the South area. Regarding the distribution of the utilization rate, the average value is zero from the 0th to the 75th percentile for exports from the South area, and from the 0th to the 95th percentile for imports from the South area. It suggests that the utilization of the scheme is concentrated among a relatively small number of "exporter-sector" pairs.

TABLE 2: Summary Statistics of the Utilization Rate of the Flexible Declaration Scheme for the Sample used in Regressions for the NRT 2019 Case

	Exports		Imports	
	South Area	Non-South Area	South Area	Non-South Area
Mean	0.150	0.010	0.065	0.103
Standard deviation	0.353	0.096	0.245	0.290
Mean of 0-5th percentiles	0	0	0	0
Mean of 5-10th percentiles	0	0	0	0
Mean of 10-25th percentiles	0	0	0	0
Mean of 25-50th percentiles	0	0	0	0
Mean of 50-75th percentiles	0	0	0	0
Mean of 75-90th percentiles	0.33	0	0	0.05
Mean of 90-95th percentiles	1.00	0	0.31	0.90
Mean of 95-100th percentiles	1.00	0.20	1.00	1.00
Sample size	40,816	76,249	48,450	97,714
N. of exporters (or importers)	2,795	4,054	4,522	6,743

Note: The summary statistics are based on the firm-sector-'country group'-week level data.

3.5 Baseline Results regarding Effects of the 2019 NRT Power Outage

Figure 3 Panel A shows the impact on the utilization rate of the Flexible Declaration Scheme for exports. The utilization rate in the South area was at a similar level to the week before the typhoon (Week -7 to Week -6) in the weeks prior to the typhoon's landfall (Week -5 to Week 0). However, in the week of the typhoon's landfall (Week 1) and up to Week 4, the utilization rate was significantly positive. Afterward, although it did not remain significant in some weeks, it generally continued at a higher level through to the end of the year.

In the Non-South area, no significant changes in the utilization rate were observed before and after the typhoon's landfall. This suggests that the increase in the utilization rate in the South area was driven by a behavioral change, where exporters began using the flexible declaration scheme following the NRT power outage. However, as shown in comparison with Figure 2, the increase in the utilization rate was smaller than in the case of KIX in 2018.

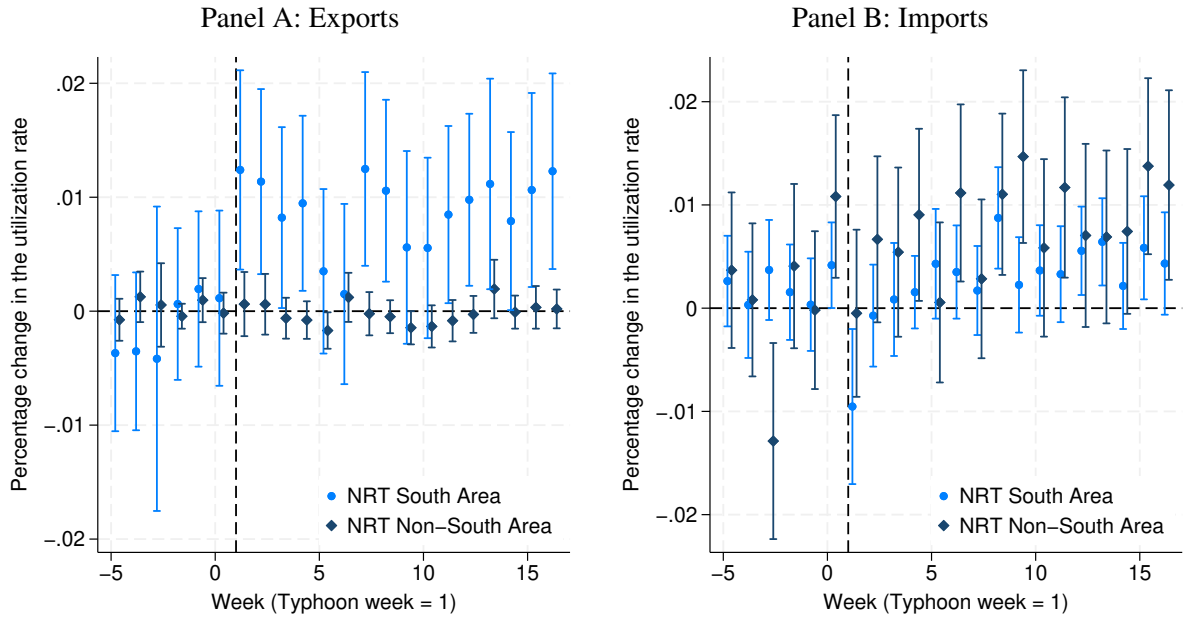
Figure 3 Panel B plots the effect on the utilization rate for imports. In the South area, the utilization rate before the typhoon (Week -5 to Week 0) remained at the same level as the period before the typhoon's impact. However, unlike exports, the utilization rate for imports showed a significant negative response in the week of the typhoon's landfall (Week 1), and then returned to the same level as the period without the typhoon's impact from the following week (Week 2) onward.[14] In the Non-South area, no significant response was observed immediately after the NRT power outage; however, the utilization rate gradually increased toward the end of the year.

The impact of Typhoon Faxi on the utilization rate of the Flexible Declaration Scheme in the South area not as substantial as that at KIX. As discussed in Section 2, this difference is likely due to the different impact of the typhoon on logistics. In the case of KIX, aircraft departures and arrivals were halted due to flooding and other damages, and access to the airport was temporarily blocked when a tanker collided with the access bridge. In contrast, at NRT, aircraft operations continued, and access to both the airport and the South area was maintained.

One possible reason why the impact on the utilization rate of the Flexible Declaration Scheme was only temporary in the case of Kansai Airport in 2018, but more sustained in the case of Narita Airport in 2019, is the presence or absence of nearby storage areas and international airports. In the case of Narita Airport, long-term substitution was relatively easy due to the presence of multiple nearby storage areas and its proximity to another international airport, Haneda. In contrast, Kansai Airport has no nearby alternative international airport (Chubu Centrair International Airport is relatively far, and Itami Airport does not serve international

[14] In Appendix B, we re-estimate the regression by replacing the dependent variable with the flexible declaration import value and total import value, respectively, to examine the reasons for the negative coefficient.

FIGURE 3: The 2019 NRT Power Outage and Utilization of the Flexible Declaration Scheme



Note: The sample size used for the estimation in Panel A is 40,816 (South area) and 76,249 (Non-South area). The sample sizes used for the estimation in Panel B are 48,450 (South area) and 97,714 (Non-South area). The point estimates and 95% confidence intervals are shown. Robust standard errors clustered at the exporter (importer) level are used. Since the sample is restricted to Week -7 (the 28th week of 2019) and later, the coefficients of the week dummies measure changes in the utilization rate of the flexible declaration scheme relative to the average of "Week -7 to Week -6." For the regression tables corresponding to this figure, see Table A2.

flights), making long-term substitution more difficult and possibly resulting in only a short-term increase in the utilization rate.

4 Different Effects of the 2018 KIX Closure across Distance-based Country Groups and Sectors

4.1 Approach to Examine the Different Effects across Distance-based Country Groups and Sectors

From the analysis so far, it has been shown that there was a significant increase in the utilization rate of the Flexible Declaration Scheme in the case of KIX in 2018. In this section, we revisit the case of KIX and examine whether the increase in the utilization rate differs by the distance to trading partners and by sector.

The dependent variable in the regression analysis is: $y_{isdt} = \frac{EX_{isdt}^{KIX,\text{Flex}}}{EX_{isdt}^{KIX}}$ where the denominator represents the total export value of exporter i for goods in sector s exported to a country in partner country distance group d in week t, and the numerator represents the value of exports using the Flexible Declaration Scheme for the same exports (i.e., the value of exports where the declaration office is at KIX, while the

storage office is at another airport). We estimate the following regression equation:

$$y_{isdt} = \sum_{t=-5}^{17} \sum_{d=1}^{5} (\beta_{td} \times D_t \times D_d) + \varphi_{isd} + e_{isdt} \tag{2}$$

where D_t denotes the week dummies, D_d denotes dummy variables based on the distance to the partner country, β_{td} is the coefficient measuring the impact on the utilization rate of the Flexible Declaration Scheme, φ_{isd} is the fixed effect for "exporter-'partner country group'-sector," and e_{isdt} denotes the error term. By estimating this regression equation, we can examine the impact on the utilization rate of the Flexible Declaration Scheme for each partner country group.

Additionally, to investigate differences in the impact by sector, we estimate the following regression equation:

$$y_{isdt} = \sum_{t=-5}^{17} \sum_{s=1}^{15} (\gamma_{ts} \times D_t \times D_s) + \psi_{isd} + \epsilon_{isdt} \tag{3}$$

where D_s denotes sector dummies, γ_{ts} denotes the coefficient measuring the impact on the utilization rate of the Flexible Declaration Scheme by sector and week, ψ_{isd} denotes the fixed effect for "exporter-'partner country group'-sector," and ϵ_{isdt} denotes the error term. When estimating the effects on the utilization rate in imports, we replace the dependent variable with $\frac{IM_{isdt}^{KIX,\text{Flex}}}{IM_{isdt}^{KIX}}$.

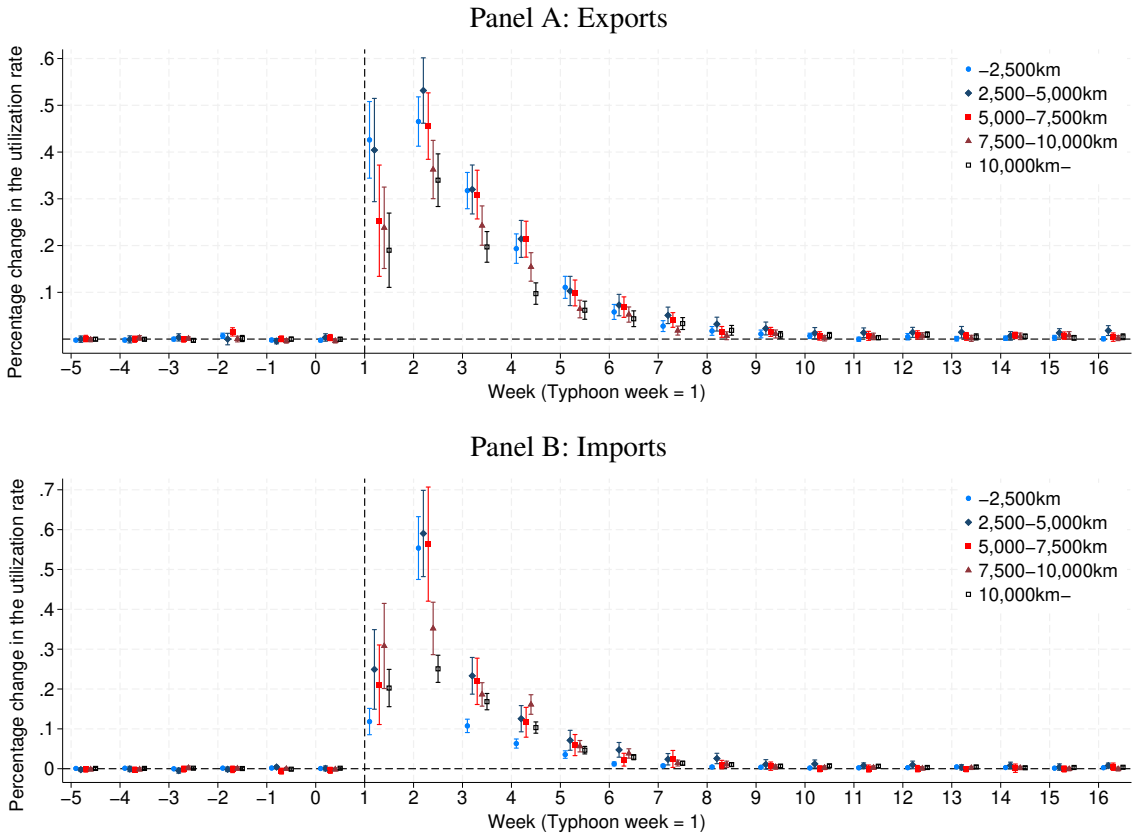
4.2 Results regarding the Different Effects across Distance-based Country Groups

Figure 4 Panel A plots the coefficients obtained by estimating equation (2) using export data. In all partner country groups, the utilization rate of the Flexible Declaration Scheme increased in the week of the KIX closure (Week 1), further increased in the following week (Week 2), and gradually decreased after Week 3, showing a similar trend to the baseline analysis. Additionally, it shows that the utilization rate increased more significantly in partner country groups that are geographically closer, such as (1) within 2,500 km and (2) 2,500–5,000 km, compared to groups with more distant countries. One possible explanation is that global value chains between Japan and neighboring countries, involving significant trade in parts and intermediate goods, keep the cost of halting trade high, leading to a greater increase in the utilization rate to sustain trade.[15] In fact, the diversion of manufacturing exports, such as semiconductors, to nearby countries like China and Singapore through alternative airports, such as NRT (Chiba Nippou, 2019; Yomiuri Shimbun, 2019) and Chubu Centrair Airport (Hayashi, 2019) is documented.

Figure 4 Panel B shows the coefficients obtained by estimating equation (2) using import data. Similar to exports, in all partner country groups, the utilization rate increased in the week after the typhoon's landfall

[15] For global value chains in East Asia, see, for example, Ando et al. (2022).

FIGURE 4: The 2018 KIX Closure and Utilization of the Flexible Declaration Scheme, by Distance-based Country Group



Note: The sample size used for the estimation in Panel A is 80,202, and the sample size used for the estimation in Panel B is 174,258. The point estimates and 95% confidence intervals are shown. Robust standard errors clustered at the exporter (importer) level are used. Since the sample is restricted to Week -7 (the 28th week of 2018) and later, the coefficients of the week dummies measure changes in the utilization rate of the flexible declaration scheme relative to the average of "Week -7 to Week -6." For the regression table corresponding to Panel A, see Table A3. For the one corresponding to Panel B, see Table A4.

(Week 1), further increased in the following week (Week 2), and gradually decreased after Week 3. However, in contrast to exports, it shows that the group of countries closest to Japan–within 2,500 km–exhibit the smallest reaction after the KIX closure compared to the other groups. It suggests that there were many transactions with distant countries that could not be paused. For example, the diversion of pharmaceutical imports from distant countries such as the EU to other airports are documented.[16]

The results show a greater rise in Flexible Declaration Scheme utilization for exports to nearby countries, while imports saw a higher increase in the utilization rate with distant countries. Several factors may explain this difference. One potential explanation is Japan's differing participation patterns in global value chains between exports and imports. Assuming that greater participation in global value chains increases time costs and raises the demand for the Flexible Declaration Scheme during emergencies, the results suggest

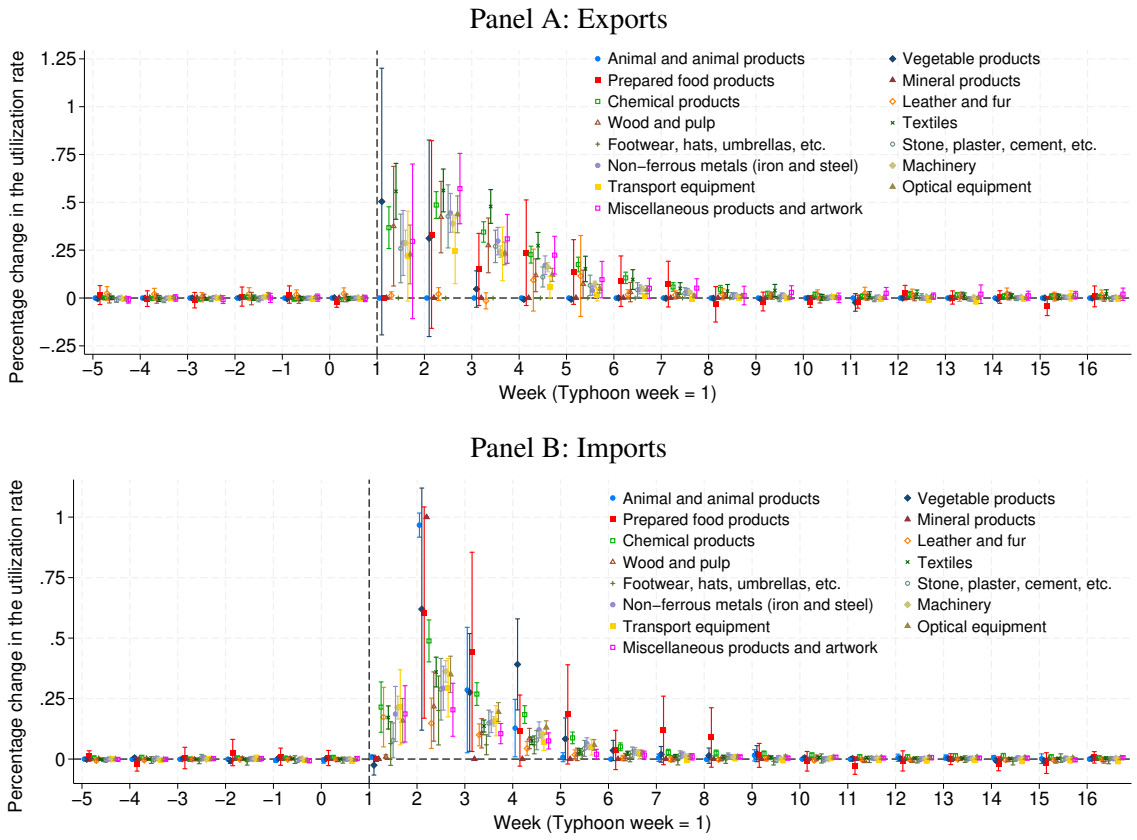
[16]For the diversion of imports to NRT, see Chiba Nippou (2019) and Yomiuri Shimbun (2019). For the diversion of imports to Chubu Airport, see Hayashi (2019).

that Japan's forward participation in global value chains is stronger with nearby countries, where it exports a greater amount of parts and components. In contrast, Japan's backward participation in global value chains is stronger with distant countries, from which it imports a greater amount of parts and components.

4.3 Results regarding the Different Effects across Sectors

Figure 5 Panel A plots the coefficients estimated from equation (3) using export data. The results show that changes in the utilization rate in response to the KIX closure vary significantly across sectors. Specifically, sectors such as 'wood and pulp,' 'textiles,' 'stone and plaster,' 'non-ferrous metals (iron and steel),' 'transport equipment,' 'optical equipment,' and 'miscellaneous goods and artwork' saw a greater increase in utilization during the week of the KIX closure (Week 1), which remained elevated until Week 5.

FIGURE 5: The 2018 KIX Closure and Utilization of the Flexible Declaration Scheme, by Sector



Note: The sample size used for the estimation in Panel A is 80,202, and the sample size used for the estimation in Panel B is 174,258. The point estimates and 95% confidence intervals are shown. Robust standard errors clustered at the exporter (importer) level are used. Since the sample is restricted to Week -7 (the 28th week of 2018) and later, the coefficients of the week dummies measure changes in the utilization rate of the flexible declaration scheme relative to the average of "Week -7 to Week -6." For the regression table corresponding to Panel A, see Table A5. For the one corresponding to Panel B, see Table A6.

Figure 5 Panel B plots the coefficients from estimating equation (3) using import data. Most industries showed significantly positive coefficients in the week of the typhoon's landfall (Week 1) and the following

weeks. The more uniform increase in the utilization rate for imports compared to exports is likely because exports could be stored as inventory during the KIX closure, whereas imports had already been shipped, making their timely receipt more urgent and reducing sectoral differences.

5 Conclusion

This study analyzes the changes in the utilization rate of the Flexible Declaration Scheme for both export and import declarations after the KIX closure due to Typhoon Jebi in 2018 and the NRT power outage due to Typhoon Faxi in 2019, using transaction-level export and import declaration data. In the case of the KIX closure, we show that the utilization rate for both exports and imports increased after the closure and gradually returned to the original level over the next few weeks. It suggests that firms used the Flexible Declaration Scheme to respond to the typhoon disaster and continued their business operations. In the case of the NRT power outage, although the increase in the utilization rate was smaller compared to the KIX case, an increase in the utilization rate for exports increased and remained at a higher level in the remaining weeks of the year.

This study quantitatively confirms changes in the utilization rate of the Flexible Declaration Scheme before and after two natural disasters, showing that disruptions at a specific airport lead to an increase in the scheme's utilization rate. We acknowledge that this study focuses on the impact on the utilization rate only. The remaining work for future research is to evaluate the extent to which this helped mitigate the reduction in trade volume and assess its impact on the overall welfare of the economy in order to more comprehensively evaluate the policy reform.

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Appendix for
"Trade Continuity Effects of the Flexible Customs Declaration Scheme: Evidence from Two Typhoons"

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A Regression Tables for the Figures in the Main Text

Table A1 presents the regression results corresponding to Figure 2. Table A2 presents the regression results corresponding to Figure 3. Table A3 presents the regression results corresponding to Panel B of Figure 4. Table A4 presents the regression results corresponding to Panel B of Figure 4. Table A5 presents the regression results corresponding to Panel A of Figure 5. Table A6 presents the regression results corresponding to Panel B of Figure 5.

TABLE A1: The 2018 KIX Closure and Utilization of the Flexible Declaration Scheme

	Exports			Imports		
	KIX	NRT	HND	KIX	NRT	HND
	(1)	(2)	(3)	(4)	(5)	(6)
Week -5 dummy	-0.0009	0.0012	0.0078	0.0001	-0.0082***	0.0002
	(0.001)	(0.003)	(0.008)	(0.001)	(0.003)	(0.005)
Week -4 dummy	-0.0006	0.0026	-0.0005	0.0003	-0.0004	0.0020
	(0.001)	(0.004)	(0.005)	(0.001)	(0.003)	(0.003)
Week -3 dummy	-0.0001	-0.0026	0.0153	0.0004	-0.0036	-0.0015
	(0.001)	(0.003)	(0.013)	(0.001)	(0.003)	(0.002)
Week -2 dummy	0.0049**	0.0104*	0.0015	0.0006	0.0000	0.0006
	(0.002)	(0.006)	(0.008)	(0.001)	(0.003)	(0.003)
Week -1 dummy	-0.0018*	0.0051*	0.0060	0.0002	-0.0006	0.0024
	(0.001)	(0.003)	(0.005)	(0.001)	(0.003)	(0.004)
Week 0 dummy	-0.0006	-0.0001	0.0137	0.0003	-0.0038	-0.0016
	(0.001)	(0.003)	(0.009)	(0.001)	(0.003)	(0.003)
Week 1 dummy	0.3071***	0.0053	0.0126*	0.1802***	0.0060**	0.0008
	(0.031)	(0.004)	(0.007)	(0.014)	(0.003)	(0.003)
Week 2 dummy	0.4282***	0.0004	0.0038	0.3466***	0.0035	0.0005
	(0.021)	(0.004)	(0.004)	(0.017)	(0.003)	(0.002)
Week 3 dummy	0.2744***	0.0036	-0.0218	0.1583***	0.0162***	-0.0057
	(0.014)	(0.003)	(0.032)	(0.007)	(0.003)	(0.004)
Week 4 dummy	0.1698***	0.0006	-0.0302*	0.1025***	0.0283***	-0.0055
	(0.010)	(0.004)	(0.018)	(0.005)	(0.003)	(0.005)
Week 5 dummy	0.0876***	0.0016	0.0010	0.0474***	0.0088***	0.0115**
	(0.007)	(0.004)	(0.019)	(0.003)	(0.003)	(0.005)
Week 6 dummy	0.0573***	0.0023	0.0006	0.0262***	0.0000	0.0226***
	(0.006)	(0.004)	(0.011)	(0.002)	(0.003)	(0.007)
Week 7 dummy	0.0326***	0.0055	0.0043	0.0129***	0.0051	0.0102**
	(0.004)	(0.003)	(0.007)	(0.001)	(0.003)	(0.004)
Week 8 dummy	0.0177***	0.0000	0.0048	0.0094***	0.0097***	0.0120***
	(0.003)	(0.003)	(0.005)	(0.001)	(0.003)	(0.004)
Week 9 dummy	0.0129***	-0.0013	-0.0005	0.0055***	0.0119***	0.0113***
	(0.002)	(0.004)	(0.008)	(0.001)	(0.003)	(0.004)
Week 10 dummy	0.0070***	0.0025	0.0094	0.0045***	0.0149***	0.0041*
	(0.002)	(0.004)	(0.009)	(0.001)	(0.003)	(0.002)
Week 11 dummy	0.0047***	0.0023	0.0162	0.0041***	0.0139***	0.0081**
	(0.002)	(0.003)	(0.011)	(0.001)	(0.003)	(0.003)
Week 12 dummy	0.0085***	0.0059*	0.0199	0.0029***	0.0131***	0.0059**
	(0.002)	(0.003)	(0.018)	(0.001)	(0.003)	(0.003)
Week 13 dummy	0.0046**	0.0036	0.0021	0.0038***	0.0127***	0.0121**
	(0.002)	(0.004)	(0.005)	(0.001)	(0.003)	(0.005)
Week 14 dummy	0.0051***	0.0005	0.0133	0.0028***	0.0165***	0.0074**
	(0.002)	(0.004)	(0.009)	(0.001)	(0.003)	(0.003)
Week 15 dummy	0.0058***	0.0030	0.0054	0.0018**	0.0114***	0.0106***
	(0.002)	(0.004)	(0.007)	(0.001)	(0.003)	(0.004)
Week 16 dummy	0.0047***	0.0060	0.0144*	0.0030***	0.0127***	0.0067*
	(0.002)	(0.004)	(0.008)	(0.001)	(0.003)	(0.004)
Sample size	80,202	105,604	10,225	174,258	173,942	25,615
N. of firm-'country group'-sector pairs	12,714	16,228	1,341	32,902	30,129	6,019
N. of firms	2,139	3,159	441	8,071	8,586	3,215
R-sq.	0.244	0.001	0.008	0.145	0.002	0.005

Note: This table presents the regression results corresponding to Figure 2. Week 1 refers to the week when the typhoon made landfall. The values in parentheses are robust standard errors clustered at the firm level. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

TABLE A2: The 2019 NRT Power Outage and Utilization of the Flexible Declaration Scheme

	Exports		Imports	
	South Area	Non-South Area	South Area	Non-South Area
	(1)	(2)	(3)	(4)
Week -5 dummy	-0.0037	-0.0008	0.0026	0.0037
	(0.003)	(0.001)	(0.002)	(0.004)
Week -4 dummy	-0.0035	0.0013	0.0003	0.0008
	(0.004)	(0.001)	(0.003)	(0.004)
Week -3 dummy	-0.0042	0.0005	0.0037	-0.0129***
	(0.007)	(0.002)	(0.002)	(0.005)
Week -2 dummy	0.0006	-0.0004	0.0015	0.0041
	(0.003)	(0.001)	(0.002)	(0.004)
Week -1 dummy	0.0019	0.0010	0.0003	-0.0002
	(0.003)	(0.001)	(0.002)	(0.004)
Week 0 dummy	0.0011	-0.0002	0.0042**	0.0108***
	(0.004)	(0.001)	(0.002)	(0.004)
Week 1 dummy	0.0124***	0.0006	-0.0095**	-0.0005
	(0.004)	(0.001)	(0.004)	(0.004)
Week 2 dummy	0.0114***	0.0006	-0.0007	0.0067
	(0.004)	(0.001)	(0.003)	(0.004)
Week 3 dummy	0.0082**	-0.0006	0.0008	0.0054
	(0.004)	(0.001)	(0.003)	(0.004)
Week 4 dummy	0.0095**	-0.0008	0.0015	0.0090**
	(0.004)	(0.001)	(0.002)	(0.004)
Week 5 dummy	0.0035	-0.0017**	0.0043	0.0006
	(0.004)	(0.001)	(0.003)	(0.004)
Week 6 dummy	0.0015	0.0012	0.0035	0.0112**
	(0.004)	(0.001)	(0.002)	(0.004)
Week 7 dummy	0.0125***	-0.0002	0.0017	0.0028
	(0.004)	(0.001)	(0.002)	(0.004)
Week 8 dummy	0.0106***	-0.0005	0.0087***	0.0110***
	(0.004)	(0.001)	(0.003)	(0.004)
Week 9 dummy	0.0056	-0.0015*	0.0023	0.0147***
	(0.004)	(0.001)	(0.002)	(0.004)
Week 10 dummy	0.0055	-0.0013	0.0037	0.0058
	(0.004)	(0.001)	(0.002)	(0.004)
Week 11 dummy	0.0085**	-0.0008	0.0033	0.0117***
	(0.004)	(0.001)	(0.002)	(0.004)
Week 12 dummy	0.0098**	-0.0003	0.0056**	0.0070
	(0.004)	(0.001)	(0.002)	(0.005)
Week 13 dummy	0.0112**	0.0019	0.0064***	0.0069
	(0.005)	(0.001)	(0.002)	(0.004)
Week 14 dummy	0.0079**	-0.0001	0.0022	0.0074*
	(0.004)	(0.001)	(0.002)	(0.004)
Week 15 dummy	0.0106**	0.0003	0.0058**	0.0138***
	(0.004)	(0.001)	(0.003)	(0.004)
Week 16 dummy	0.0123***	0.0002	0.0043*	0.0119**
	(0.004)	(0.001)	(0.003)	(0.005)
Sample size	40,816	76,249	48,450	97,714
N. of firm-'country group'-sector pairs	8,199	13,588	11,055	19,109
N. of firms	2,795	4,054	4,522	6,743
R-sq.	0.002	0.000	0.002	0.001

Note: This table presents the regression results corresponding to Figure 3. Week 1 refers to the week when the typhoon made landfall. The values in parentheses are robust standard errors clustered at the firm level. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

TABLE A3: The 2018 KIX Closure and Utilization of the Flexible Declaration Scheme, by Distance-based Country Group, Exports

	-2,500km	2,500-5,000km	5,000-7,500km	7,500-10,000km	10,000km-
	(1)	(2)	(3)	(4)	(5)
Week -5 dummy×Country group dummy	-0.0021	-0.0002	0.0012	-0.0013	-0.0002
	(0.002)	(0.003)	(0.003)	(0.002)	(0.002)
Week -4 dummy×Country group dummy	-0.0021	-0.0006	-0.0002	0.0024	-0.0004
	(0.002)	(0.004)	(0.003)	(0.003)	(0.002)
Week -3 dummy×Country group dummy	0.0000	0.0037	-0.0006	0.0011	-0.0027
	(0.002)	(0.004)	(0.003)	(0.002)	(0.002)
Week -2 dummy×Country group dummy	0.0070**	0.0001	0.0154***	0.0001	0.0012
	(0.003)	(0.006)	(0.005)	(0.003)	(0.003)
Week -1 dummy×Country group dummy	-0.0019	-0.0044	0.0007	-0.0039*	-0.0001
	(0.002)	(0.003)	(0.003)	(0.002)	(0.002)
Week 0 dummy×Country group dummy	-0.0024	0.0034	0.0033	-0.0039*	-0.0004
	(0.002)	(0.004)	(0.003)	(0.002)	(0.002)
Week 1 dummy×Country group dummy	0.4260***	0.4043***	0.2532***	0.2380***	0.1901***
	(0.042)	(0.056)	(0.061)	(0.044)	(0.041)
Week 2 dummy×Country group dummy	0.4653***	0.5316***	0.4556***	0.3626***	0.3398***
	(0.027)	(0.036)	(0.036)	(0.032)	(0.029)
Week 3 dummy×Country group dummy	0.3176***	0.3200***	0.3090***	0.2428***	0.1971***
	(0.020)	(0.027)	(0.027)	(0.021)	(0.017)
Week 4 dummy×Country group dummy	0.1935***	0.2142***	0.2136***	0.1543***	0.0973***
	(0.016)	(0.020)	(0.020)	(0.016)	(0.012)
Week 5 dummy×Country group dummy	0.1107***	0.1029***	0.0987***	0.0643***	0.0617***
	(0.012)	(0.016)	(0.014)	(0.010)	(0.010)
Week 6 dummy×Country group dummy	0.0581***	0.0728***	0.0683***	0.0525***	0.0435***
	(0.008)	(0.012)	(0.011)	(0.008)	(0.009)
Week 7 dummy×Country group dummy	0.0278***	0.0508***	0.0409***	0.0182***	0.0333***
	(0.006)	(0.009)	(0.008)	(0.005)	(0.006)
Week 8 dummy×Country group dummy	0.0175***	0.0320***	0.0154***	0.0072*	0.0187***
	(0.005)	(0.008)	(0.006)	(0.004)	(0.005)
Week 9 dummy×Country group dummy	0.0110***	0.0227***	0.0154***	0.0109**	0.0091**
	(0.004)	(0.007)	(0.005)	(0.004)	(0.004)
Week 10 dummy×Country group dummy	0.0069**	0.0127**	0.0068	0.0019	0.0080**
	(0.003)	(0.006)	(0.005)	(0.003)	(0.003)
Week 11 dummy×Country group dummy	-0.0002	0.0136***	0.0070	0.0057	0.0032
	(0.002)	(0.005)	(0.005)	(0.004)	(0.002)
Week 12 dummy×Country group dummy	0.0051	0.0144***	0.0090**	0.0069**	0.0097***
	(0.003)	(0.005)	(0.005)	(0.003)	(0.003)
Week 13 dummy×Country group dummy	0.0009	0.0147**	0.0057	0.0016	0.0047
	(0.002)	(0.006)	(0.004)	(0.003)	(0.003)
Week 14 dummy×Country group dummy	0.0019	0.0068	0.0080**	0.0060*	0.0058**
	(0.002)	(0.005)	(0.003)	(0.004)	(0.003)
Week 15 dummy×Country group dummy	0.0027	0.0133***	0.0074*	0.0080**	0.0027
	(0.003)	(0.005)	(0.004)	(0.004)	(0.003)
Week 16 dummy×Country group dummy	0.0008	0.0182***	0.0042	0.0020	0.0050
	(0.002)	(0.005)	(0.005)	(0.003)	(0.003)
Sample size			80,202		
N. of firm-'country group'-sector pairs			12,714		
N. of firms			2,139		
R-sq.			0.255		

Note: This table presents the regression results corresponding to Panel B of Figure 4. Week 1 refers to the week when the typhoon made landfall. The values in parentheses are robust standard errors clustered at the firm level. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

TABLE A4: The 2018 KIX Closure and Utilization of the Flexible Declaration Scheme, by Distance-based Country Group, Imports

	-2,500km	2,500-5,000km	5,000-7,500km	7,500-10,000km	10,000km-
	(1)	(2)	(3)	(4)	(5)
Week -5 dummy×Country group dummy	0.0007	-0.0023	-0.0017	-0.0017	0.0007
	(0.001)	(0.002)	(0.003)	(0.002)	(0.001)
Week -4 dummy×Country group dummy	0.0012	-0.0007	-0.0024	-0.0018	0.0008
	(0.001)	(0.003)	(0.003)	(0.002)	(0.001)
Week -3 dummy×Country group dummy	-0.0002	-0.0048	-0.0009	0.002	0.0013
	(0.001)	(0.003)	(0.004)	(0.002)	(0.001)
Week -2 dummy×Country group dummy	0.0014*	-0.0014	-0.0016	0.0005	0.0005
	(0.001)	(0.003)	(0.004)	(0.002)	(0.002)
Week -1 dummy×Country group dummy	0.0018**	0.0042**	-0.006	-0.0004	-0.0012
	(0.001)	(0.002)	(0.004)	(0.002)	(0.001)
Week 0 dummy×Country group dummy	0.0006	0.0008	-0.004	-0.0017	0.0012
	(0.001)	(0.003)	(0.004)	(0.002)	(0.001)
Week 1 dummy×Country group dummy	0.1183***	0.2492***	0.2108***	0.3080***	0.2025***
	(0.017)	(0.051)	(0.051)	(0.055)	(0.024)
Week 2 dummy×Country group dummy	0.5538***	0.5903***	0.5637***	0.3521***	0.2507***
	(0.040)	(0.055)	(0.073)	(0.034)	(0.017)
Week 3 dummy×Country group dummy	0.1075***	0.2331***	0.2193***	0.1864***	0.1683***
	(0.009)	(0.023)	(0.030)	(0.015)	(0.010)
Week 4 dummy×Country group dummy	0.0631***	0.1255***	0.1165***	0.1611***	0.1033***
	(0.006)	(0.017)	(0.019)	(0.013)	(0.007)
Week 5 dummy×Country group dummy	0.0355***	0.0713***	0.0593***	0.0565***	0.0466***
	(0.005)	(0.013)	(0.014)	(0.007)	(0.005)
Week 6 dummy×Country group dummy	0.0121***	0.0474***	0.0227***	0.0382***	0.0289***
	(0.002)	(0.009)	(0.008)	(0.006)	(0.003)
Week 7 dummy×Country group dummy	0.0074***	0.0237***	0.0245**	0.0142***	0.0137***
	(0.002)	(0.007)	(0.011)	(0.004)	(0.003)
Week 8 dummy×Country group dummy	0.0044***	0.0257***	0.0103*	0.0111***	0.0104***
	(0.001)	(0.007)	(0.005)	(0.004)	(0.002)
Week 9 dummy×Country group dummy	0.0037***	0.0108*	0.0064	0.0042	0.0065***
	(0.001)	(0.006)	(0.005)	(0.003)	(0.002)
Week 10 dummy×Country group dummy	0.0019*	0.0120**	-0.0001	0.0025	0.0073***
	(0.001)	(0.005)	(0.004)	(0.002)	(0.002)
Week 11 dummy×Country group dummy	0.0023*	0.0076**	0.0005	0.0027	0.0063***
	(0.001)	(0.004)	(0.004)	(0.002)	(0.002)
Week 12 dummy×Country group dummy	0.0027***	0.0095*	0.0001	0.0006	0.0032*
	(0.001)	(0.005)	(0.004)	(0.002)	(0.002)
Week 13 dummy×Country group dummy	0.0046***	0.0035	-0.0014	0.0019	0.0046***
	(0.001)	(0.003)	(0.003)	(0.002)	(0.002)
Week 14 dummy×Country group dummy	0.0030***	0.0081*	0.0013	0.0018	0.0024
	(0.001)	(0.004)	(0.005)	(0.002)	(0.002)
Week 15 dummy×Country group dummy	0.0014	0.0041	-0.0006	-0.0008	0.0032*
	(0.001)	(0.004)	(0.004)	(0.002)	(0.002)
Week 16 dummy×Country group dummy	0.0025**	0.0078**	0.005	-0.0009	0.0036**
	(0.001)	(0.003)	(0.005)	(0.002)	(0.002)
Sample size			174,258		
N. of firm-'country group'-sector pairs			32,902		
N. of firms			8,071		
R-sq.			0.163		

Note: This table presents the regression results corresponding to Panel B of Figure 4. Week 1 refers to the week when the typhoon made landfall. The values in parentheses are robust standard errors clustered at the firm level. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

TABLE A5: The 2018 KIX Closure and Utilization of the Flexible Declaration Scheme, by Sector, Exports

	Sector 5 Chemical products	Sector 6 Leather and fur	Sector 7 Wood and pulp	Sector 8 Textiles	Sector 10 Stone, plaster, cement, etc.	Sector 11 Non-ferrous metals (iron and steel)	Sector 12 Machinery	Sector 13 Transport equipment	Sector 14 Optical equipment	Sector 15 Miscellaneous products and artwork
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Week -5 dummy × Sector dummy	0.0008	0.0239	-0.0025	0.0018	-0.0119**	-0.0003	0.0001	-0.0037	-0.0037	-0.0093
	(0.003)	-0.018	(0.012)	(0.005)	(0.006)	(0.003)	(0.001)	(0.003)	(0.003)	(0.009)
Week -4 dummy × Sector dummy	-0.0019	0.0211	-0.0032	-0.0030	-0.0104	-0.0005	-0.0001	-0.0010	0.0019	0.0002
	(0.003)	-0.015	(0.012)	(0.008)	(0.007)	(0.003)	(0.001)	(0.004)	(0.003)	(0.009)
Week -3 dummy × Sector dummy	-0.0060	0.0044	0.0043	-0.0042	-0.0053	0.0028	0.0023*	0.0002	0.0009	-0.0083
	(0.004)	-0.012	(0.008)	(0.004)	(0.007)	(0.004)	(0.001)	(0.003)	(0.002)	(0.010)
Week -2 dummy × Sector dummy	0.0035	0.0215	-0.0031	0.0018	-0.0054	0.0004	0.0037	0.0059	0.0144**	0.0006
	(0.006)	-0.017	(0.017)	(0.007)	(0.007)	(0.005)	(0.002)	(0.006)	(0.007)	(0.012)
Week -1 dummy × Sector dummy	-0.0062**	0.0182	-0.0075	-0.0031	-0.0012	0.0000	-0.0020*	-0.0040	0.0043	0.0018
	(0.003)	-0.012	(0.010)	(0.006)	(0.005)	(0.004)	(0.001)	(0.004)	(0.003)	(0.010)
Week 0 dummy × Sector dummy	-0.0084*	0.0224	0.0003	-0.0026	-0.0018	-0.0001	0.0022*	-0.0057	0.0016	-0.0023
	(0.004)	-0.016	(0.010)	(0.006)	(0.005)	(0.003)	(0.001)	(0.004)	(0.002)	(0.009)
Week 1 dummy × Sector dummy	0.3678***	0.0131	0.3754**	0.5576***	0.2591***	0.2877***	0.2873***	0.2187*	0.2277***	0.2962
	(0.056)	-0.01	(0.159)	(0.075)	(0.092)	(0.087)	(0.034)	(0.120)	(0.078)	(0.206)
Week 2 dummy × Sector dummy	0.4860***	0.0208	0.4231***	0.5622***	0.4266***	0.4446***	0.3890***	0.2464***	0.4373***	0.5720***
	(0.036)	-0.017	(0.095)	(0.057)	(0.084)	(0.052)	(0.023)	(0.088)	(0.049)	(0.094)
Week 3 dummy × Sector dummy	0.3451***	-0.0146	0.2751***	0.4785***	0.2699***	0.2974***	0.2422***	0.2304***	0.2328***	0.3093***
	(0.027)	-0.021	(0.073)	(0.045)	(0.043)	(0.037)	(0.015)	(0.071)	(0.030)	(0.065)
Week 4 dummy × Sector dummy	0.2268***	0.0937	0.1187***	0.2738***	0.1098***	0.1713***	0.1613***	0.0571**	0.1212***	0.2240***
	(0.023)	-0.083	(0.044)	(0.035)	(0.027)	(0.025)	(0.012)	(0.029)	(0.017)	(0.050)
Week 5 dummy × Sector dummy	0.1750***	0.115	0.0728*	0.1519***	0.0660**	0.0387***	0.0716***	0.0172	0.0486***	0.0962**
	(0.020)	-0.108	(0.037)	(0.034)	(0.027)	(0.012)	(0.008)	(0.017)	(0.011)	(0.049)
Week 6 dummy × Sector dummy	0.1055***	0.0182	0.0308	0.0964***	0.0424**	0.0448***	0.0466***	0.0092	0.0432***	0.0508*
	(0.015)	-0.013	(0.026)	(0.026)	(0.019)	(0.012)	(0.006)	(0.006)	(0.011)	(0.027)
Week 7 dummy × Sector dummy	0.0580***	0.0158	0.0139*	0.0503***	0.0255*	0.0321***	0.0297***	-0.0036	0.0104**	0.0516**
	(0.011)	-0.011	(0.008)	(0.015)	(0.014)	(0.009)	(0.005)	(0.004)	(0.005)	(0.025)
Week 8 dummy × Sector dummy	0.0455***	0.0193	0.0125*	0.0359**	0.0110	0.0125*	0.0106***	-0.0010	0.0087	0.0130
	(0.010)	-0.014	(0.007)	(0.018)	(0.009)	(0.008)	(0.003)	(0.004)	(0.005)	(0.025)
Week 9 dummy × Sector dummy	0.0230***	0.0135	0.0104	0.0394**	-0.0018	0.0122	0.0101***	-0.0006	0.0009	0.0296*
	(0.006)	-0.01	(0.008)	(0.016)	(0.009)	(0.008)	(0.003)	(0.004)	(0.003)	(0.018)
Week 10 dummy × Sector dummy	0.0192***	0.0177	-0.0026	0.0035	-0.0009	0.0032	0.0066***	0.0066	0.0026	0.0010
	(0.006)	-0.013	(0.012)	(0.008)	(0.006)	(0.005)	(0.002)	(0.006)	(0.004)	(0.013)
Week 11 dummy × Sector dummy	0.0095*	0.0236	0.0039	0.0140	-0.0061	0.0034	0.0036*	-0.0026	0.0000	0.0245
	(0.005)	-0.017	(0.008)	(0.010)	(0.007)	(0.006)	(0.002)	(0.004)	(0.003)	(0.016)
Week 12 dummy × Sector dummy	0.0184**	0.0199	0.0038	0.0203*	0.0053	-0.0027	0.0066**	-0.0081	0.0044	0.0096
	(0.008)	-0.014	(0.009)	(0.011)	(0.009)	(0.005)	(0.003)	(0.008)	(0.003)	(0.008)
Week 13 dummy × Sector dummy	0.0159**	0.004	0.0142*	0.0092	-0.0045	-0.0079	0.0033	-0.0173**	0.0019	0.0200
	(0.007)	-0.011	(0.009)	(0.009)	(0.005)	(0.005)	(0.002)	(0.008)	(0.003)	(0.025)
Week 14 dummy × Sector dummy	0.0104*	0.0219	0.0102	0.0113**	-0.0016	0.0021	0.0043*	-0.0030	0.0009	0.0121
	(0.006)	-0.015	(0.010)	(0.006)	(0.006)	(0.004)	(0.002)	(0.005)	(0.003)	(0.012)
Week 15 dummy × Sector dummy	0.0090	0.0074	0.0058	0.0063	0.0043	0.0029	0.0056**	0.0108	0.0035	0.0154
	(0.007)	-0.012	(0.009)	(0.007)	(0.005)	(0.004)	(0.002)	(0.014)	(0.003)	(0.010)
Week 16 dummy × Sector dummy	0.0042	0.017	-0.0017	0.0217**	-0.0056	0.0029	0.0030**	-0.0040	0.0051	0.0199
	(0.006)	-0.013	(0.008)	(0.011)	(0.006)	(0.004)	(0.001)	(0.004)	(0.003)	(0.016)
Sample size					80,202					
N. of firm-'country group'-sector pairs					12,714					
N. of firms					2,139					
R-sq.					0.261					

Note: This table presents the regression results corresponding to Panel A of Figure 5. Week 1 refers to the week when the typhoon made landfall. The values in parentheses are robust standard errors clustered at the firm level. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

TABLE A6: The 2018 KIX Closure and Utilization of the Flexible Declaration Scheme, by Sector, Imports

	Sector 5 Chemical products	Sector 6 Leather and fur	Sector 7 Wood and pulp	Sector 8 Textiles	Sector 10 Stone, plaster, cement, etc.	Sector 11 Non-ferrous metals (iron and steel)	Sector 12 Machinery	Sector 13 Transport equipment	Sector 14 Optical equipment	Sector 15 Miscellaneous products and artwork
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Week -5 dummy × Sector dummy	0.0051	-0.0062**	0.0012	-0.0009	-0.0057*	0.0003	0.0007	-0.0017	-0.0008	-0.0012
	(0.003)	(0.003)	(0.002)	(0.002)	(0.003)	(0.003)	(0.001)	(0.005)	(0.002)	(0.003)
Week -4 dummy × Sector dummy	0.0073**	-0.0047**	0.0020	-0.0004	-0.0041	0.0040	0.0005	-0.0041	-0.0033*	-0.0006
	(0.003)	(0.002)	(0.002)	(0.001)	(0.003)	(0.003)	(0.001)	(0.005)	(0.002)	(0.003)
Week -3 dummy × Sector dummy	-0.0004	-0.0005	-0.0013	0.0000	0.0060	0.0063*	-0.0004	0.0010	-0.0003	0.0023
	(0.004)	(0.002)	(0.003)	(0.001)	(0.007)	(0.003)	(0.001)	(0.005)	(0.002)	(0.004)
Week -2 dummy × Sector dummy	0.0046	-0.0018	0.0016	-0.0002	0.0007	0.0015	0.0018	0.0041	-0.0042**	0.0026
	(0.004)	(0.002)	(0.004)	(0.002)	(0.003)	(0.005)	(0.001)	(0.006)	(0.002)	(0.003)
Week -1 dummy × Sector dummy	0.0044	-0.0016	0.0027	0.0012	-0.0059	0.0002	0.0013	-0.0020	-0.0050**	-0.0065
	(0.003)	(0.002)	(0.003)	(0.002)	(0.004)	(0.003)	(0.001)	(0.004)	(0.002)	(0.004)
Week 0 dummy × Sector dummy	0.0073***	-0.0004	-0.0033	0.0006	-0.0004	-0.0007	-0.0002	-0.0060	-0.0022	0.0026
	(0.003)	(0.002)	(0.004)	(0.002)	(0.003)	(0.003)	(0.001)	(0.006)	(0.002)	(0.003)
Week 1 dummy × Sector dummy	0.2149***	0.1734***	0.0097**	0.1718***	0.0773**	0.1864***	0.2128***	0.2138***	0.1588***	0.1867***
	(0.053)	(0.063)	(0.004)	(0.024)	(0.037)	(0.058)	(0.024)	(0.079)	(0.047)	(0.059)
Week 2 dummy × Sector dummy	0.4884***	0.1480***	0.2171***	0.3598***	0.2885***	0.2930***	0.3625***	0.2953***	0.3501***	0.2037***
	(0.044)	(0.053)	(0.073)	(0.031)	(0.065)	(0.046)	(0.023)	(0.061)	(0.038)	(0.056)
Week 3 dummy × Sector dummy	0.2688***	0.1000***	0.1064***	0.1367***	0.1480***	0.1522***	0.1554***	0.1585***	0.1944***	0.1052***
	(0.024)	(0.023)	(0.031)	(0.013)	(0.028)	(0.022)	(0.010)	(0.032)	(0.020)	(0.021)
Week 4 dummy × Sector dummy	0.1839***	0.0438***	0.0847***	0.0755***	0.0782***	0.1212***	0.1002***	0.0726***	0.1305***	0.0751***
	(0.019)	(0.015)	(0.021)	(0.008)	(0.020)	(0.017)	(0.007)	(0.019)	(0.014)	(0.017)
Week 5 dummy × Sector dummy	0.0876***	0.0177*	0.0195	0.0317***	0.0438***	0.0638***	0.0501***	0.0493***	0.0581***	0.0199*
	(0.012)	(0.010)	(0.013)	(0.006)	(0.017)	(0.012)	(0.005)	(0.017)	(0.011)	(0.010)
Week 6 dummy × Sector dummy	0.0507***	0.0044	0.0083	0.0242***	0.0288***	0.0315***	0.0267***	0.0191*	0.0247***	0.0166**
	(0.008)	(0.005)	(0.008)	(0.004)	(0.011)	(0.008)	(0.003)	(0.011)	(0.006)	(0.008)
Week 7 dummy × Sector dummy	0.0271***	-0.0014	0.0018	0.0131***	0.0176**	0.0178***	0.0127***	-0.0044	0.0105*	0.0093
	(0.007)	(0.005)	(0.007)	(0.003)	(0.008)	(0.006)	(0.002)	(0.005)	(0.006)	(0.007)
Week 8 dummy × Sector dummy	0.0248***	-0.0018	-0.0006	0.0103***	0.0119*	0.0087*	0.0071***	0.0052	0.0087*	0.0087**
	(0.006)	(0.002)	(0.003)	(0.003)	(0.007)	(0.005)	(0.002)	(0.007)	(0.004)	(0.004)
Week 9 dummy × Sector dummy	0.0226***	0.0020	0.0059	0.0079***	-0.0065*	0.0068*	0.0013	-0.0054	0.0087**	0.0041
	(0.005)	(0.005)	(0.004)	(0.003)	(0.004)	(0.004)	(0.001)	(0.005)	(0.004)	(0.004)
Week 10 dummy × Sector dummy	0.0160***	-0.0053*	0.0048	0.0066***	-0.0013	0.0024	0.0012	0.0037	0.0071**	0.0073*
	(0.005)	(0.003)	(0.006)	(0.002)	(0.005)	(0.003)	(0.001)	(0.005)	(0.003)	(0.004)
Week 11 dummy × Sector dummy	0.0096**	-0.0022	-0.0052	0.0061***	0.0044	0.0020	0.0041***	-0.0027	0.0057*	0.0043
	(0.004)	(0.002)	(0.005)	(0.002)	(0.003)	(0.003)	(0.002)	(0.005)	(0.003)	(0.003)
Week 12 dummy × Sector dummy	0.0093**	-0.0022	-0.0062	0.0040**	-0.0032	0.0024	0.0020	-0.0057	0.0067*	0.0061
	(0.004)	(0.003)	(0.004)	(0.002)	(0.003)	(0.003)	(0.001)	(0.006)	(0.004)	(0.005)
Week 13 dummy × Sector dummy	0.0138***	-0.0012	-0.0003	0.0043**	-0.0007	0.0036	0.0018	-0.0039	0.0070*	0.0043
	(0.004)	(0.002)	(0.003)	(0.002)	(0.003)	(0.003)	(0.001)	(0.004)	(0.004)	(0.003)
Week 14 dummy × Sector dummy	0.0140***	-0.0034	-0.0039	0.0029*	-0.0014	0.0055*	0.0016	-0.0064	0.0052	0.0041
	(0.005)	(0.004)	(0.004)	(0.002)	(0.004)	(0.003)	(0.001)	(0.006)	(0.004)	(0.004)
Week 15 dummy × Sector dummy	0.0096**	-0.0034	-0.0058	0.0032*	-0.0025	0.0042	0.0007	-0.0053	0.0041	-0.0032
	(0.004)	(0.003)	(0.006)	(0.002)	(0.003)	(0.003)	(0.001)	(0.006)	(0.003)	(0.003)
Week 16 dummy × Sector dummy	0.0056*	-0.0004	-0.0046	0.0045**	0.0027	0.0013	0.0035**	-0.0072	0.0037	0.0059*
	(0.003)	(0.002)	(0.006)	(0.002)	(0.003)	(0.003)	(0.001)	(0.006)	(0.003)	(0.003)
Sample size	174,258									
N. of firm-'country group'-sector pairs	32,902									
N. of firms	8,071									
R-sq.	0.157									

Note: This table presents the regression results corresponding to Panel B of Figure 5. Week 1 refers to the week when the typhoon made landfall. The values in parentheses are robust standard errors clustered at the firm level. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

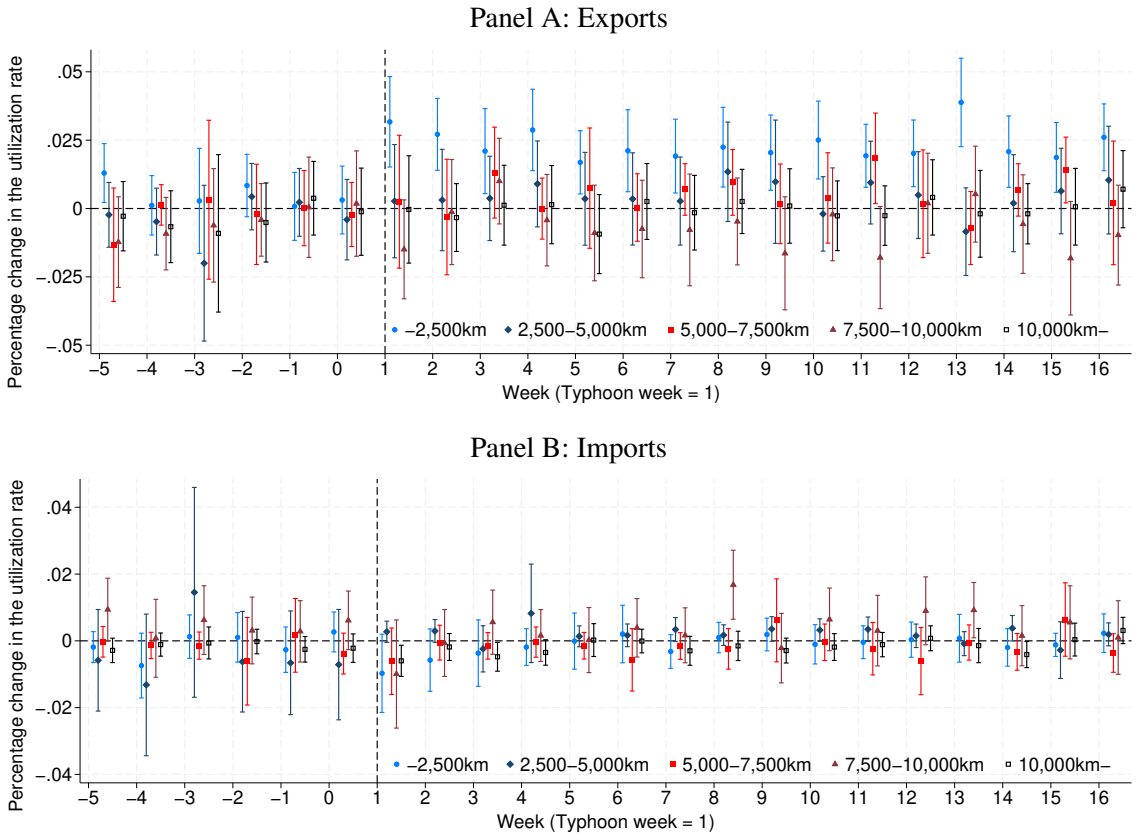
B Additional Analysis on the Effects of the 2019 NRT Power Outage

B.1 Effects of the 2019 NRT Power Outage by Distance-based Country Group

This section discusses the results of estimating the impact of the 2019 power outage at NRT on the utilization rate of the Flexible Declaration Scheme by distance-based country groups and sectors.

Figure A1 Panel A illustrates the effect on the utilization rate for exports through the South area at NRT by distance-based country groups. The results show that the utilization rate increased after the NRT outage for exports to the nearest distance group (within 2,500 km) and remained elevated until the end of the year. In contrast, the utilization rate remained largely unchanged for other country groups. This suggests that exporters adjusted their use of the Flexible Declaration Scheme primarily for exports to nearby countries.

FIGURE A1: The 2019 NRT Power Outage and Utilization of the Flexible Declaration Scheme, South Area, by Distance-based Country Group



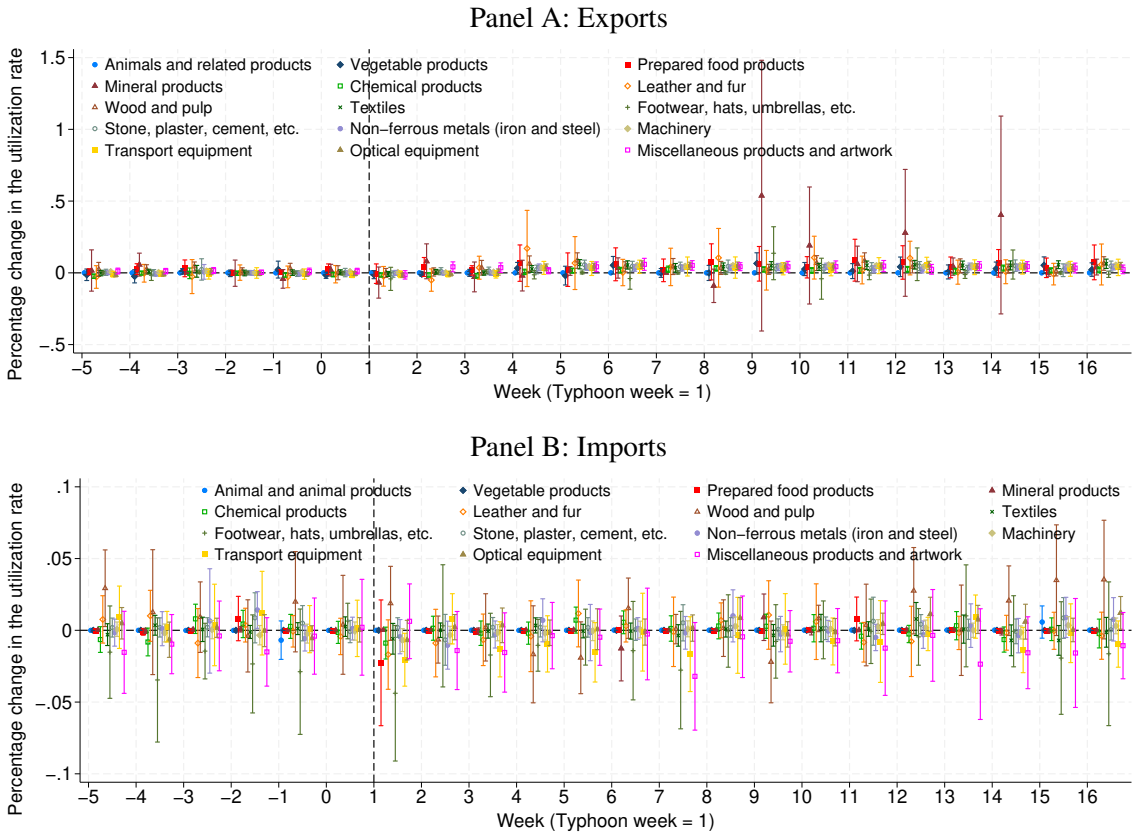
Note: The sample size for Panel A is 45,144, and the sample size for Panel B is 79,363. The point estimates and 95% confidence intervals are shown. Robust standard errors clustered at the exporter (importer) level are used. Since the sample is restricted to Week -7 (the 28th week) and later, the coefficients of the week dummies measure changes in the utilization rate of the flexible declaration scheme relative to the average of "Week -7 to Week -6." For the regression table corresponding to Panel A, see Table A7. For the one corresponding to Panel B, see Table A8.

Figure A1 Panel B shows the effect of the NRT outage on the utilization rate for imports through the South area at NRT by distance-based country groups. A small but statistically significant increase is observed for the second-closest group (2,500–5,000 km). In contrast, the utilization rate for the most distant group (over 10,000 km) decreased, with statistical significance at the 5% level. For the other groups, although the utilization rate declined in Week 1, these changes were not statistically significant. Overall, the results suggest that importers' use of the Flexible Declaration Scheme did not increase following the NRT outage.

B.2 Effects of the 2019 NRT Power Outage by Sector

Figure A2 Panel A shows the effect of the NRT power outage on the utilization rate for exports through the South area at NRT by sector. A statistically significant increase is observed for 'chemical products' and 'stone and plaster,' while no significant reactions are found in other sectors. Figure A2 Panel B presents results for imports. The utilization rate in the 'machinery' and 'transport equipment' sectors significantly decreased after the NRT power outage, whereas no significant changes were observed in other sectors.

FIGURE A2: The 2019 NRT Power Outage and Utilization of the Flexible Declaration Scheme, South Area, by Sector



Note: The sample size for Panel A is 45,144, and the sample size for Panel B is 79,363. The point estimates and 95% confidence intervals are shown. Robust standard errors clustered at the exporter (importer) level are used. Since the sample is restricted to Week -7 (the 28th week) and later, the coefficients of the week dummies measure changes in the utilization rate of the flexible declaration scheme relative to the average of "Week -7 to Week -6." For the regression table corresponding to Panel A, see Table A9. For the one corresponding to Panel B, see Table A10.

B.3 Effects of the 2019 NRT Power Outage on Import Values

The results in the main section indicate that the utilization rate of the Flexible Declaration Scheme for imports in the South area at NRT has decreased. Since the utilization rate is given by $\frac{IM_{isdt}^{NRT,South,\text{Flex}}}{IM_{isdt}^{NRT,South}}$, in order to understand the mechanism behind the decrease, it is necessary to examine whether the decrease is due to a decrease in the flexible declaration import value $IM_{isdt}^{NRT,South,\text{Flex}}$ or due to an increase in the total import value $IM_{isdt}^{NRT,South}$. To clarify this, we re-estimate equation (1) by replacing the dependent variable with the flexible declaration import value and the total import value, respectively. The dependent variable is the inverse hyperbolic sine transformation (arcsinh) of the import value, specifically:

$$y_{isdt} = \ln(IM_{isdt}^{NRT,South,\text{Flex}} + \sqrt{1 + IM_{isdt}^{NRT,South,\text{Flex}}})$$

or

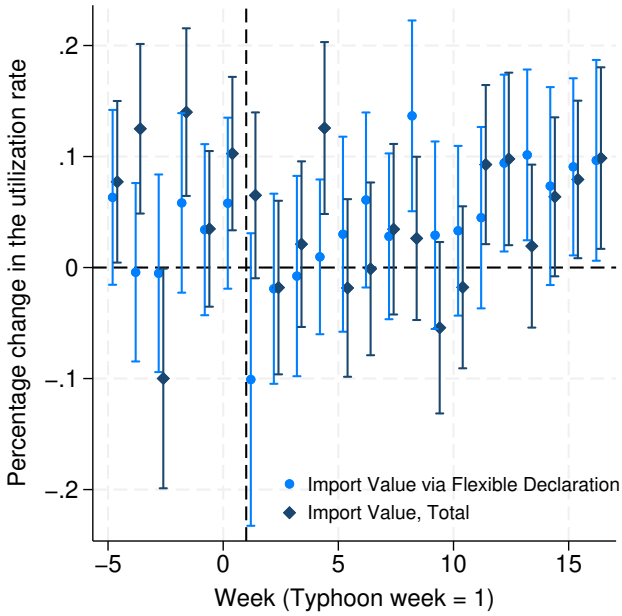
$$y_{isdt} = \ln(IM_{isdt}^{NRT,South} + \sqrt{1 + IM_{isdt}^{NRT,South}}).$$

To compare with the effects on the share $\frac{IM_{isdt}^{NRT,South,\text{Flex}}}{IM_{isdt}^{NRT,South}}$, we estimate using exactly the same sample as in Figure 3 Panel B.

Figure A3 presents the results. It shows that the flexible declaration import value decreased by about 10% in the week of the NRT power outage (Week 1), albeit statistically insignificant. The total import value increased by approximately 6%, which is statistically significant at the 10% level (note that the figure displays 95% confidence intervals). This suggests that the decrease in the utilization rate for imports was driven by a slight increase in total imports and a slight decrease in the import value under the Flexible Declaration Scheme.

It is difficult to determine the reason for the decrease in the flexible declaration import value despite the operational delays caused by the power outage. One possible explanation is that imports were diverted to other airports, with declarations filed at different ports. Additionally, there are analytical challenges. Unlike exports, imports involve a time lag between shipment from partner countries and arrival at airports in Japan. Therefore, it is possible that shipments had already been processed before the typhoon's impact, making it difficult to capture the effect on importers.

FIGURE A3: The 2019 NRT Power Outage and Utilization of the Flexible Declaration Scheme, South Area, asinh



Note: The sample size is 48,450. The point estimates and 95% confidence intervals are shown. Robust standard errors clustered at the importer level are used. Since the sample is restricted to Week -7 (the 28th week) and later, the coefficients of the week dummies measure changes in the utilization rate of the flexible declaration scheme to the average of "Week -7 to Week -6." For the regression table corresponding to this figure, see Table A11.

TABLE A7: The 2019 NRT Power Outage and Utilization of the Flexible Declaration Scheme, by Distance-based Country Group, Exports

	-2,500km	2,500-5,000km	5,000-7,500km	7,500-10,000km	10,000km-
	(1)	(2)	(3)	(4)	(5)
Week -5 dummy×Country group dummy	0.0130**	-0.0023	-0.0133	-0.0123	-0.0028
	(0.005)	(0.006)	(0.011)	(0.008)	(0.006)
Week -4 dummy×Country group dummy	0.0012	-0.0048	0.0013	-0.0092	-0.0067
	(0.006)	(0.006)	(0.004)	(0.007)	(0.007)
Week -3 dummy×Country group dummy	0.0028	-0.0200	0.0032	-0.0062	-0.0091
	(0.010)	(0.015)	(0.015)	(0.011)	(0.015)
Week -2 dummy×Country group dummy	0.0084	0.0043	-0.0022	-0.0042	-0.0051
	(0.006)	(0.006)	(0.009)	(0.007)	(0.007)
Week -1 dummy×Country group dummy	0.0008	0.0023	0.0001	0.0005	0.0038
	(0.006)	(0.006)	(0.007)	(0.009)	(0.007)
Week 0 dummy×Country group dummy	0.0031	-0.0041	-0.0022	0.0018	-0.0012
	(0.006)	(0.008)	(0.006)	(0.010)	(0.008)
Week 1 dummy×Country group dummy	0.0317***	0.0027	0.0025	-0.0149	-0.0003
	(0.008)	(0.011)	(0.012)	(0.009)	(0.010)
Week 2 dummy×Country group dummy	0.0271***	0.0031	-0.0031	-0.0013	-0.0033
	(0.007)	(0.009)	(0.011)	(0.010)	(0.006)
Week 3 dummy×Country group dummy	0.0210***	0.0037	0.0131	0.0100	0.0012
	(0.008)	(0.008)	(0.008)	(0.008)	(0.007)
Week 4 dummy×Country group dummy	0.0287***	0.0090	0.0000	-0.0043	0.0014
	(0.008)	(0.008)	(0.006)	(0.009)	(0.007)
Week 5 dummy×Country group dummy	0.0169***	0.0036	0.0074	-0.0090	-0.0094
	(0.006)	(0.009)	(0.011)	(0.009)	(0.007)
Week 6 dummy×Country group dummy	0.0211***	0.0035	0.0004	-0.0075	0.0026
	(0.008)	(0.009)	(0.006)	(0.009)	(0.007)
Week 7 dummy×Country group dummy	0.0192***	0.0027	0.0070	-0.0078	-0.0015
	(0.007)	(0.008)	(0.005)	(0.010)	(0.007)
Week 8 dummy×Country group dummy	0.0224***	0.0134	0.0096	-0.0047	0.0026
	(0.007)	(0.009)	(0.006)	(0.008)	(0.006)
Week 9 dummy×Country group dummy	0.0204***	0.0098	0.0017	-0.0164	0.0009
	(0.007)	(0.012)	(0.007)	(0.011)	(0.007)
Week 10 dummy×Country group dummy	0.0250***	-0.0020	0.0039	-0.0021	-0.0027
	(0.007)	(0.007)	(0.008)	(0.009)	(0.007)
Week 11 dummy×Country group dummy	0.0193***	0.0095	0.0184**	-0.0179*	-0.0026
	(0.006)	(0.008)	(0.008)	(0.010)	(0.006)
Week 12 dummy×Country group dummy	0.0202***	0.0049	0.0017	0.0019	0.0041
	(0.006)	(0.008)	(0.010)	(0.009)	(0.007)
Week 13 dummy×Country group dummy	0.0388***	-0.0085	-0.0071	0.0053	-0.0019
	(0.008)	(0.008)	(0.007)	(0.009)	(0.008)
Week 14 dummy×Country group dummy	0.0208***	0.0019	0.0068	-0.0057	-0.0019
	(0.007)	(0.009)	(0.005)	(0.009)	(0.006)
Week 15 dummy×Country group dummy	0.0187***	0.0064	0.0141**	-0.0182*	0.0006
	(0.007)	(0.008)	(0.006)	(0.011)	(0.007)
Week 16 dummy×Country group dummy	0.0260***	0.0104	0.0020	-0.0097	0.0071
	(0.006)	(0.010)	(0.012)	(0.009)	(0.007)
Sample size			45,144		
N. of firm-'country group'-sector pairs			9,028		
N. of firms			2,797		
R-sq.			0.005		

Note: This table presents the regression results corresponding to Panel A of Figure A1. Week 1 refers to the week when the typhoon made landfall. The values in parentheses are robust standard errors clustered at the firm level. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

TABLE A8: The 2019 NRT Power Outage and Utilization of the Flexible Declaration Scheme, by Distance-based Country Group, Imports

	-2,500km	2,500-5,000km	5,000-7,500km	7,500-10,000km	10,000km-
	(1)	(2)	(3)	(4)	(5)
Week -5 dummy×Country group dummy	-0.0019	-0.0058	-0.0003	0.0094**	-0.0029
	(0.002)	(0.008)	(0.002)	(0.005)	(0.002)
Week -4 dummy×Country group dummy	-0.0074	-0.0132	-0.0014	0.0008	-0.0011
	(0.005)	(0.011)	(0.002)	(0.006)	(0.002)
Week -3 dummy×Country group dummy	0.0013	0.0145	-0.0014	0.0062	-0.0006
	(0.003)	(0.016)	(0.002)	(0.005)	(0.002)
Week -2 dummy×Country group dummy	0.0010	-0.0062	-0.0061	0.0031	-0.0002
	(0.004)	(0.008)	(0.007)	(0.005)	(0.002)
Week -1 dummy×Country group dummy	-0.0027	-0.0066	0.0017	0.0029	-0.0025
	(0.003)	(0.008)	(0.006)	(0.005)	(0.002)
Week 0 dummy×Country group dummy	0.0027	-0.0071	-0.0038	0.0061	-0.0022
	(0.003)	(0.008)	(0.003)	(0.004)	(0.002)
Week 1 dummy×Country group dummy	-0.0097	0.0027*	-0.0061	-0.0099	-0.0060**
	(0.006)	(0.002)	(0.005)	(0.008)	(0.002)
Week 2 dummy×Country group dummy	-0.0058	0.0030*	-0.0005	-0.0006	-0.0018
	(0.005)	(0.002)	(0.003)	(0.005)	(0.002)
Week 3 dummy×Country group dummy	-0.0037	-0.0024	-0.0015	0.0056	-0.0048**
	(0.005)	(0.004)	(0.002)	(0.005)	(0.002)
Week 4 dummy×Country group dummy	-0.0019	0.0082	-0.0004	0.0016	-0.0035*
	(0.003)	(0.008)	(0.002)	(0.004)	(0.002)
Week 5 dummy×Country group dummy	-0.0001	0.0014	-0.0015	0.0002	0.0002
	(0.004)	(0.002)	(0.002)	(0.005)	(0.003)
Week 6 dummy×Country group dummy	0.0020	0.0017	-0.0057	0.0039	-0.0001
	(0.004)	(0.002)	(0.005)	(0.004)	(0.002)
Week 7 dummy×Country group dummy	-0.0032	0.0034*	-0.0016	0.0017	-0.0030
	(0.003)	(0.002)	(0.002)	(0.004)	(0.002)
Week 8 dummy×Country group dummy	0.0010	0.0017	-0.0024	0.0168***	-0.0015
	(0.002)	(0.002)	(0.003)	(0.005)	(0.002)
Week 9 dummy×Country group dummy	0.0019	0.0036*	0.0061	-0.0022	-0.0029
	(0.002)	(0.002)	(0.006)	(0.005)	(0.002)
Week 10 dummy×Country group dummy	-0.0010	0.0032*	-0.0004	0.0064	-0.0019
	(0.003)	(0.002)	(0.003)	(0.005)	(0.002)
Week 11 dummy×Country group dummy	-0.0004	0.0035*	-0.0024	0.0031	-0.0011
	(0.003)	(0.002)	(0.004)	(0.005)	(0.002)
Week 12 dummy×Country group dummy	0.0004	0.0015	-0.0061	0.0090*	0.0008
	(0.003)	(0.002)	(0.005)	(0.005)	(0.002)
Week 13 dummy×Country group dummy	0.0008	-0.0008	-0.0005	0.0092**	-0.0014
	(0.004)	(0.002)	(0.003)	(0.004)	(0.003)
Week 14 dummy×Country group dummy	-0.0020	0.0038*	-0.0033	0.0015	-0.0041**
	(0.003)	(0.002)	(0.003)	(0.005)	(0.002)
Week 15 dummy×Country group dummy	-0.0012	-0.0028	0.0064	0.0055	0.0004
	(0.002)	(0.004)	(0.006)	(0.006)	(0.003)
Week 16 dummy×Country group dummy	0.0023	0.0019	-0.0037	0.0010	0.0031
	(0.003)	(0.002)	(0.003)	(0.006)	(0.002)
Sample size			79,363		
N. of firm-'country group'-sector pairs			16,923		
N. of firms			6,157		
R-sq.			0.002		

Note: This table presents the regression results corresponding to Panel B of Figure A1. Week 1 refers to the week when the typhoon made landfall. The values in parentheses are robust standard errors clustered at the firm level. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

TABLE A9: The 2019 NRT Power Outage and Utilization of the Flexible Declaration Scheme, by Sector, Exports

	Sector 5 Chemical products	Sector 6 Leather and fur	Sector 7 Wood and pulp	Sector 8 Textiles	Sector 10 Stone, plaster, cement, etc.	Sector 11 Non-ferrous metals (iron and steel)	Sector 12 Machinery	Sector 13 Transport equipment	Sector 14 Optical equipment	Sector 15 Miscellaneous products and artwork
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Week -5 dummy × Sector dummy	0.0027	-0.0873	-0.0029	-0.0021	0.0105	0.0046	0.0003	0.0291	-0.0143	0.0021
	(0.006)	(0.053)	(0.004)	(0.008)	(0.012)	(0.006)	(0.005)	(0.027)	(0.013)	(0.015)
Week -4 dummy × Sector dummy	-0.0012	-0.0075	0.0164	0.0053	-0.0141	-0.0042	-0.0017	-0.0216	-0.0128	0.0036
	(0.007)	(0.007)	(0.021)	(0.005)	(0.025)	(0.008)	(0.005)	(0.024)	(0.010)	(0.013)
Week -3 dummy × Sector dummy	-0.0126	-0.0715	0.0039	-0.0464*	0.0154*	-0.0033	0.0043	-0.0290*	0.0245	0.0200
	(0.011)	(0.051)	(0.004)	(0.025)	(0.008)	(0.014)	(0.012)	(0.018)	(0.021)	(0.017)
Week -2 dummy × Sector dummy	0.0081	-0.0683	0.0032	-0.0068	-0.0010	-0.0030	-0.0007	0.0305	0.0088	-0.0167
	(0.006)	(0.056)	(0.003)	(0.014)	(0.016)	(0.007)	(0.006)	(0.049)	(0.008)	(0.026)
Week -1 dummy × Sector dummy	0.0019	-0.0577	-0.0011	0.0148	-0.0016	0.0018	0.0034	-0.0126	-0.0042	0.0128
	(0.006)	(0.044)	(0.004)	(0.011)	(0.018)	(0.008)	(0.005)	(0.028)	(0.009)	(0.022)
Week 0 dummy × Sector dummy	0.0067	-0.0129	-0.0060	0.0054	0.0340	0.0100	0.0006	0.0085	-0.0260**	-0.0035
	(0.009)	(0.017)	(0.006)	(0.008)	(0.025)	(0.008)	(0.006)	(0.058)	(0.012)	(0.016)
Week 1 dummy × Sector dummy	0.0118	0.0111	-0.0127	-0.0049	0.0679*	0.0114	0.0056	0.0357	-0.0013	-0.0297
	(0.009)	(0.014)	(0.009)	(0.014)	(0.038)	(0.010)	(0.007)	(0.046)	(0.014)	(0.034)
Week 2 dummy × Sector dummy	0.0203**	0.0056	0.0307	0.0115	0.0439*	0.0047	0.0043	-0.0113	0.0083	-0.0290
	(0.009)	(0.008)	(0.027)	(0.020)	(0.025)	(0.005)	(0.006)	(0.041)	(0.009)	(0.035)
Week 3 dummy × Sector dummy	0.0137	0.0329	-0.0084	0.0004	0.0236	0.0036	0.0152**	0.0268	-0.0027	0.0384
	(0.008)	(0.046)	(0.007)	(0.011)	(0.015)	(0.009)	(0.007)	(0.045)	(0.008)	(0.032)
Week 4 dummy × Sector dummy	0.0192**	0.0431	0.0047	0.0103	0.0217	0.0069	0.0049	-0.0127	0.0132	0.0157
	(0.009)	(0.057)	(0.004)	(0.007)	(0.013)	(0.006)	(0.007)	(0.024)	(0.010)	(0.013)
Week 5 dummy × Sector dummy	-0.0064	-0.0736	0.0062	0.0094	0.0210	0.0241*	0.0064	-0.0242	-0.0020	-0.0077
	(0.008)	(0.065)	(0.014)	(0.007)	(0.020)	(0.015)	(0.006)	(0.016)	(0.012)	(0.025)
Week 6 dummy × Sector dummy	0.0066	-0.1128	-0.0290	0.0116	-0.0071	0.0082	0.0141**	-0.0441	0.0082	0.0014
	(0.008)	(0.072)	(0.022)	(0.009)	(0.016)	(0.009)	(0.006)	(0.029)	(0.009)	(0.015)
Week 7 dummy × Sector dummy	0.0127	-0.0454	-0.0032	0.0046	0.0251**	0.0137	0.0036	0.0431	-0.0050	-0.0079
	(0.008)	(0.038)	(0.007)	(0.008)	(0.013)	(0.010)	(0.006)	(0.045)	(0.009)	(0.035)
Week 8 dummy × Sector dummy	0.0154*	-0.0836	0.0444	0.0184*	0.0148	0.0157	0.0067	0.0181	0.0076	0.0186
	(0.008)	(0.053)	(0.044)	(0.011)	(0.020)	(0.010)	(0.006)	(0.048)	(0.008)	(0.028)
Week 9 dummy × Sector dummy	0.0079	-0.0556	-0.0065	-0.0024	0.0223*	0.0077	0.0070	0.0150	-0.0036	0.0335*
	(0.012)	(0.047)	(0.008)	(0.012)	(0.013)	(0.008)	(0.006)	(0.026)	(0.011)	(0.020)
Week 10 dummy × Sector dummy	0.0175**	0.0046	0.0047	0.0016	0.0001	0.0110	0.0081	-0.0003	-0.0053	0.0107
	(0.008)	(0.009)	(0.005)	(0.010)	(0.012)	(0.010)	(0.006)	(0.034)	(0.012)	(0.022)
Week 11 dummy × Sector dummy	0.0065	-0.0034	0.0020	0.0068	0.0044	0.0056	0.0057	0.0310	0.0037	0.0004
	(0.007)	(0.006)	(0.003)	(0.007)	(0.010)	(0.007)	(0.006)	(0.039)	(0.009)	(0.027)
Week 12 dummy × Sector dummy	0.0151	0.0038	-0.0113	0.0152	0.0638*	0.0037	0.0079	-0.0094	0.0003	0.0112
	(0.010)	(0.024)	(0.007)	(0.011)	(0.033)	(0.008)	(0.006)	(0.032)	(0.014)	(0.015)
Week 13 dummy × Sector dummy	0.0081	0.0238	0.0491	0.0046	-0.0062	0.0240**	0.0108*	0.0118	0.0028	0.0169
	(0.010)	(0.026)	(0.045)	(0.009)	(0.020)	(0.012)	(0.006)	(0.053)	(0.012)	(0.019)
Week 14 dummy × Sector dummy	0.0168*	-0.1166	-0.0066	0.0096	0.0134	0.0030	0.0095	0.0180	-0.0052	-0.0013
	(0.010)	(0.076)	(0.006)	(0.007)	(0.009)	(0.009)	(0.006)	(0.044)	(0.007)	(0.018)
Week 15 dummy × Sector dummy	0.0191**	-0.1151*	-0.0021	0.0068	0.0346**	0.0076	0.0054	-0.0004	-0.0081	0.0240
	(0.008)	(0.067)	(0.003)	(0.008)	(0.016)	(0.009)	(0.005)	(0.050)	(0.011)	(0.021)
Week 16 dummy × Sector dummy	0.0224**	0.0019	-0.0010	0.0034	0.0137	0.0090	0.0129**	0.0150	-0.0085	0.0059
	(0.009)	(0.008)	(0.005)	(0.012)	(0.022)	(0.011)	(0.006)	(0.036)	(0.014)	(0.021)
Sample size					45,144					
N. of firm-'country group'-sector pairs					9,028					
N. of firms					2,797					
R-sq.					0.009					

Note: This table presents the regression results corresponding to Panel A of Figure A2. Week 1 refers to the week when the typhoon made landfall. The values in parentheses are robust standard errors clustered at the firm level. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

TABLE A10: The 2019 NRT Power Outage and Utilization of the Flexible Declaration Scheme, by Sector, Imports

	Sector 5 Chemical products	Sector 6 Leather and fur	Sector 7 Wood and pulp	Sector 8 Textiles	Sector 10 Stone, plaster, cement, etc.	Sector 11 Non-ferrous metals (iron and steel)	Sector 12 Machinery	Sector 13 Transport equipment	Sector 14 Optical equipment	Sector 15 Miscellaneous products and artwork
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Week -5 dummy × Sector dummy	-0.0064	0.0076	0.0293**	-0.0030	0.0019	-0.0016	0.0008	0.0091	0.0049	-0.0153
	(0.005)	(0.008)	(0.014)	(0.004)	(0.003)	(0.005)	(0.003)	(0.011)	(0.006)	(0.015)
Week -4 dummy × Sector dummy	-0.0081*	0.0101	0.0127	0.0035	0.0020	0.0011	-0.0019	0.0025	-0.0066	-0.0096
	(0.005)	(0.009)	(0.022)	(0.004)	(0.003)	(0.006)	(0.003)	(0.005)	(0.006)	(0.011)
Week -3 dummy × Sector dummy	0.0080	-0.0089	0.0092	0.0006	0.0021	0.0065	0.0005	0.0037	0.0018	-0.0039
	(0.005)	(0.012)	(0.013)	(0.004)	(0.003)	(0.019)	(0.003)	(0.014)	(0.003)	(0.012)
Week -2 dummy × Sector dummy	0.0044	0.0036	-0.0039	-0.0012	0.0087	0.0142**	-0.0034	0.0120	-0.0002	-0.0150
	(0.005)	(0.006)	(0.013)	(0.002)	(0.009)	(0.007)	(0.003)	(0.015)	(0.006)	(0.012)
Week -1 dummy × Sector dummy	0.0027	-0.0007	0.0199	0.0012	0.0049	-0.0057	-0.0023	0.0008	-0.0055	-0.0040
	(0.004)	(0.006)	(0.018)	(0.002)	(0.006)	(0.004)	(0.003)	(0.008)	(0.004)	(0.014)
Week 0 dummy × Sector dummy	-0.0014	-0.0043	0.0038	0.0026	-0.0009	0.0012	-0.0005	0.0013	0.0003	0.0021
	(0.004)	(0.006)	(0.018)	(0.003)	(0.004)	(0.004)	(0.003)	(0.010)	(0.004)	(0.017)
Week 1 dummy × Sector dummy	-0.0089	-0.0169	0.0188	-0.0059	0.0019	-0.0044	-0.0068*	-0.0205**	-0.0068	0.0063
	(0.006)	(0.012)	(0.013)	(0.005)	(0.003)	(0.006)	(0.004)	(0.009)	(0.007)	(0.013)
Week 2 dummy × Sector dummy	0.0015	-0.0089	-0.0065	0.0001	-0.0066	-0.0104	-0.0032	0.0080	0.0022	-0.0141
	(0.004)	(0.012)	(0.008)	(0.003)	(0.009)	(0.009)	(0.003)	(0.009)	(0.004)	(0.014)
Week 3 dummy × Sector dummy	-0.0020	-0.0066	0.0020	-0.0005	0.0021	-0.0029	-0.0017	-0.0133	0.0035	-0.0155
	(0.004)	(0.009)	(0.012)	(0.003)	(0.003)	(0.005)	(0.003)	(0.010)	(0.006)	(0.014)
Week 4 dummy × Sector dummy	-0.0020	-0.0041	-0.0167	0.0034	0.0021	0.0070	-0.0020	-0.0095	-0.0017	-0.0037
	(0.004)	(0.013)	(0.017)	(0.003)	(0.003)	(0.008)	(0.002)	(0.010)	(0.005)	(0.012)
Week 5 dummy × Sector dummy	0.0071	0.0117	-0.0191	-0.0005	0.0020	-0.0016	-0.0003	-0.0153	0.0007	-0.0048
	(0.005)	(0.012)	(0.013)	(0.002)	(0.003)	(0.010)	(0.003)	(0.011)	(0.007)	(0.010)
Week 6 dummy × Sector dummy	0.0056	0.0030	0.0154	-0.0005	0.0004	0.0013	0.0006	-0.0013	-0.0012	-0.0026
	(0.004)	(0.006)	(0.011)	(0.003)	(0.004)	(0.004)	(0.003)	(0.014)	(0.005)	(0.016)
Week 7 dummy × Sector dummy	0.0013	-0.0010	0.0008	-0.0036	0.0052	-0.0017	0.0010	-0.0166	0.0016	-0.0321*
	(0.005)	(0.012)	(0.005)	(0.004)	(0.006)	(0.006)	(0.003)	(0.013)	(0.005)	(0.019)
Week 8 dummy × Sector dummy	0.0031	0.0070	0.0015	0.0009	0.0020	0.0101	0.0028	-0.0035	0.0085	-0.0045
	(0.005)	(0.006)	(0.010)	(0.003)	(0.003)	(0.009)	(0.003)	(0.013)	(0.007)	(0.014)
Week 9 dummy × Sector dummy	0.0028	0.0107	-0.0220	-0.0035	0.0007	-0.0026	-0.0014	0.0010	-0.0028	-0.0076
	(0.004)	(0.012)	(0.015)	(0.004)	(0.004)	(0.006)	(0.003)	(0.013)	(0.005)	(0.011)
Week 10 dummy × Sector dummy	0.0015	0.0060	0.0083*	0.0015	0.0014	-0.0005	0.0010	-0.0078	-0.0013	-0.0072
	(0.005)	(0.013)	(0.005)	(0.005)	(0.004)	(0.004)	(0.003)	(0.008)	(0.005)	(0.011)
Week 11 dummy × Sector dummy	-0.0041	-0.0083	0.0037	0.0009	0.0063	-0.0050	0.0027	-0.0078	0.0045	-0.0124
	(0.005)	(0.007)	(0.015)	(0.003)	(0.009)	(0.005)	(0.002)	(0.015)	(0.004)	(0.017)
Week 12 dummy × Sector dummy	-0.0026	-0.0077	0.0276*	0.0079	0.0042	-0.0030	0.0018	-0.0025	0.0112*	-0.0035
	(0.003)	(0.012)	(0.015)	(0.006)	(0.003)	(0.005)	(0.003)	(0.006)	(0.006)	(0.016)
Week 13 dummy × Sector dummy	0.0032	-0.0018	0.0000	0.0008	0.0007	0.0033	0.0001	0.0095	0.0076	-0.0236
	(0.005)	(0.006)	(0.016)	(0.005)	(0.004)	(0.008)	(0.003)	(0.008)	(0.005)	(0.020)
Week 14 dummy × Sector dummy	-0.0064	-0.0017	0.0206*	-0.0070	-0.0007	-0.0037	-0.0015	-0.0137*	0.0060	-0.0156
	(0.004)	(0.006)	(0.012)	(0.005)	(0.004)	(0.006)	(0.002)	(0.008)	(0.006)	(0.013)
Week 15 dummy × Sector dummy	0.0008	-0.0003	0.0349*	-0.0070	0.0086	0.0090	0.0035	-0.0020	0.0003	-0.0158
	(0.004)	(0.007)	(0.020)	(0.005)	(0.007)	(0.007)	(0.003)	(0.010)	(0.004)	(0.019)
Week 16 dummy × Sector dummy	-0.0022	-0.0038	0.0354*	-0.0014	0.0004	0.0077	0.0031	-0.0096	0.0122**	-0.0107
	(0.005)	(0.008)	(0.021)	(0.005)	(0.004)	(0.008)	(0.003)	(0.008)	(0.006)	(0.012)
Sample size	79,363									
N. of firm-'country group'-sector pairs	16,923									
N. of firms	6,157									
R-sq.	0.005									

Note: This table presents the regression results corresponding to Panel B of Figure A2. Week 1 refers to the week when the typhoon made landfall. The values in parentheses are robust standard errors clustered at the firm level. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

TABLE A11: The 2019 NRT Power Outage and Utilization and Imports, asinh

	Import value via flexible declaration scheme	Import value, total
	(1)	(2)
Week -5 dummy	0.0632	0.0772**
	(0.040)	(0.037)
Week -4 dummy	-0.0042	0.1250***
	(0.041)	(0.039)
Week -3 dummy	-0.0052	-0.0999**
	(0.045)	(0.050)
Week -2 dummy	0.0582	0.1400***
	(0.041)	(0.039)
Week -1 dummy	0.0341	0.0348
	(0.039)	(0.036)
Week 0 dummy	0.0580	0.1026***
	(0.039)	(0.035)
Week 1 dummy	-0.1009	0.0650*
	(0.067)	(0.038)
Week 2 dummy	-0.0191	-0.0180
	(0.044)	(0.040)
Week 3 dummy	-0.0077	0.0211
	(0.046)	(0.038)
Week 4 dummy	0.0096	0.1257***
	(0.036)	(0.040)
Week 5 dummy	0.0300	-0.0184
	(0.045)	(0.041)
Week 6 dummy	0.0609	-0.0012
	(0.040)	(0.040)
Week 7 dummy	0.0281	0.0345
	(0.038)	(0.039)
Week 8 dummy	0.1366***	0.0263
	(0.044)	(0.038)
Week 9 dummy	0.0291	-0.0542
	(0.043)	(0.039)
Week 10 dummy	0.0331	-0.0178
	(0.039)	(0.037)
Week 11 dummy	0.0449	0.0927**
	(0.042)	(0.037)
Week 12 dummy	0.0941**	0.0978**
	(0.041)	(0.040)
Week 13 dummy	0.1015***	0.0193
	(0.039)	(0.037)
Week 14 dummy	0.0734	0.0637*
	(0.045)	(0.037)
Week 15 dummy	0.0907**	0.0794**
	(0.041)	(0.036)
Week 16 dummy	0.0966**	0.0986**
	(0.046)	(0.042)
Sample size	48,450	48,450
N. of firm-'country group'-sector pairs	11,055	11,055
N. of firms	4,522	4,522
R-sq.	0.001	0.003

Note: This table presents the regression results corresponding to Panel A of Figure A3. Week 1 refers to the week when the typhoon made landfall. The values in parentheses are robust standard errors clustered at the firm level. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

C Data Details

Table A12 summarizes the sector classification used in this paper. Table A13 shows the distances from Japan to its main trading partners.

TABLE A12: Sectoral Classification

NACCS first 2 digit	Division	Sectoral classification in this study	NACCS first 2 digit	Division	Sectoral classification in this study
01	Division 1	1 Animal and related products	50	Division 11	8 Textiles
02	Division 1	1 Animal and related products	51	Division 11	8 Textiles
03	Division 1	1 Animal and related products	52	Division 11	8 Textiles
04	Division 1	1 Animal and related products	53	Division 11	8 Textiles
05	Division 1	1 Animal and related products	54	Division 11	8 Textiles
06	Division 2	2 Plants and related products	55	Division 11	8 Textiles
07	Division 2	2 Plants and related products	56	Division 11	8 Textiles
08	Division 2	2 Plants and related products	57	Division 11	8 Textiles
09	Division 2	2 Plants and related products	58	Division 11	8 Textiles
10	Division 2	2 Plants and related products	59	Division 11	8 Textiles
11	Division 2	2 Plants and related products	60	Division 11	8 Textiles
12	Division 2	2 Plants and related products	61	Division 11	8 Textiles
13	Division 2	2 Plants and related products	62	Division 11	8 Textiles
14	Division 2	2 Plants and related products	63	Division 11	8 Textiles
15	Division 3	2 Plants and related products	64	Division 12	9 Footwear, hats, umbrellas, etc.
16	Division 4	3 Food	65	Division 12	9 Footwear, hats, umbrellas, etc.
17	Division 4	3 Food	66	Division 12	9 Footwear, hats, umbrellas, etc.
18	Division 4	3 Food	67	Division 12	9 Footwear, hats, umbrellas, etc.
19	Division 4	3 Food	68	Division 13	10 Stone and plaster
20	Division 4	3 Food	69	Division 13	10 Stone and plaster
21	Division 4	3 Food	70	Division 13	10 Stone and plaster
22	Division 4	3 Food	71	Division 14	10 Stone and plaster
23	Division 4	3 Food	72	Division 15	11 Steel
24	Division 4	3 Food	73	Division 15	11 Steel
25	Division 5	4 Mineral products	74	Division 15	11 Steel
26	Division 5	4 Mineral products	75	Division 15	11 Steel
27	Division 5	4 Mineral products	76	Division 15	11 Steel
28	Division 6	5 Chemicals	77	Missing	
29	Division 6	5 Chemicals	78	Division 15	11 Steel
30	Division 6	5 Chemicals	79	Division 15	11 Steel
31	Division 6	5 Chemicals	80	Division 15	11 Steel
32	Division 6	5 Chemicals	81	Division 15	11 Steel
33	Division 6	5 Chemicals	82	Division 15	11 Steel
34	Division 6	5 Chemicals	83	Division 15	11 Steel
35	Division 6	5 Chemicals	84	Division 16	12 Machinery
36	Division 6	5 Chemicals	85	Division 16	12 Machinery
37	Division 6	5 Chemicals	86	Division 17	13 Transport equipment
38	Division 6	5 Chemicals	87	Division 17	13 Transport equipment
39	Division 7	5 Chemicals	88	Division 17	13 Transport equipment
40	Division 7	5 Chemicals	89	Division 17	13 Transport equipment
41	Division 8	6 Leather and fur	90	Division 18	14 Optical equipment
42	Division 8	6 Leather and fur	91	Division 18	14 Optical equipment
43	Division 8	6 Leather and fur	92	Division 18	14 Optical equipment
44	Division 9	7 Wood and pulp	93	Division 19	15 Artistic and other products
45	Division 9	7 Wood and pulp	94	Division 20	15 Artistic and other products
46	Division 9	7 Wood and pulp	95	Division 20	15 Artistic and other products
47	Division 10	7 Wood and pulp	96	Division 20	15 Artistic and other products
48	Division 10	7 Wood and pulp	97	Division 21	15 Artistic and other products
49	Division 10	7 Wood and pulp			

TABLE A13: Distance from Japan, Examples

	Country (Region) name	Distance from Japan (km)	Distance country group		Country (Region) name	Distance from Japan (km)	Distance country group
1	South Korea	1,157	1	26	Qatar	8,263	4
2	China	2,098	1	27	Norway	8,417	4
3	Taiwan	2,103	1	28	Turkey	8,959	4
4	Hong Kong	2,891	2	29	Germany	9,298	4
5	Macao	2,940	2	30	Belgium	9,463	4
6	The Philippines	3,000	2	31	The UK	9,574	4
7	Mongolia	3,019	2	32	New Zealand	9,576	4
8	Viet Nam	3,673	2	33	Egypt	9,578	4
9	Thailand	4,613	2	34	Ireland	9,599	4
10	Bangladesh	4,904	2	35	Switzerland	9,681	4
11	Papua New Guinea	5,086	3	36	Italy	9,869	4
12	Nepal	5,166	3	37	Canada	10,358	5
13	Singapore	5,326	3	38	Ethiopia	10,401	5
14	Malaysia	5,329	3	39	Spain	10,777	5
15	Kazakhstan	5,335	3	40	The US	10,856	5
16	Indonesia	5,792	3	41	Portugal	11,156	5
17	India	5,848	3	42	Mexico	11,312	5
18	Pakistan	5,980	3	43	Uganda	11,539	5
19	Russia	7,486	3	44	Zimbabwe	12,827	5
20	Iran	7,673	4	45	Jamaica	12,929	5
21	Finland	7,830	4	46	Ecuador	14,746	5
22	Australia	7,831	4	47	French Guiana	15,506	5
23	UAE	8,063	4	48	Paraguay	18,372	5
24	Sweden	8,181	4	49	Argentina	18,550	5
25	Ukraine	8,216	4	50	Brazil	18,587	5

Note: The distance data was obtained from CEPII (https://www.cepii.fr/cepii/en/bdd_modele/bdd_modele_item.asp?id=6).