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【要旨】
This study investigates the impact of the closure of Japan's major international port on firm export behavior. In 2018, Typhoon *Jebi* directly struck Kansai International Airport (KIX), caused a two-week shutdown of the airport. Utilizing this event as a natural experiment, we examine the stability of logistic infrastructure achieved through the diversion of air exports to other airports, as well as the sectoral heterogeneity of this response. We find that the airport closure resulted in a diversion of exports to other airports, leading to a decline in total air exports only during the week of the typhoon's impact. While exports through non-KIX airports increased, these effects persisted for five to nine weeks. The extent of trade diversion was smaller in the machinery and transport equipment sectors. Our findings suggest that the disruption caused by a temporary airport closure can have substantial short-term impacts but does not result in permanent or long-lasting effects.

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A Disturbed Airport and Diverted Exports: Evidence from Typhoon *Jebi*[*]

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Abstract

This study investigates the impact of the closure of Japan's major international port on firm export behavior. In 2018, Typhoon *Jebi* directly struck Kansai International Airport (KIX), caused a two-week shutdown of the airport. Utilizing this event as a natural experiment, we examine the stability of logistic infrastructure achieved through the diversion of air exports to other airports, as well as the sectoral heterogeneity of this response. We find that the airport closure resulted in a diversion of exports to other airports, leading to a decline in total air exports only during the week of the typhoon's impact. While exports through non-KIX airports increased, these effects persisted for five to nine weeks. The extent of trade diversion was smaller in the machinery and transport equipment sectors. Our findings suggest that the disruption caused by a temporary airport closure can have substantial short-term impacts but does not result in permanent or long-lasting effects.

Key Words: Natural disaster, exports, transportation, airport closure, Japan
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1. Introduction

Ports play a pivotal role in the logistics of international trade, which draws significant attention from government policies and investment. With the surge of globalization, trade volumes have seen a dramatic increase which requires efficient port logistics characterized by precision, punctuality, and expedited transit and customs procedures within global value chain networks (Volpe Martincus et al., 2015). The quality of ports has become indispensable to international trade and economic growth (Radelet and Sachs, 1998; Limão and Venables, 2001). According to Hummels and Schaur (2013), each additional day spent in transit is equivalent to an ad valorem tariff of 0.6 to 2.1%.[1] However, when a major natural disaster strikes a port, the repercussions on economic activities are enormous.[2]

This study investigates the impact of a damaged port on exports from Japan. On September 4, 2018, Typhoon Jebi directly struck Kansai International Airport (hereafter KIX), an international airport in Osaka, caused a two-week shutdown. During this period, exporters had severely limited access to KIX and rerouted their shipments through other airports. Utilizing Japanese transaction-level Customs data on air transportation, we examine the effects of the KIX closure on exports through KIX, non-KIX airports, and overall air exports, as well as their sectoral heterogeneity.[3] Our results provide insights into the stability and instability of logistic infrastructure underlying the previously observed robustness of international trade flows to exogenous shocks.[4]

Our study offers several contributions to the existing literature due to several advantages in unique settings. First, the typhoon struck Osaka Bay, where the airport is located on an artificial island, resulting in intensive damage to the airport's operations for two weeks, while mainland firms in the vicinity experienced much less damage. This allows for a more precise measurement of the impact of a damaged port on undamaged firms' export

[1] Another estimate by Hummels (2007) indicates that each additional day spent in transit reduces the probability that the US imports from the country by about 1%.

[2] The stop of port operations results in halted exports and necessitating firms to reroute their shipments to nearby ports for a long duration (Friedt, 2021; Sytsma, 2020; Hamano and Vermeulen, 2020; Xu and Itoh, 2018). According to the survey by UNCTAD (2017), many ports have been impacted by extreme weather events, causing delays and disrupting operations.

[3] This study focuses particularly on exports rather than imports because the link between the KIX closure and exporters' decisions is more straightforward to analyze. In contrast, the import side involves a more complex decision structure due to foreign exporters' choices and the time lag between the initial shipment and its arrival in Japan. Nevertheless, we present results from the import side in the Appendix, which show that import diversion, particularly its sectoral heterogeneity, was less clear.

[4] For example, see Obashi (2010), for trade responses to exchange rate shocks; Ando and Kimura (2012), for the 2008-09 Global Financial Crisis and the 2011 Great East Japan Earthquake; and Ando et al. (2021), for the COVID shock.

behaviors. Second, our study sheds light on short-run airport shutdowns. Only two-week shutdown enables us to investigate whether firms resiliently maintain their export activities by rerouting to other ports or cease exporting during the shutdown. Third, while previous studies predominantly use port-level data on damaged ports, we employ transaction-level data, facilitating a more rigorous investigation of the impact.

Our empirical strategy exploits exporter-sector-level differences in exposure to the KIX closure, using initial reliance on KIX as measured by the share of air export values relative to total air exports during the first 28 weeks of 2018 (i.e., from January 1 to July 15). The underlying idea is that exporter-sector pairs relying on KIX experienced greater exposure to the closure, while those not using KIX were unaffected. Utilizing exposure levels to the closure allows us to isolate the causal effect of the KIX closure while controlling for other potential macro shocks that uniformly affect all exporters and sectors.

Our results suggest no robust evidence that KIX-reliant exporter-sector pairs decreased their exports through KIX—while the linear model suggests that KIX-reliant exporter-sector pairs reduced exports via KIX by approximately six times more than non-KIX-reliant pairs, the Poisson Pseudo Maximum Likelihood (PPML) method indicates essentially no difference between the two groups. Nevertheless, we find that KIX-reliant exporter-sector pairs increased their exports through non-KIX airports by 1.2 times more than non-KIX-reliant observations—while the linear model suggests a sixfold greater diversion, the PPML estimate indicates an increase of 1.2 times in the week following the typhoon's arrival. As a result of the successful diversion to non-KIX airports, the decline in overall air exports was limited to the week of the typhoon's impact.

We also examine sectoral differences in response to the KIX closure, focusing on the machinery and transport equipment sector (hereafter referred to simply as the machinery sector). In the context of international trade involving Japan and other Asian nations, the machinery sector has been a key focus due to its unique relationship with the global economy and its greater reliance on supply chains, including both domestic and international trade in parts and components (e.g., Obashi, 2010; Ando and Kimura, 2012; and Ando et al., 2021).[5] Our results suggest

[5] Obashi (2010) examines the stability of machinery trade within East Asia and shows that machinery trade, especially trade in parts and components, is stable to exchange rate fluctuations once trade link is created. Ando and Kimura (2012) investigate the trade responses to the 2008-09 Global Financial Crises and the 2011 Great East Japan Earthquake. They show that although there was a decline in machinery trade in response to the two shocks, machinery trade quickly recovered in the following year. Ando et al. (2021) show that there was almost no decline of machinery trade in response to the COVID shock.

that the extent of trade diversion in the machinery sector was smaller, presumably due to lower inventory holding costs, which may have encouraged exporters to temporarily hold their products and ship them after KIX reopened. Additionally, the potential presence of relation-specific investments tied to specific shipping routes may have made exporters more reluctant to switch to other airports. These findings provide supporting evidence on the previously documented swift recovery of machinery trade in response to macro shock such as the 2008-09 Global Financial Crisis and the COVID crisis.[6]

This study contributes to the literature on natural disasters and economic activities. Damage by a large scale natural disaster had a negative impact on local economic activities (see, for example, Husby et al., 2014; Noy and du Pont IV, 2018; Lima and Barbosa, 2019; and de Oliveira, 2019). Recent studies on this topic tend to employ firm-level data, finding the growth of damaged firms (e.g., Leiter et al., 2009; Okazaki et al., 2019), examining the likelihood of shutdown (e.g., Craioveanu and Terrell, 2016; Cole et al., 2019), or demonstrating a quick recovery to pre-disaster levels (e.g., Husby et al., 2014; Tanaka, 2015; Elliott et al., 2015; Okubo and Strobl, 2021). Other studies examine long-run economic growth patterns after natural disasters (e.g., Barone and Mocetti, 2014; Cavallo et al., 2013). Yet, the impact of infrastructure damage, specifically in port, remains relatively unexplored at the firm level.

Studies using port-level aggregate trade data have shown that damaged ports can lead to a substantial rerouting of trade flows to less affected ports with a lasting diversion effect. Using the Japanese port level trade data, Hamano and Vermeulen (2020) found that 40% of trade flows were re-routed from damaged port to less damaged ports in Great East Japan Earthquake. Similarly, Friedt (2021) and Sytsma (2020), using the US port level trade data, and Xu and Itoh (2018), using the Japanese prefecture level container data to study the impact of Kobe earthquake, found similar results and observed long lasting diversion effect. However, firm-level trade data is fairly limited in this strand. Using firm-level export data in Chile, Volpe Martincus and Blyde (2013) found that the damaged ports by earthquake had negative impact on firm's exports (large firm's homogeneous goods), primary caused by a large reduction in the number of shipments. Verschuur et al. (2020) examine the effects of 141 disruptions caused

[6]We argue that the previously documented swift recovery in machinery trade was driven by the sector's lower inventory holding costs, which facilitated a rapid rebound, and by the potential presence of relation-specific investments in shipping routes, which enhanced the supply chain's robustness to external shocks.

by 27 disasters in 74 ports and show that transportation diversion across ports was not often observed during the disruptions. On the contrary, we show that there was a substantial transportation diversion to other ports within Japan, successfully providing affected firms with transportation opportunities through other airports.

We contribute to the literature on how trade responds to damaged infrastructure using Japanese transaction-level Customs data, focusing specifically on airports, known for quicker recovery compared to seaports. In contrast to many previous studies where both firms and ports were seriously damaged, our case involves the sole damage to an airport, KIX, by a typhoon, allowing us to isolate the impact of the airport shutdown. We note that all other four international airports locate far from Osaka area and thus undamaged. Undamaged firms could flexibly reroute from the damaged to undamaged airports, which allows us to emphasize the impact of the shutdown on the damaged airport. Unlike seaports, airports facilitate shipping without loading large cargo and containers by gantry cranes, potentially leading to a quicker return of shipments.

This study challenges previously observed findings of long duration and large magnitude of diversion effects. In this paper, when firms remain undamaged and only the port is affected, they can easily redirect from the damaged to the undamaged and swiftly return once the port recovers. Our aim is to shed light on this aspect of firms' resilience in the face of shutdown of transportation infrastructure.

The rest of the paper is organized as follows: Section 2 describes the background of the event. Section 3 summarizes our data. Section 4 provides our estimation models and results. Section 5 offers concluding remarks. Additional details and results are presented in Appendix.

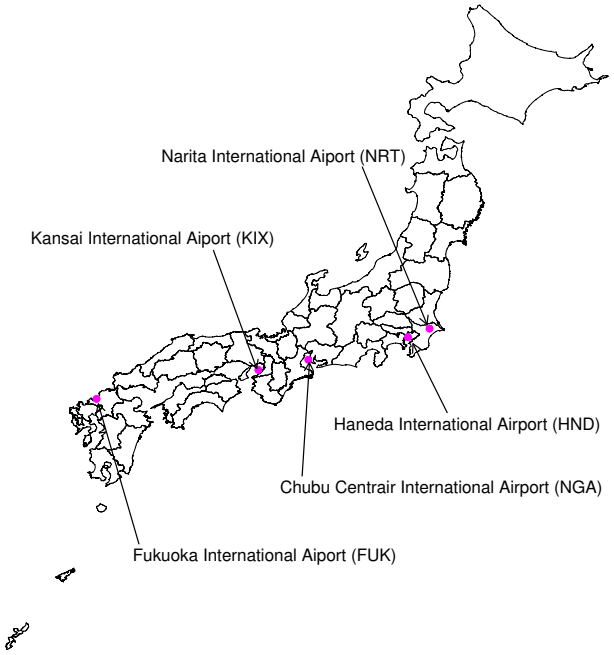
2. Background

2.1. Kansai International Airport (KIX)

In Japan there are five major international airports, Narita (Tokyo-Narita International Airport; NRT), Haneda (Tokyo-Haneda International Airport; HND), Kansai International Airport (KIX), Nagoya International Airport (Chubu Centrair International Airport; NGA), and Fukuoka International Airport (FUK). See Figure 1 for the

locations of these airports. Among them, KIX ranks as the third-largest airport in Japan and is located in Osaka prefecture, serving as a central hub for Western Japan. The airport situated on an artificial island in the Bay of Osaka. KIX started operations in September 1994. By 2014, it had evolved into a key Asian hub, operating more than 900 weekly flights to all over the world.[7] In 2016 passenger traffic reached 25.2 million and international freight reached 700,000 tons.[8] A large portion of exports from the Kansai region (Osaka, Hyogo, and Kyoto prefectures) relies on KIX. According to Trade Statistics of Japan, the airport exports amounted to 5.6 trillion yen in 2017, which constitutes 34% of the total Kansai region's exports. This surpasses the export values of Osaka and Kobe ports (sea ports) and thus KIX is the foremost port (both air and sea ports) in the Kansai region. Exports of semiconductors and electrical equipment in the Kansai region heavily rely on KIX, i.e. 67% of semiconductor exports, 58% of electronic circuit exports, and 52% of scientific optical equipment exports in the Kansai region.[9]

FIGURE 1: MAP OF JAPAN



NOTE. The figure shows the locations major international airports in Japan.

KIX is a unique location on an island in the middle of Osaka Bay. This offers some advantages such as the

[7] See New Kansai Airport Company, Ltd. (March 26, 2024), in Japanese, available at http://www.nkiac.co.jp/news/2013/1915/2014summer.pdf, accessed on January 3rd, 2025.

[8] See Kansai Airport (2024) "The Kansai Airport in Numbers," in Japanese, available at http://www.kansai-airports.co.jp/company-profile/about-airports/file/A-7-1_kix_overview_jn.pdf, accessed on January 3rd, 2025.

[9] See the Trade Statistics of Japan, the Ministry of Finance, available at https://www.customs.go.jp/toukei/info/.

absence of residential areas nearby, no conflicts related to noise and vibration. Consequently, the airport operates 24 hours as a pivotal air travel hub. However, this island setting also face serious risks of natural disasters like high tides, earthquakes, and typhoons. Additionally, there is a risk of disruptions to electricity and water supply from the mainland. The geographical isolation of the airport with only access via one main bridge makes it vulnerable in natural disasters. Furthermore, such artificial island has seen gradual ground subsidence over time.

2.2. Impacts of Typhoon Arrived on September 4th, 2018

Japan experiences typhoons every summer. Many of them land in Southwestern Japan and subsequently moving northeast, causing substantial damage. On September 4th, 2018, a powerful typhoon struck Japan, which landed at Tokushima prefecture, traverse the Osaka Bay, and directly hit Osaka with a central pressure of 955 hPa and wind speeds of 45 m/s.[10] The typhoon caused 14 fatalities, 980 injuries, complete collapse of 68 buildings, partial collapse of 833 buildings, and partial damage to 97,009 buildings.[11] In particular, Osaka prefecture had the largest damage, i.e. eight fatalities and 464 injuries.[12] KIX, located in the Osaka Bay, suffered extensive damage from high tide and strong winds, submerging terminals and runways. All flights were canceled and electricity supply was disrupted for a few days. The bridge connecting to the mainland was destroyed by a tanker in the bay, leading to a complete halt in airport operations.

During this period, operations at KIX completely shut down for several days and then it took around two weeks to recover operations. Since physical shipping of products at the airport was completely halted, products were stored within the airport facilities. The airport eventually reopened on September 21st, with 99% of passenger flights and 86% of cargo operations resuming on the same day (Sankei Newspaper, September 21st, 2018).[13] The

[10] See the report by Japan Meteorological Agency titled "Regarding Typhoon No. 21 of 2018 (Heisei 30-nen taifū dai 21-gō ni tsuite)", available at https://www.pa.kkr.mlit.go.jp/file/pdf/takasiotaisaku/20180919/5.pdf, accessed on June 15, 2025.

[11] See the report by the Fire and Disaster Management Agency, titled "Damage Caused by Typhoon No. 21 of 2018 and Response Status of Firefighting Agencies, etc., 10th Report (Heisei 30 taifū dai 21-go ni yoru higai oyobi shōbō kikan-tō no taiō jōkyō (dai 10-hō))," available at https://www.fdma.go.jp/disaster/info/items/40fa100bdc7b7db0e896733faa88c208d8b032ee.pdf, accessed on June 15, 2015.

[12] See the same report by the Fire and Disaster Management Agency.

[13] The title of the news article is "Kansai Airport terminal, which suffered flooding damage due to the typhoon, fully reopens. Passenger flights are 99% restored, cargo flights 86% — 'A major step toward full recovery' (Taifū de shinsui higai no Kankū tāminaru ga zenmen saikai – ryokaku-bin wa 99%, kamotsu-bin wa 86% 'honkaku fukkyū e no ōkina ippo')," available at https://www.sankei.com/article/20180921-OBOAA5Z7AZPY3DGWOEAKMAJBJA/, accessed on June 15, 2025.

recovery from the damage took around 15 days.

2.3. Firms' Response to the KIX Closure

While the damage to KIX was temporary, it revealed the vulnerability of the airport, which serves as a crucial export hub for firms in the Kansai region. As mentioned above, many firms in the region heavily relied on KIX due to its proximity to central Osaka and its 24-hour operational status. The temporary shutdown prompted exporting firms to recognize the fragility of KIX and risks associated with largely relying on a single airport. Some firms shifted their exports from alternative airports during the closure. After the reopening, some firms diversified their choice of airports for exporting.

According to Nikkei Newspaper (Nikkei Newspaper, Sept 5th 2019), Panasonic, Co., an electrical machinery company in Kansai Area, immediately switched to Narita Airport in the shutdown.[14] The KIX closure led firms to use business continuity plans (BCP) and make strategic decisions to diversify their airport usage for exporting. Likewise, Shimazu, Co., a precision machinery producer in Kyoto, experienced cargo damage at KIX and, as a response, utilized Narita Airport as a substitute for one month following the typhoon (Nikkei Newspaper, Sept 5th 2019).[15] Accordingly, many machinery companies in Kansai region implemented a BCP and immediately diversify its airport usage to keep on exporting during the shutdown of KIX rather than stopping exporting.

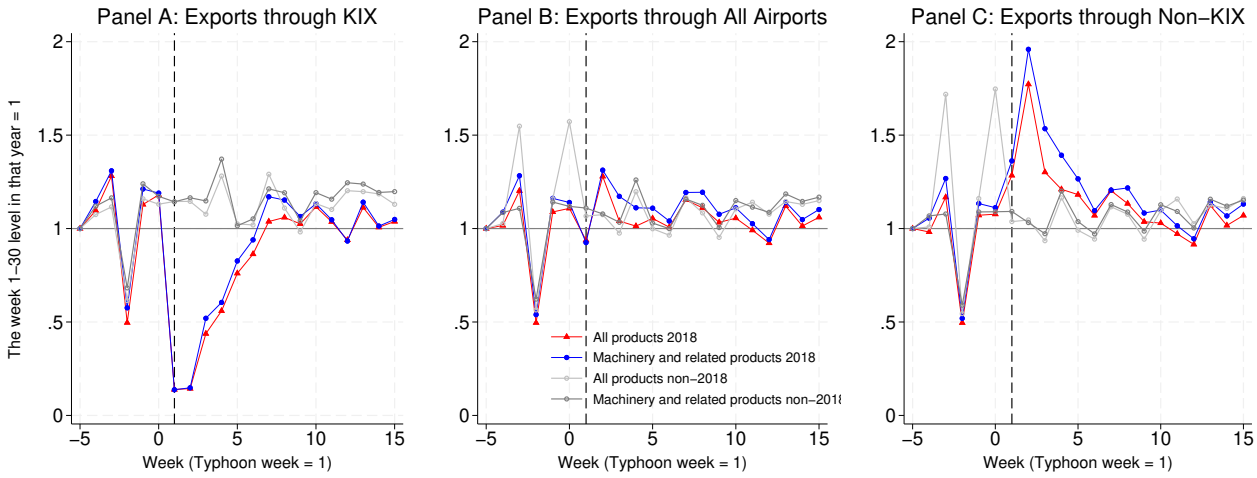
2.4. Mean Dynamics of Exports

We investigate whether the temporary shutdown of KIX resulted in trade diversion to other airports. To provide a preliminary insight, Figure 2 illustrates the mean dynamics of exports by all exporters during 2018, compared to the average for the other years (2014–2017 and 2019). As we examine whether exports from the "machinery and transport equipment sector" (i.e., simply, the machinery sector) follow a different pattern compared with exports from other sectors, we plot both total exports as well as machinery exports.

[14]The title of the news article is "Typhoon Lessons: Moving Away from 'KIX Dependence' Panasonic and others disperse to Narita and other airports; Murata Manufacturing establishes a response headquarters (Taifuu kyōkun ni datsu 'Kanku izon' Panasonic, Narita nado ni bunsan Murata Seisakusho wa taisaku honbu o kitei)," available at https://www.nikkei.com/article/DGKKZO49404940U9A900C1LKA000/, accessed on January 3rd, 2025.

[15]The same source as the previous footnote.

FIGURE 2: EXPORTS, MEAN DYNAMICS



NOTE. The "non-2018 years" include 2014–2017 and 2019. The export values are normalized by dividing them by the average export value between the 1st and 30th weeks in 2018. When defining the 1st week as January 1st to January 7th of 2018, the 36th week corresponds to September 3rd to September 10th of 2018. When defining "Week 1" as the week typhoon hit, the 36th week, "Week -5" corresponds to the 30th. The plotted export values are normalized by dividing them by the average export values between Week -34 and Week -5 (the 1st and 30th weeks).

Panel A shows that in the week the typhoon struck, referred to as week 1, exports through KIX dropped by approximately 80% compared to the average value during the first 30 weeks of the same year, both for total exports and machinery exports. Exports through KIX remained lower until week 6 but returned to their original levels by week 7. Panel B shows that total exports and machinery exports via all airports decreased by about 10% in week 1 relative to week 0. However, both total and machinery exports rebounded in week 2 and remained at a higher level compared to other years. Panel C presents the average dynamics of exports through non-KIX airports. It shows that total and machinery exports increased by approximately 20% relative to their original levels in week 1, followed by a further increase by 80% for total exports and by 100% for machinery exports. This surge in exports through non-KIX airports persisted until week 5.

Although the mean dynamics provide useful insights, the results should be interpreted cautiously. The dynamics shown in Figure 2 do not account for exporter fixed effects or week fixed effects, which capture time-invariant exporter characteristics and macro shocks that uniformly affect all exporters. Additionally, Figure 2 presents the average export values for all exporters. Since exposure to the KIX closure varies among exporters—some frequently

use KIX, while others do not use the airport at all—our regression analysis incorporates exporters' reliance on KIX prior to the typhoon's arrival. This approach allows us to examine whether responses to the KIX closure differ based on the level of reliance on the airport, thereby isolating the effects of the KIX closure on trade diversion.

3. Data

3.1. Japan Customs Data

Our study employs Japanese transaction-level Customs data from 2014 to 2019.[16] This dataset includes a comprehensive record of exports and imports at the declaration level in Japan. The dataset also provides transaction details such as the names and addresses of exporters (or importers), HS 9 digit product codes, shipping ports, destinations, declaration dates, export values in FOB prices (or import values in CIF prices), quantities, and quantity units of measurement. This dataset is the universe of international trade through all seaports and airports in Japan. We use the transaction data exceeding 200 thousand JPY at export declaration base at the daily basis.

3.2. Setup

We are particularly interested in the effect of the KIX closure on exporters' behavior. Therefore, we restrict our sample to *exports* through *airports* by *those who used KIX at least once* in 2018. First, we focus on exports because importing decisions are likely influenced by foreign exporters' actions, and the time lag between shipping from the origin country and arrival in Japan complicates the examination of the KIX closure's effects on importing decisions.[17] Second, we focus on diversion between airports rather than between an airport and seaports because, while substitution from air to maritime transportation is reasonable in the long run, a swift transition from air to maritime transportation is assumed to be challenging due to the differing cargo capacities of the two transportation modes.[18] Third, since one of our main dependent variables is 'exports through KIX,' we are unable to define

[16] The Japan customs data are also used by, for example, Ito et al. (2024) and Yoshida et al. (2024).

[17] Nevertheless, in Appendix C, we examine the effects of the KIX closure on imports. While we observe import diversion to non-KIX airports, we do not find a clear difference in import diversion between the machinery sector and other sectors.

[18] Additionally, it is noted shipments were redirected to other airports, such as Narita International Airport (NRT) and Chubu Centrair International Airport (NGA) (NX Logistics Research Institute and Consulting, 2020).

changes in exports through KIX before and after the typhoon hit for exporters who never used KIX in the first place. For this reason, our sample includes exporters who used KIX at least once in 2018 only.

The original Japan Customs data on exports are used to construct a balanced panel dataset at the exporter-sector-week level, comprising a cross-section of exporter-sector pairs and a time series of weeks. It allows for potentially different reactions to the KIX closure between, for example, the machinery division of a firm and the textile division of the same firm. Different responses to the KIX closure across divisions within a firm are plausible if each division has a separate shipping office and, therefore, makes different decisions when facing a shock.

If exporters do not engage in exports during a week, the zero trade flow is not included in the original Japan Customs data, making it an unbalanced panel. However, since zero trade flows could be an important consequence of the KIX closure, they are added to the dataset, resulting in a balanced panel.

The sample generation process is as follows: (i) Retain only air exports; (ii) Retain only exports of sector s's products; (iii) Construct a balanced panel at the exporter-week level. Repeat steps (i) to (iii) for the following nine sectors: (1) live animals and animal-related products, (2) plants, food, and beverages, (3) coal, (4) chemicals, (5) leather, (6) wood, pulp, and paper, (7) textiles, (8) stone, cement, and metals, and (9) machinery and transport equipment (i.e., simply, the machinery sector).[19] In the final step, we stack the nine datasets from the nine sectors to construct one exporter-sector-week level dataset. This process results in a sample of 13,516 exporter-sector pairs, including 8,754 unique exporters.[20] The total sample size for the panel dataset is 716,348 (13,516 × 53 weeks).

[19] Our sectoral classification of each set of declared exports is based on the HS code of the product listed at the top of the declared document, which, in many cases, is the product with the highest export (or import) value.

[20] This sample of 8,754 exporters does not include all exporters who used KIX at least once in 2018 because we drop observations with missing HS codes or HS codes that are not included in the nine categories. We also drop exporters for which location information–prefecture–could not be retrieved from the addresses of exporters.

4. Estimation

4.1. Baseline Model

To examine the effects of the KIX closure on trade, we estimate the following:

$$y_{ist} = \sum_{t=30}^{53} \left(\alpha_t \times \theta_{is}^{KIX} \times T_t\right) + \phi_{is} + \phi_t + \epsilon_{ist}, \tag{1}$$

where i indicates firm, s indicates sector, and t indicates week. The dependent variable denotes (i) exports through KIX, (ii) exports through any airports, (iii) exports through non-KIX airports, either in the form of "inverse hyperbolic sine"-transformed export values—e.g., $\text{arcsinh}(EX_{ist}) = \ln\left(EX_{ist} + \sqrt{1 + (EX_{ist})^2}\right)$ where EX_{ist} denotes export values by firm-sector pair i-s in period (week) t—for the linear regression model or in the form of raw values for the Pseud Poisson Maximum Likelihood (PPML) estimation model. Since the exporter-sector-week-level dataset includes many zero trade flows, the asinh transformation can lead to different results depending on the unit of the raw variable—i.e., whether it is in JPY, 1,000 JPY, or 1,000,000 JPY. For this reason, Chen and Roth (2024) suggest that PPML is a more suitable model.

The variable θ_{is}^{KIX} is the treatment variable constructed as either a binary or continuous variable. In the binary setting, it takes unity if exporter-sector pair i–s's exports through KIX during the first 28 weeks of 2018 (January 1st to July 15th) as a share of all air exports during the same period is greater than the 90th-percentile of the distribution.[21] In the continuous setting, θ_{is}^{KIX} is the export values through KIX divided by the export values through any airports during the first 28 weeks of 2018. We use the KIX reliance level computed based on data from the first 28 weeks to ensure that it is not affected by expectations of the typhoon's arrival. According to the Japan Meteorological Agency, the lifespan of a typhoon—the period from its formation to its transition into a tropical depression—is, on average, 5.2 days.[22] Therefore, it is highly unlikely that exporters could have anticipated the typhoon striking KIX by July 15th. The variable T_t denotes the dummy variable taking unity when the observation

[21] See Figure A1 for average KIX reliance levels of each bin of KIX reliance level's percentiles. It shows that the 90th percentile is about 0.5.

[22] See https://www.jma.go.jp/jma/kishou/know/typhoon/1-4.html, accessed on January 3rd, 2025.

comes from Week t, and α_t is a parameter to be estimated.

The variable ϕ_{is} denotes firm-sector fixed effects. The variable ϕ_t indicates week fixed effects. ϵ_{ist} denotes the error term. Our main interest is on the coefficients of the interaction terms of KIX dummies and week dummies, i.e. α_t. Table 1 presents summary statistics of the variables. Table 2 presents correlation coefficients across key explanatory variables.

TABLE 1: SUMMARY STATISTICS OF THE EXPORT-SIDE VARIABLES

				Mean in each percentile bin					
	Obs	Mean	Std. dev.	0-10th	10-25th	25-50th	50-75th	75-90th	90-100th
(1) Exports from KIX, asinh	716,348	3.61	6.56	0	0	0	0	12.74	16.95
(2) Exports from all airports, asinh	716,348	6.61	7.90	0	0	0	9.43	15.98	18.58
(3) Exports from nonKIX airports, asinh	716,348	4.64	7.31	0	0	0	2.24	15.13	18.16
(4) Exports from HND, asinh	716,348	1.61	4.78	0	0	0	0	0.24	15.70
(5) Exports from NRT, asinh	716,348	3.56	6.71	0	0	0	0	11.87	17.74
(6) Exports from FUK, asinh	716,348	0.30	2.17	0	0	0	0	0	3.00
(7) Exports from NGA, asinh	716,348	1.16	4.05	0	0	0	0	0	11.64
(8) Exports from KIX, raw data	716,348	7.21	183.00	0	0	0	0	0.84	70.81
(9) Exports from all airports, raw data	716,348	24.50	328.00	0	0	0	0.51	5.13	235.60
(10) Exports from nonKIX airports, raw data	716,348	17.20	233.00	0	0	0	0.05	2.44	168.70
(11) Exports from HND, raw data	716,348	2.38	35.70	0	0	0	0	0	23.77
(12) Exports from NRT, raw data	716,348	12.30	185.00	0	0	0	0	1.16	121.80
(13) Exports from FUK, raw data	716,348	1.21	81.70	0	0	0	0	0	12.06
(14) Exports from NGA, raw data	716,348	1.08	45.60	0	0	0	0	0	10.85
(15) KIX exporter dummy, based on 90th pc	13,516	0.10	0.31						
(16) KIX exporter dummy, based on 75th pc	13,516	0.25	0.43						
(17) KIX exporter dummy, based on 50th pc	13,516	0.50	0.50						
(18) KIX reliance level	13,516	0.19	0.23						
(19) Machinery sector dummy	13,516	0.40	0.49						

Notes: The number of exporters included in the sample is 8,754 for all variables. The unit of variables (8)-(14) are million JPY. The summary statistics of variables (15)-(19) are based on the cross-sectional observations.

TABLE 2: CORRELATION MATRIX FOR THE KEY EXPLANATORY VARIABLES

	(a)	(b)	(c)	(d)	(e)
(a) KIX exporter dummy, based on 90th pc	1				
(b) KIX exporter dummy, based on 75th pc	0.59	1			
(c) KIX exporter dummy, based on 50th pc	0.34	0.58	1		
(d) KIX reliance level	0.81	0.86	0.68	1	
(e) Machinery sector dummy	0.07	0.07	0.03	0.07	1

Notes: The sample size is 13,516.

4.2. Baseline Results

Figure 3 Part I displays the results of estimating a linear model with asinh-transformed dependent variables and a binary treatment variable. Our baseline binary treatment variable is defined using the 90th-percentile cutoff. The figure also presents estimates based on additional binary treatment variables defined using the 75th- and 50th-percentile cutoffs to examine the robustness of the results.

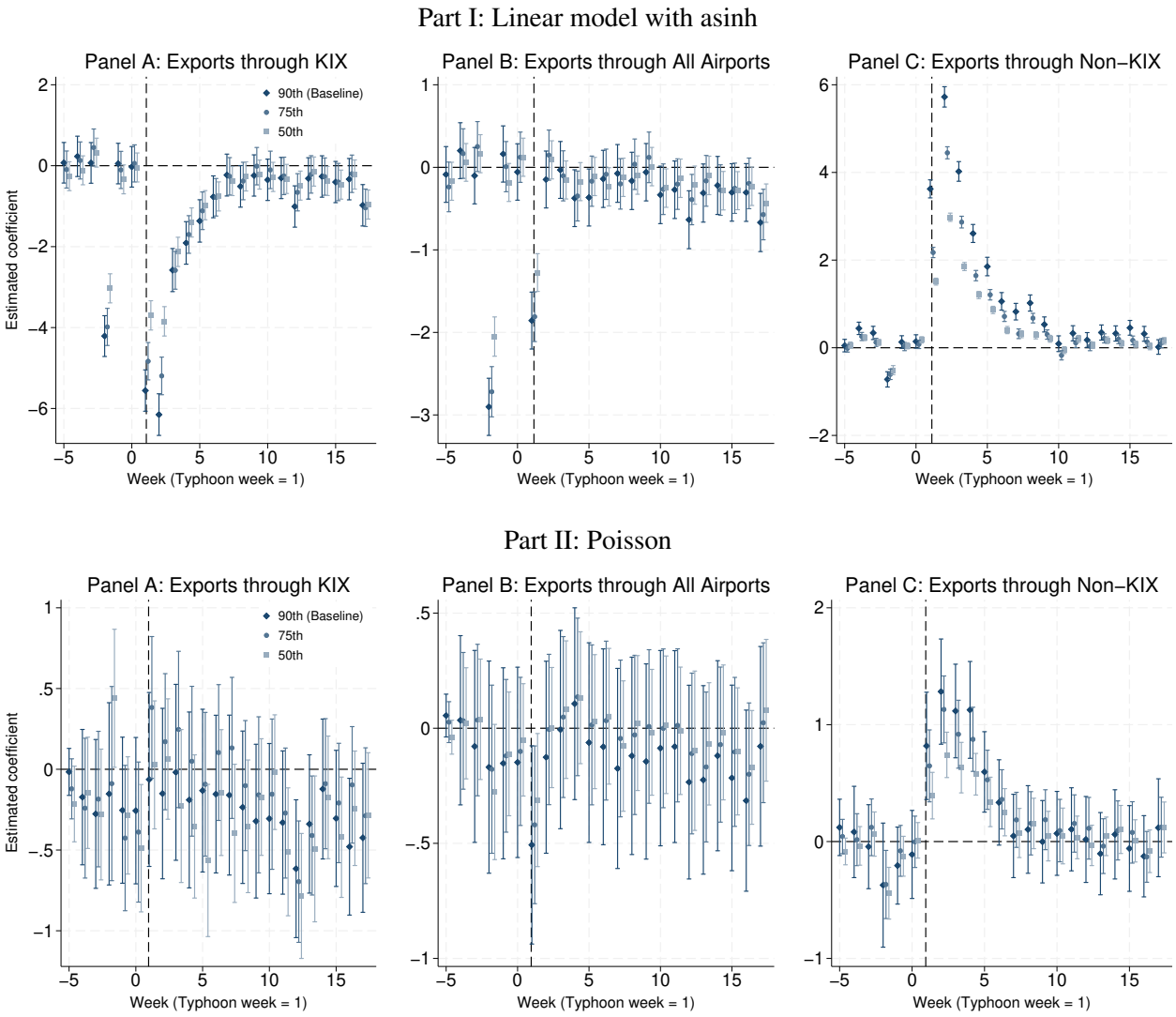
Panel A shows that exports through KIX declined more significantly for firm-sector pairs relying on KIX. The estimates based on the baseline binary treatment variable (90th-percentile cutoff) indicate that firm-sector pairs relying on KIX reduced their exports through KIX by about six times more than other firm-sector pairs during week 1, the week the typhoon hit the airport. The largest decline occurred in week 2, and this reduction persisted until week 6. Export levels through KIX returned to pre-shock levels by week 7. The results are qualitatively similar when using alternative binary treatment variables with softer definitions of "KIX exporters," though the declines in exports through KIX were slightly smaller with the 75th- and 50th-percentile cutoffs.

Panel B of Figure 3 Part I presents the effects on exports through all airports, estimated by the linear model. The results indicate that total exports via all airports declined by about twice as much for firm-sector pairs relying on KIX compared to other firm-sector pairs in week 1. However, this negative effect was short-lived. These findings suggest that the diversion to non-KIX airports did not initially offset the decline in exports through KIX. Nevertheless, export levels returned to their pre-shock levels by week 2, indicating that the diversion to non-KIX airports fully absorbed the decline in exports through KIX after week 2.

Panel C of Figure 3 Part I shows the effects on exports through non-KIX airports, as estimated by the linear model.[23] It is almost a mirror image of the left panel, which depicts the effects on exports through KIX. The results indicate that exports via non-KIX airports increased by about four times more for firm-sector pairs relying on KIX compared to other firm-sector pairs in week 1, based on the 90th-percentile cutoff. In week 2, the level of trade diversion rose to about six times greater for these KIX exporters. This trade diversion persisted for nine weeks,

[23] In Appendix B, we present results from examining the effects on exports via other airports by airport—Haneda (HND), Narita (NRT), Fukuoka (FUK), and Nagoya (NGA)—individually. Figure A2 shows the results with the binary treatment variable, and Figure A3 shows the results with the continuous treatment variable.

FIGURE 3: EFFECTS OF KIX CLOSURE ON EXPORTS, WITH THE BINARY TREATMENT



NOTE. The bands are 95 percent confidence intervals. Standard errors are clustered at the exporter level. See Table A2 for the coefficients plotted in Part I. See Table A3 for the coefficients plotted in Part II.

with exports returning to pre-shock levels in the tenth week.[24]

Figure 3 Part II presents the results obtained using the PPML method with raw dependent variables. Compared to the results shown in Part I, which were estimated using the linear model, notable differences are observed. First, the estimated coefficients in Part II are smaller than those in Panel I. Second, Panel A of Part I and Part II indicate

[24] When determining whether the outcome has "returned to the pre-shock level," it is important to consider not only statistical significance but also the magnitude of the coefficients. Looking at Column (7) of Table A2, it is true that, for example, the coefficient for Week 16 is 0.32 and statistically significant. However, compared to the coefficients for Week 1 (3.63) and Week 2 (5.72), it is considerably smaller. Therefore, it is reasonable to say that the outcome has "almost" returned to the previous level. That said, $[\exp(0.32)-1] \times 100 = 37\%$ is still a relatively large figure. Even so, in the PPML estimation results shown in Table A3, the coefficients are no longer statistically significant from Week 7 onward. Based on this, it is difficult to conclude that the impact persisted for a long period.

that there is essentially no difference between "KIX exporters" and other exporters. However, Panel B of Part II show a decline in overall exports in week 1, consistent with Panel B of Part I. Additionally, Panel C of Part II indicates that trade diversion persisted until week 6, aligning broadly with the findings from Panel C of Part I. However, the magnitude of trade diversion is smaller than Part I. Firm-sector pairs relying more on KIX increased their exports via non-KIX airports by 80-130% more than other firm-sector pairs in week 1-2.

Overall, the results presented in Figure 3 suggest that (i) firm-sector pairs relying more on KIX experienced a decline in their exports in one week after the arrival of the typhoon; and (ii) they increased their exports through non-KIX.

4.3. Considering Typhoon Damages in Osaka and Continuous Treatment

Previous research has focused on the impact of damage on ports and nearby firms (e.g., Friedt, 2021). As the typhoon directly struck and severely damaged KIX. To address the concern that the decline of exports via KIX could potentially be caused by a decline of production caused by the typhoon, rather than the diversion to other airports, we re-run the regression models with the sample excluding firms located in Osaka prefecture. Figure 4 Parts I and II show results with the binary treatment variable defined with the 90th-percentile cutoff and with the linear model and PPML, respectively. These results indicate that the point estimates are very similar between the sample that includes firms in Osaka and the sample that excludes them.

In addition, Figure 5 Parts I and II show results with the continuous treatment variable—the share of air exports via KIX as a share of total air exports—with the linear model and PPML, respectively. Panel A of Part I indicates that the coefficient from Week 1 is about -10. This means that, for example, comparing with firms with the 0.2 KIX reliance, firms with the 0.3 KIX reliance—the difference is 10 percentage points—decreased their exports through KIX more by about 100% (since $10 \times 0.1 = 1$).[25] The greater negative effects on KIX exporters persisted until week 6.

Panel B of Part I shows that there was a negative effect on exports through all airports only in week 1. A

[25]For example, if a firm with a KIX reliance level of 0.1 reduced its exports by 7% as a result of the typhoon, and a firm with a KIX reliance level of 0.2 reduced its exports by 14%, we can say that the firm with a reliance level of 0.2 experienced a 100% greater decline in exports compared to the firm with a reliance level of 0.1.

10 percentage point increase in KIX reliance led to an almost 32.8% greater decline in air exports.[26] Panel C of Part I indicates that the same increase in KIX reliance resulted in a 58.6% greater rise in exports through non-KIX airports in week 1 and a 90.8% greater increase in non-KIX exports in week 2.[27] The positive effects on exports via non-KIX airports persisted until week 9.

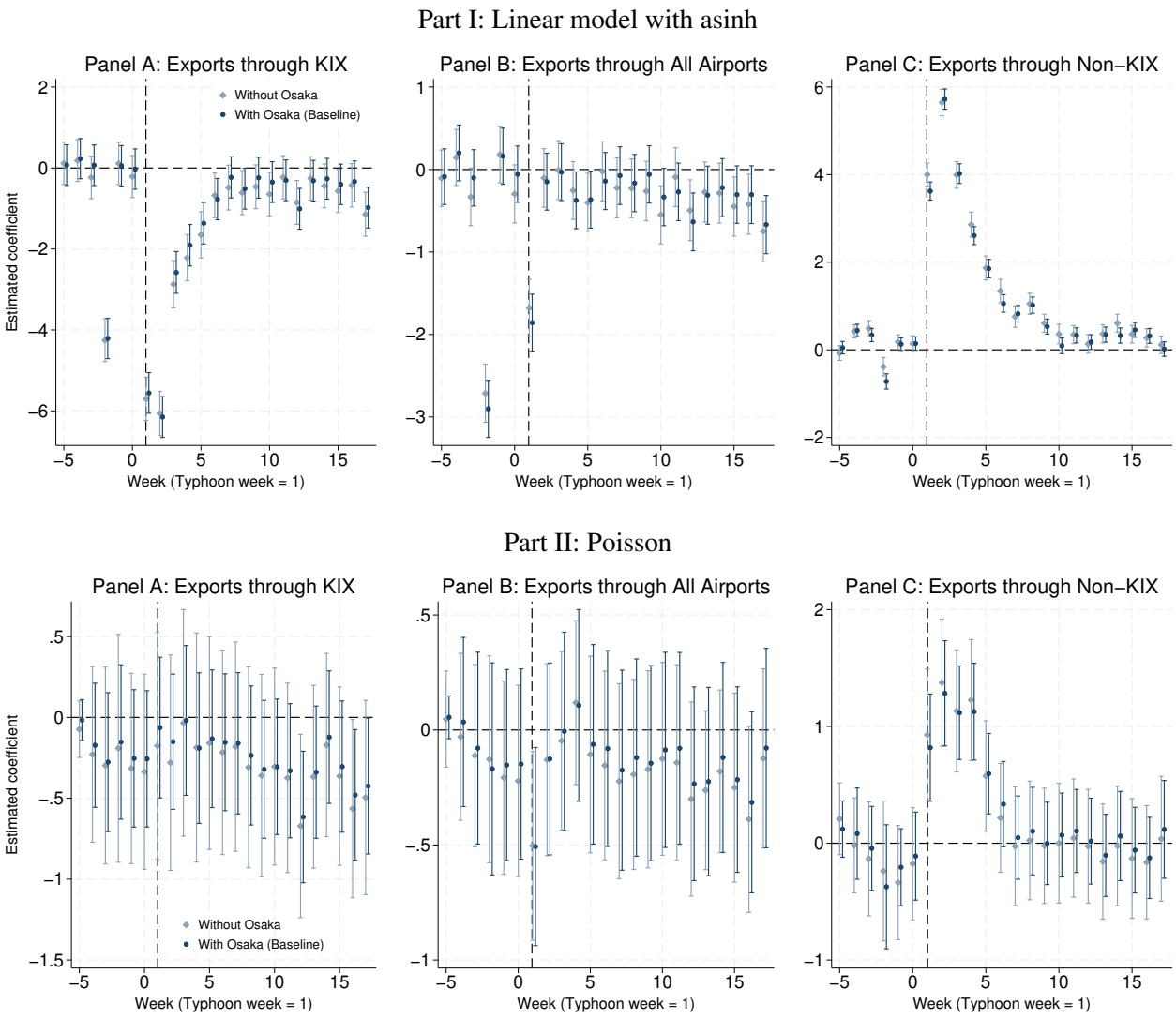
Part II shows the PPML results. Panel A indicates that there is essentially no difference between KIX exporters and other exporters in terms of declines in exports via KIX. Panel B shows a decline in exports through all airports, with the point estimate from week 1 being about -0.6 compared to firms with lower KIX reliance. This means that firms with a 10 percentage point higher KIX reliance experienced a 6% greater decline in all air exports than other exporters. Panel C shows a point estimate of 1.2 for week 1 and 2 for week 2. These suggest that a 10 percentage point higher KIX reliance led to a 12% greater increase in exports through non-KIX airports in week 1 relative to other exporters, and a 20% greater increase in non-KIX exports in week 2 relative to other exporters.

All the panels in Figure 5 report the point estimates with and without firms located in Osaka. In all these panels, the difference between the two estimates are not substantial. Overall, the differences between the coefficients with and without firms located in Osaka are minor compared to the overall magnitude of the coefficients, suggesting that firms' locations play a limited role in explaining trade diversion patterns.

[26] The estimated coefficient for Week 1 in Column (3) of Table A6 is 3.28. This measures the effect of a one-unit change in the KIX reliance level. Therefore, the effect of a 10 percentage point change in the KIX reliance level leads to 328 × 0.1 = 32.8% additional decline in air exports.

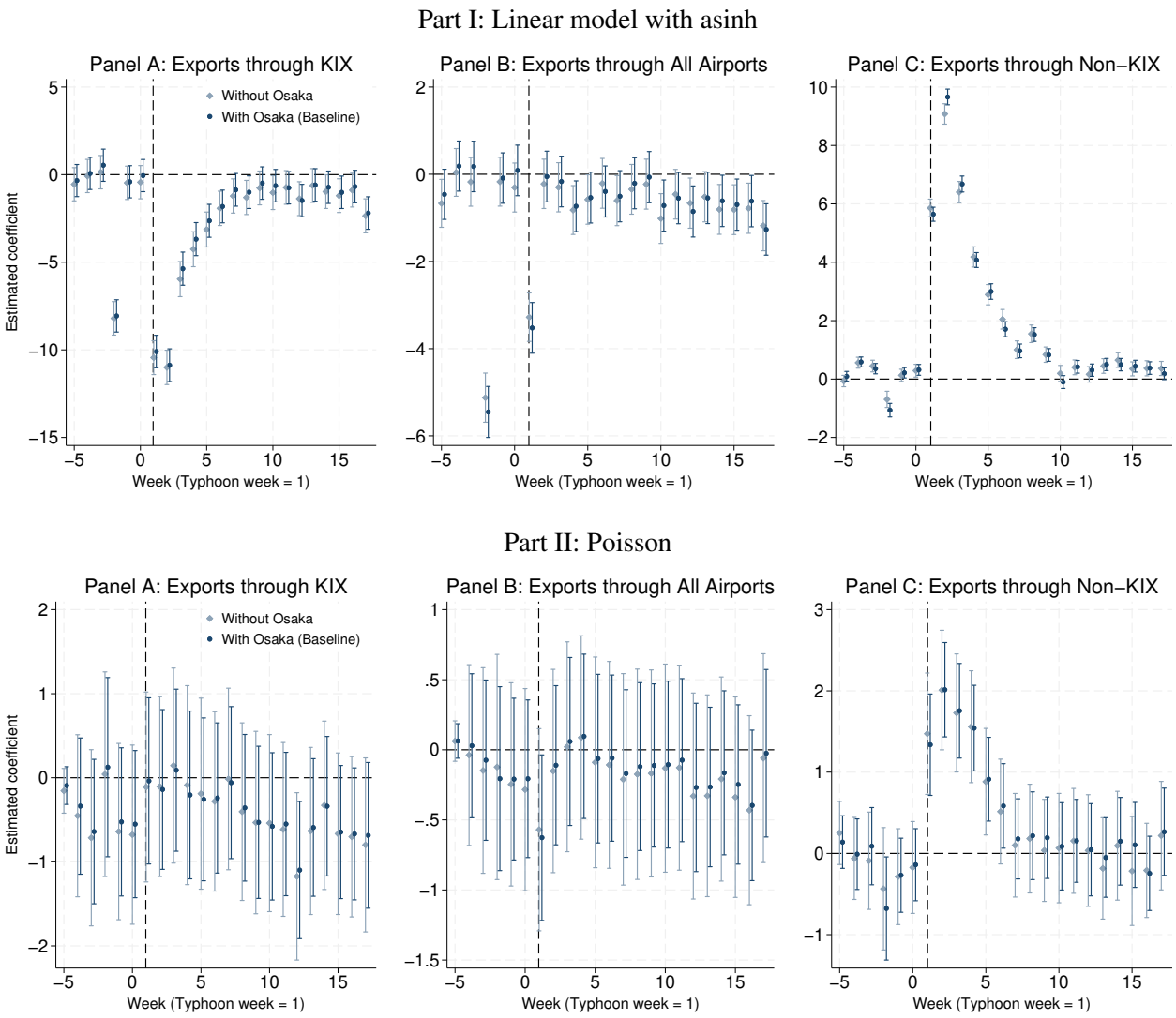
[27] The estimated coefficient for Week 1 in Column (5) of Table A6 is 5.86. So, the effect of a 10 percentage point change in the KIX reliance level leads to 586 × 0.1 = 58.6% additional decline in air exports. The estimated coefficient for Week 2 in the same column is 9.08. So, the effect of a 10 percentage point change in the KIX reliance level leads to 908 × 0.1 = 90.8% additional decline in air exports.

FIGURE 4: EXPORTS, BINARY TREATMENT, WITH/WITHOUT FIRMS LOCATED IN OSAKA



NOTE. The treatment variable is the binary treatment variable based on the 90th-percentile cutoff. The bands are 95 percent confidence intervals. See Table A4 for the coefficients plotted in Part I. See Table A5 for the coefficients plotted in Part II.

FIGURE 5: EXPORTS, CONTINUOUS TREATMENT, WITH/WITHOUT FIRMS LOCATED IN OSAKA



NOTE. The bands are 95 percent confidence intervals. See Table A6 for the coefficients plotted in Part I. See Table A7 for the coefficients plotted in Part II.

4.4. Sectoral Heterogeneity in Responses to the KIX Closure

4.4.1. Approach to Examine Sectoral Heterogeneity

Firms from different sectors may have reacted to the closure of differently. To explore the possibility, we estimate the following model:

$$y_{ist} = \sum_{t=30}^{53} \left(\beta_{1t} \times \theta_{is}^{KIX} \times D_s^{Machinery} \times T_t\right) + \sum_{t=30}^{53} \left(\beta_{2t} \times \theta_{is}^{KIX} \times T_t\right) + \sum_{t=30}^{53} \left(\beta_{3t} \times D_s^{Machinery} \times T_t\right) + \phi_{is} + \phi_t + \epsilon_{ist}, \tag{2}$$

where θ_{is}^{KIX} denotes the treatment variable, either binary or continuous; $D_s^{Machinery}$ denotes the dummy variable taking unity if sector s is the "machinery and transport equipment sector" (i.e., simply, the machinery sector); and T_t denotes the week dummies. The coefficients β_{1t} measures the difference between shipments in the machinery sector and the other sectors in terms of their reactions to the KIX closure.

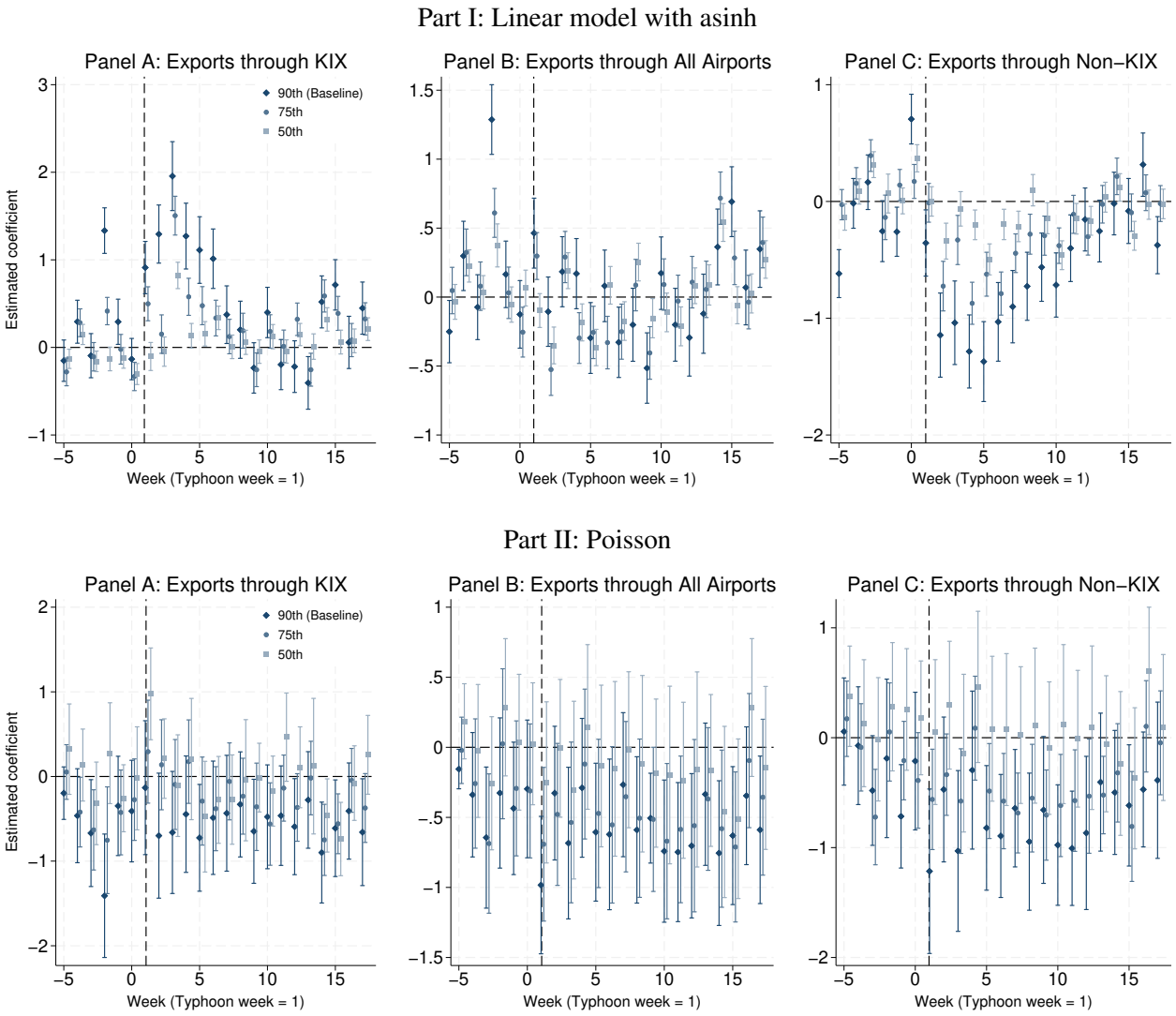
4.4.2. Linear Model Results on Sectoral Heterogeneity

Figure 6 Part I displays estimated coefficients, $\hat{\beta}_{1t}$, obtained from the linear model with the asinh-transformed dependent variable of exports through non-KIX airports. The analysis incorporates three binary treatment variables based on the 90th-, 75th-, and 50th-percentile cutoffs, respectively. Panel A examines the effects on exports through KIX. It shows that $\hat{\beta}_{1t}$ are positive, particularly with the 90th-percentile cutoff, and remain positive and statistically significant until week 7.

When compared to the coefficient values presented in Figure 3, the findings suggest that while typical KIX-reliant exporter-sector pairs decreased their exports through KIX *six* times more than other exporters in week 2, typical KIX-reliant exporters within the machinery sector decreased their exports through KIX only *five* times more than other exporters in the machinery sector in the same week.[28] As expected, the difference between the machinery sector and other sectors diminishes with the lower cutoffs of the 75th- and 50th-percentiles. Nevertheless, the

[28] Column (1) of Table A2 shows that the coefficient for the week 2 dummy is -6.15. Column (1) of Table A8 shows that the coefficient for the week 2 dummy is 1.29. The sum of these coefficients is -4.86, suggesting that KIX-reliant exporters within the machinery sector decreased their exports through KIX by about *five* times more than other exporters in the machinery sector.

FIGURE 6: EXPORTS, INTERACTING WITH THE MACHINERY SECTOR DUMMY, BINARY TREATMENT



NOTE. The bands are 95 percent confidence intervals. See Table A8 for the coefficients plotted in Part I. See Table A9 for the coefficients plotted in Part II.

machinery sector's relatively smaller declines in exports through KIX are still evident with these lower cutoffs.

Figure 6 Part I Panel C shows the effects on non-KIX exports. The coefficients of the triple interaction terms are estimated to be negative and particularly larger in absolute value with the 90th-percentile cutoff. The coefficient for week 2 is approximately -1.1. Figure 3 Part I Panel C shows that typical KIX-reliant exporter-sector pairs increased their exports through non-KIX airports by six times more than other exporter-sector pairs in week 2. Combining with this result, Figure 6 Part I Panel C suggests that the coefficient from the triple interaction term in Week 2 is -1.14, suggesting that typical KIX-reliant exporters within the machinery sector increased their exports

through non-KIX airports by 4.58 times (since 5.72 - 1.14 = 4.58) more than other exporters week 2.[29] The smaller diversion by the machinery sector shown in Panel C constitutes a mirror image of Panel A.

Figure 6 Part I Panel B shows the effects on all air exports. The results indicate a lack of consistency in the sign of the coefficients over time. For example, the coefficient of the triple interaction term with the 90th-percentile cutoff is positive and significant in week 1, then becomes negative and insignificant in week 2. It subsequently turns positive and insignificant in weeks 3 and 4, and negative and significant in week 5. To summarize, the results from Figure 6 Part I indicate that the trade diversion response of the machinery sector was smaller than that of other sectors. However, there is no clear difference in the effects on all air exports between the machinery sector and the other sectors.

4.4.3. PPML Results on Sectoral Heterogeneity

Figure 6 Part II presents the PPML results.[30] Panel A shows that the decline in exports via KIX is slightly smaller for the machinery sector. While the coefficient of the triple interaction term in week 1 is essentially zero and insignificant with the 90th- and 75th-percentile cutoffs, it is positive and statistically significant with the 50th-percentile cutoff. This result suggests that moderately KIX-reliant exporters—rather than highly KIX-reliant exporters—in the machinery sector tend to experience smaller declines in exports through KIX.

On the other hand, Panel C of Part II shows that the coefficients of the triple interaction terms are essentially zero with the 50th-percentile cutoff, while these coefficients are estimated to be negative and statistically significant after week 1 with the 90th- and 75th-percentile cutoffs. These results imply that, while highly KIX-reliant exporters in the machinery sector diverted to non-KIX airports less than exporters in other sectors,[31] moderately KIX-reliant exporters in the machinery sector diverted their exports to non-KIX airports just as much as exporters in other sectors.

[29] Column (7) of Table A2 shows that the coefficient for the week 1 dummy is 5.72. Column (7) of Table A8 shows that the coefficient for the week 1 dummy is -1.14. The sum of these two coefficients is 4.58.

[30] In Appendix B, Figures A4 and A5 present robustness checks for trade diversion patterns in the machinery sector. Figure A4 uses a binary treatment variable, while Figure A5 uses a continuous one. Both compare results with and without exporters in Osaka, employing linear models in Part I and PPML in Part II. The findings consistently show minimal differences between including and excluding Osaka.

[31] Column (7) of Table A3 shows that the coefficient for the week 1 dummy is 0.82. Column (7) of Table A9 shows that the coefficient for the week 1 dummy is -1.22. The sum of these coefficients is -0.40, suggesting that KIX-reliant exporters in the machinery sector even relatively decreased their exports through non-KIX airports compared to non-KIX-reliant exporters.

Panel B of Part II shows that the coefficient with the 90th- and 75th-percentile cutoffs in week 1 is negative, suggesting that highly KIX-reliant exporters in the machinery sector decreased their overall air exports more than exporters in the other sectors in week 1. This result implies that KIX-reliant exporters in the machinery sector did not divert their exports as much as exporters in other sectors, consistent with the results in Panel C.

Overall, the results suggest that, in response to the KIX closure, "moderately KIX-reliant exporters" in the machinery sector decreased exports via KIX less, while these exporters increased exports via non-KIX airports as much as exporters in other sectors. On the other hand, "highly KIX-reliant exporters" in the machinery sector diverted their exports via non-KIX airports less (even relatively decreased their exports via non-KIX airports compared to non-KIX-reliant exporters), while these exporters decreased their exports via KIX just as much as exporters in other sectors.

4.4.4. Robustness Checks on Sectoral Heterogeneity by Restricting the Observations

The results so far suggest slight differences between the linear model's results presented in Figure 6 Part I and the PPML results presented in Figure 6 Part II.[32] As discussed in Section 4.2, these differences presumably arise from the fact that the exporter-sector-week dataset includes many zero trade flows. To reconcile the differences between the linear model and PPML, we re-run the linear regression models, restricting the observations to frequent exporters whose export values rarely or never take zero. Figure 7 displays the results of the linear model with the binary treatment variable, using a sample that includes frequent exporters only.

Part I uses the sample of exporters who exported during at least 20 of the first 28 weeks of 2018, from January 1st to July 15th. The results are slightly closer to the PPML results in Part II of Figure 6. Figure 7 Part I Panel A shows that the coefficient of the triple interaction term in week 1 is positive across all three cutoffs. However, the coefficients are larger with the 50th-percentile cutoff than the 75th, and larger with the 75th than the 90th-percentile cutoff. This suggests that moderately KIX-reliant exporters in the machinery sector decreased their exports less than highly KIX-reliant exporters, consistent with Figure 6 Part II Panel A. Figure 7 Part I Panel B shows that

[32] In Appendix B, we present results from additional robustness checks. Figure A4 shows the effects on exports, with interacting terms with the machinery sector dummy, *binary* treatment variable based on the 90th-percentile cutoff, with and without Osaka. Figure A5 shows the effects on exports, with interacting terms with the machinery sector dummy, *continuous* treatment variable, with and without Osaka.

the coefficients from week 1 are positive, suggesting that KIX-reliant exporters in the machinery sector decreased their overall air exports less than other exporters. Figure 7 Part I Panel C shows that KIX-reliant exporters in the machinery sector increased their exports through non-KIX airports less, with minimal differences between the 90th-, 75th-, and 50th-percentile cutoffs.

Part II uses the sample of exporters who exported every week during the first 28 weeks of 2018. The results are very much closer to the PPML results in Part II of Figure 6. Figure 7 Part II Panel A shows that the decline of exports via KIX was smaller, especially for moderately KIX-reliant exporters in the machinery sector. Panel B shows that there are no difference in the decline of overall air exports in week 1 between KIX-reliant exporters in the machinery sector and other sectors. Panel C shows that the increase in non-KIX exports was smaller for highly KIX-reliant exporters in the machinery sector.

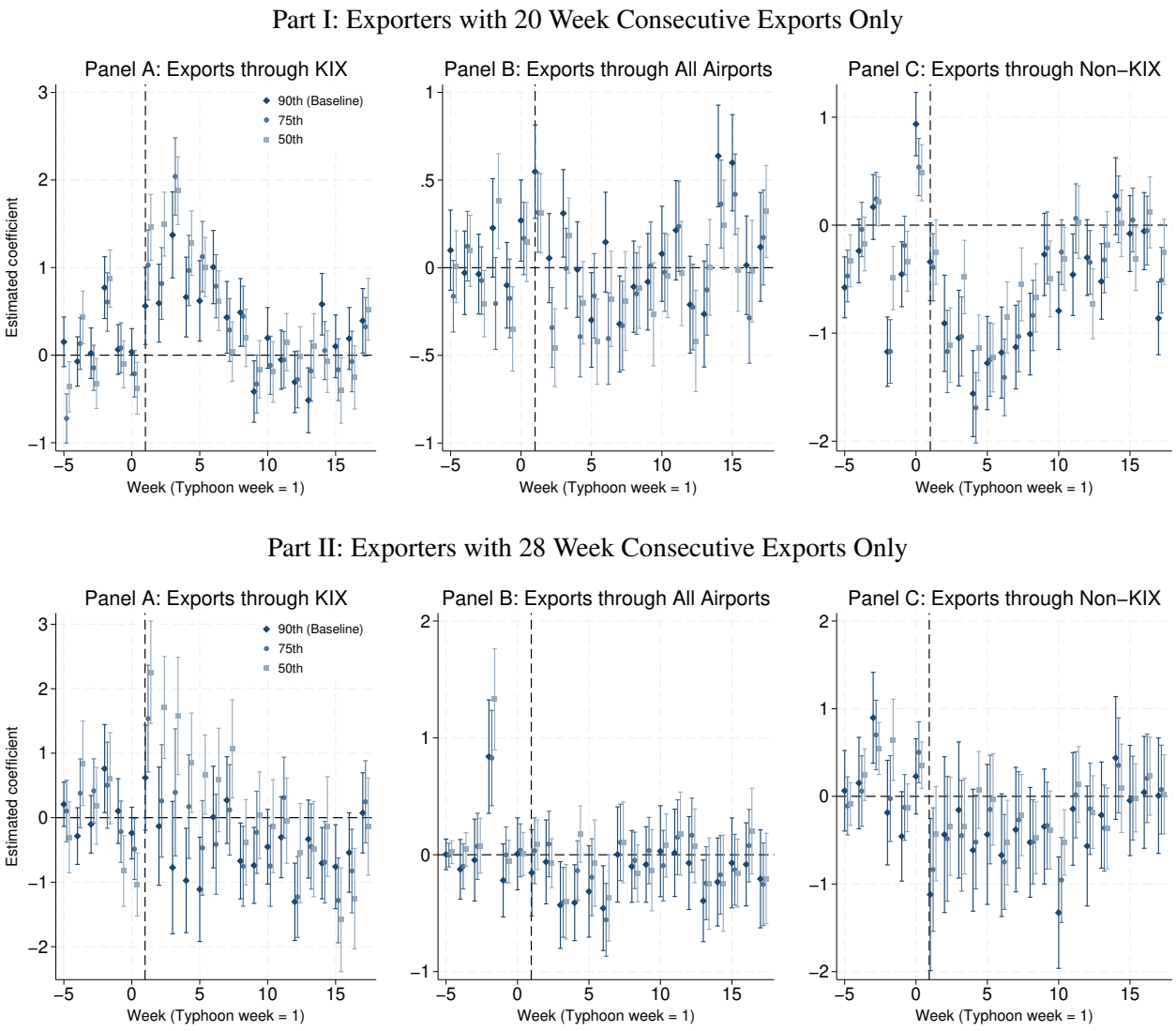
4.4.5. Why Is the Machinery Sector Special?

The degree of trade diversion depends on various factors. Four main factors influence the extent of trade diversion: (i) the durability of the products, (ii) the urgency of buyers' demand for timely delivery of the products, (iii) inventory holding costs, and (iv) the extent to which exports adhere to the current exporting route.

Regarding (i), for example, Oberhofer et al. (2021), Hummels and Schaur (2013), and Hendy and Zaki (2021) show that trade in perishable products is more sensitive to time costs in trade. Regarding (ii), these studies also indicate that parts and components are more sensitive to time costs, presumably because firms need to use these parts and components to complete final goods within a certain time frame. Existing studies specifically focusing on Japanese machinery trade (e.g., Obashi, 2010; Ando and Kimura, 2012; and Ando et al., 2021) also show that trade in products from the machinery sector, especially parts and components are more resilient to shocks such as exchange rate fluctuations, the 2008-09 Global Financial Crisis, and the 2011 Great East Japan Earthquake.

Products in the machinery sector are not perishable; therefore, they are less sensitive to time costs in this regard. However, products in the machinery sector are more likely to be incorporated into global supply chains, which, according to these prior studies, would make them more sensitive to time costs. As our results suggest that

FIGURE 7: EXPORTS, INTERACTING WITH THE MACHINERY SECTOR DUMMY, BINARY TREATMENT, LINEAR MODEL WITH ASINH, FREQUENT EXPORTERS ONLY



NOTE. The bands are 95 percent confidence intervals. See Table A10 for the coefficients plotted in Part I. See Table A11 for the coefficients plotted in Part II.

shipments from the machinery sector diverted less to non-KIX airports, the time costs arising from global value chain participation may not be very high.

Regarding (iii), since we lack data on inventory holding costs, we are unable to determine their role. However, our results indicate that highly KIX-reliant exporters in the machinery sector reduced their exports via KIX as much as exporters in other sectors, while the increase in non-KIX exports by these KIX-reliant exporters was smaller than the increase in non-KIX exports in other sectors. Therefore, this suggests that these KIX-reliant firms may have

kept their inventory in storage while KIX was closed and resumed exporting after KIX re-opened. This scenario implies that inventory costs for highly KIX-reliant exporters are lower.

Regarding (iv), previous studies have found that Japanese downstream manufacturing firms often maintain special relationships with upstream manufacturing firms (e.g., Asanuma, 1989; Asanuma, 1992a; Asanuma, 1992b; and Aoki, 1988). If similar special relationships exist between machinery manufacturers and wholesalers due to the specialized nature of the machinery and transport equipment products, it would make switching exporting routes in response to a port closure more difficult. This scenario is consistent with our findings that trade diversion in the machinery sector was smaller than the other sector.

5. Conclusion

This study has examined the impact of the closure of one of Japan's major international airports, KIX, following the hit by Typhoon *Jebi*, on exports. We find that the two-week shutdown of the airport significantly reduced exports through KIX and increased exports through other airports. Due to successful trade diversion, there was a decline in overall air exports only in the week the typhoon hit, with no decline in the following weeks. Diversion to other airports was observed until the sixth to ninth week following the closure of KIX, depending on the regression specification. Contrary to previous studies showing that trade diversion caused by a damaged port is long-lasting or nearly permanent, our results highlight that a swift diversion to other airports led to a quick recovery of overall exports, likely due to high-quality transport infrastructure and the presence of multiple international airports within a reasonable distance.

We also find that the machinery sector experienced a smaller trade diversion, caused by both a smaller decline in exports via KIX and a smaller increase in exports via non-KIX airports. These results suggest that highly KIX-reliant exporters in the machinery sector are likely to have lower inventory holding costs, making it possible for them to hold their inventory in response to a temporary airport closure. In addition, there might be special manufacturer-wholesaler relationships that make specific export routes more attractive, reducing their tendency to divert exports. These results echo the previously observed strong resilience of machinery trade in response to

exogenous shocks.

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Appendix for
"A Disturbed Airport and Diverted Exports: Evidence from Typhoon *Jebi*"

Toshihiro Okubo and Akira Sasahara

A. Regression Tables for the Figures in the Main Text

This section presents additional details regarding the dataset and regression tables corresponding to figures in the main text.

- Table A1 summarizes the definition of the nine secors used in the analysis.
- Table A2 corresponds to Figure 3 Part I.
- Table A3 corresponds to Figure 3 Part II.
- Table A4 corresponds to Figure 4 Part I.
- Table A5 corresponds to Figure 4 Part II.
- Table A6 corresponds to Figure 5 Part I.
- Table A7 corresponds to Figure 5 Part II.
- Table A8 corresponds to Figure 6 Part I.
- Table A9 corresponds to Figure 6 Part II.

TABLE A1: THE NINE SECTORS IN THE ANALYSIS

HS first two digits	Sector name	HS first two digits	Sector name
01	1 Live animals and animal-related products	50	7 Textiles
02	1 Live animals and animal-related products	51	7 Textiles
03	1 Live animals and animal-related products	52	7 Textiles
04	1 Live animals and animal-related products	53	7 Textiles
05	1 Live animals and animal-related products	54	7 Textiles
06	2 Plants, food, and beverages	55	7 Textiles
07	2 Plants, food, and beverages	56	7 Textiles
08	2 Plants, food, and beverages	57	7 Textiles
09	2 Plants, food, and beverages	58	7 Textiles
10	2 Plants, food, and beverages	59	7 Textiles
11	2 Plants, food, and beverages	60	7 Textiles
12	2 Plants, food, and beverages	61	7 Textiles
13	2 Plants, food, and beverages	62	7 Textiles
14	2 Plants, food, and beverages	63	7 Textiles
15	2 Plants, food, and beverages	64	7 Textiles
16	2 Plants, food, and beverages	65	7 Textiles
17	2 Plants, food, and beverages	66	7 Textiles
18	2 Plants, food, and beverages	67	7 Textiles
19	2 Plants, food, and beverages	68	8 Stone, cement, and metals
20	2 Plants, food, and beverages	69	8 Stone, cement, and metals
21	2 Plants, food, and beverages	70	8 Stone, cement, and metals
22	2 Plants, food, and beverages	71	8 Stone, cement, and metals
23	2 Plants, food, and beverages	72	8 Stone, cement, and metals
24	2 Plants, food, and beverages	73	8 Stone, cement, and metals
25	3 Coal	74	8 Stone, cement, and metals
26	3 Coal	75	8 Stone, cement, and metals
27	3 Coal	76	8 Stone, cement, and metals
28	4 Chemicals	78	8 Stone, cement, and metals
29	4 Chemicals	79	8 Stone, cement, and metals
30	4 Chemicals	80	8 Stone, cement, and metals
31	4 Chemicals	81	8 Stone, cement, and metals
32	4 Chemicals	82	8 Stone, cement, and metals
33	4 Chemicals	83	8 Stone, cement, and metals
34	4 Chemicals	84	9 Machinery and transport equipment
35	4 Chemicals	85	9 Machinery and transport equipment
36	4 Chemicals	86	9 Machinery and transport equipment
37	4 Chemicals	87	9 Machinery and transport equipment
38	4 Chemicals	88	9 Machinery and transport equipment
39	4 Chemicals	89	9 Machinery and transport equipment
40	4 Chemicals	91	9 Machinery and transport equipment
41	5 Leather	92	9 Machinery and transport equipment
42	5 Leather		
43	5 Leather		
44	6 Wood, pulp, and paper		
45	6 Wood, pulp, and paper		
46	6 Wood, pulp, and paper		
47	6 Wood, pulp, and paper		
48	6 Wood, pulp, and paper		
49	6 Wood, pulp, and paper		

Notes: HS first two digit number 77 is not listed in the product classification table.

TABLE A2: REGRESSION TABLE FOR FIGURE 3 PART I, EXPORTS, BINARY TREATMENT, LINEAR MODEL WITH ASINH

	KIX			All airports			Non-KIX		
Cutoffs	90th	75th	50th	90th	75th	50th	90th	75th	50th
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
KIX exporter dummy x Week -1 dummy	0.05	-0.10	-0.34*	0.16	0.01	-0.18	0.13*	0.03	0.04
	(0.26)	(0.23)	(0.18)	(0.17)	(0.16)	(0.12)	(0.07)	(0.05)	(0.04)
KIX exporter dummy x Week 0 dummy	-0.03	0.06	-0.04	-0.06	0.12	0.12	0.14*	0.08	0.18***
	(0.26)	(0.23)	(0.18)	(0.17)	(0.16)	(0.12)	(0.08)	(0.05)	(0.04)
KIX exporter dummy x Week 1 dummy	-5.56***	-4.83***	-3.70***	-1.86***	-1.81***	-1.27***	3.63***	2.17***	1.51***
	(0.26)	(0.24)	(0.19)	(0.18)	(0.15)	(0.12)	(0.11)	(0.06)	(0.04)
KIX exporter dummy x Week 2 dummy	-6.15***	-5.20***	-3.85***	-0.15	0.15	0.09	5.72***	4.45***	2.98***
	(0.26)	(0.24)	(0.19)	(0.18)	(0.16)	(0.12)	(0.12)	(0.07)	(0.05)
KIX exporter dummy x Week 3 dummy	-2.58***	-2.58***	-2.13***	-0.03	-0.10	-0.15	4.02***	2.87***	1.85***
	(0.27)	(0.24)	(0.18)	(0.18)	(0.16)	(0.12)	(0.11)	(0.07)	(0.05)
KIX exporter dummy x Week 4 dummy	-1.91***	-1.70***	-1.40***	-0.37**	-0.35**	-0.17	2.61***	1.65***	1.20***
	(0.27)	(0.24)	(0.18)	(0.18)	(0.15)	(0.12)	(0.11)	(0.06)	(0.04)
KIX exporter dummy x Week 5 dummy	-1.37***	-1.11***	-0.98***	-0.37**	-0.17	-0.11	1.85***	1.21***	0.86***
	(0.27)	(0.24)	(0.18)	(0.18)	(0.16)	(0.12)	(0.11)	(0.06)	(0.04)
KIX exporter dummy x Week 6 dummy	-0.77***	-0.78***	-0.76***	-0.14	-0.08	-0.24*	1.06***	0.71***	0.40***
	(0.26)	(0.24)	(0.18)	(0.18)	(0.16)	(0.12)	(0.10)	(0.06)	(0.04)
KIX exporter dummy x Week 7 dummy	-0.23	-0.26	-0.38**	-0.07	-0.20	-0.12	0.82***	0.32***	0.31***
	(0.26)	(0.24)	(0.18)	(0.18)	(0.16)	(0.12)	(0.10)	(0.06)	(0.04)
KIX exporter dummy x Week 8 dummy	-0.51*	-0.38	-0.26	-0.16	0.04	-0.09	1.02***	0.68***	0.28***
	(0.26)	(0.24)	(0.18)	(0.18)	(0.16)	(0.12)	(0.09)	(0.06)	(0.04)
KIX exporter dummy x Week 9 dummy	-0.24	-0.01	-0.22	-0.06	0.12	0.01	0.53***	0.30***	0.20***
	(0.26)	(0.24)	(0.18)	(0.18)	(0.16)	(0.12)	(0.09)	(0.05)	(0.04)
KIX exporter dummy x Week 10 dummy	-0.35	-0.10	-0.28	-0.33*	-0.27*	-0.25**	0.09	-0.17***	-0.06
	(0.26)	(0.24)	(0.18)	(0.18)	(0.16)	(0.12)	(0.09)	(0.05)	(0.04)
KIX exporter dummy x Week 11 dummy	-0.30	-0.25	-0.33*	-0.27	-0.20	-0.13	0.33***	0.11**	0.20***
	(0.26)	(0.24)	(0.18)	(0.18)	(0.16)	(0.12)	(0.09)	(0.05)	(0.04)
KIX exporter dummy x Week 12 dummy	-1.01***	-0.66***	-0.49***	-0.63***	-0.39**	-0.22*	0.18**	0.04	0.06
	(0.26)	(0.24)	(0.18)	(0.18)	(0.16)	(0.12)	(0.09)	(0.05)	(0.04)
KIX exporter dummy x Week 13 dummy	-0.31	-0.22	-0.14	-0.31*	-0.16	-0.10	0.35***	0.21***	0.17***
	(0.26)	(0.24)	(0.18)	(0.18)	(0.16)	(0.12)	(0.09)	(0.05)	(0.04)
KIX exporter dummy x Week 14 dummy	-0.27	-0.27	-0.38**	-0.22	-0.28*	-0.28**	0.33***	0.19***	0.09**
	(0.26)	(0.24)	(0.18)	(0.18)	(0.16)	(0.12)	(0.09)	(0.05)	(0.04)
KIX exporter dummy x Week 15 dummy	-0.40	-0.40*	-0.47**	-0.30*	-0.25	-0.28**	0.46***	0.17***	0.08**
	(0.26)	(0.24)	(0.18)	(0.18)	(0.16)	(0.12)	(0.09)	(0.05)	(0.04)
KIX exporter dummy x Week 16 dummy	-0.33	-0.20	-0.22	-0.30*	-0.19	-0.23*	0.32***	0.13**	0.03
	(0.26)	(0.24)	(0.18)	(0.18)	(0.16)	(0.12)	(0.09)	(0.05)	(0.04)
KIX exporter dummy x Week 17 dummy	-0.98***	-1.04***	-0.96***	-0.67***	-0.57***	-0.43***	0.02	0.11**	0.16***
	(0.26)	(0.24)	(0.18)	(0.18)	(0.16)	(0.12)	(0.09)	(0.05)	(0.04)
N	716,348	716,348	716,348	716,348	716,348	716,348	716,348	716,348	716,348
N of exporter-sector pairs	13,516	13,516	13,516	13,516	13,516	13,516	13,516	13,516	13,516
N of exporters	8,754	8,754	8,754	8,754	8,754	8,754	8,754	8,754	8,754
Share of treated obs. in cross-section	0.10	0.25	0.50	0.10	0.25	0.50	0.10	0.25	0.50
R-sq.	0.49	0.49	0.49	0.54	0.54	0.54	0.59	0.59	0.59

Notes: Week 1 is the week the typhoon hit, the 36th week of the year 2018. Robust standard errors clustered at the exporter level are in parentheses. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% level, respectively. All regressions include the week -5 to week -2 dummies interacted with the KIX exporter dummies. However, these coefficients are not reported in the table. The regressions also include exporter-sector fixed effects and week-sector fixed effects.

TABLE A3: REGRESSION TABLE FOR FIGURE 3 PART II, EXPORTS, BINARY TREATMENT, PPML

	KIX			All airports			Non-KIX		
	90th	75th	50th	90th	75th	50th	90th	75th	50th
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
KIX exporter dummy x Week -1 dummy	-0.25	-0.43*	-0.29	-0.15	-0.12	-0.11	-0.21	-0.08	-0.13
	(0.23)	(0.23)	(0.19)	(0.21)	(0.17)	(0.14)	(0.17)	(0.11)	(0.09)
KIX exporter dummy x Week 0 dummy	-0.26	-0.39*	-0.49**	-0.15	-0.10	-0.05	-0.11	0.00	0.01
	(0.23)	(0.22)	(0.20)	(0.21)	(0.16)	(0.13)	(0.19)	(0.11)	(0.08)
KIX exporter dummy x Week 1 dummy	-0.06	0.38*	0.03	-0.51**	-0.42**	-0.31**	0.82***	0.65***	0.39***
	(0.28)	(0.22)	(0.20)	(0.22)	(0.18)	(0.15)	(0.23)	(0.16)	(0.10)
KIX exporter dummy x Week 2 dummy	-0.15	0.17	0.06	-0.13	-0.01	0.00	1.28***	1.13***	0.74***
	(0.27)	(0.22)	(0.19)	(0.21)	(0.17)	(0.13)	(0.23)	(0.15)	(0.10)
KIX exporter dummy x Week 3 dummy	-0.02	0.25	-0.23	-0.01	0.05	0.08	1.12***	0.92***	0.63***
	(0.28)	(0.25)	(0.24)	(0.22)	(0.18)	(0.15)	(0.20)	(0.15)	(0.11)
KIX exporter dummy x Week 4 dummy	-0.19	0.05	-0.35	0.11	0.14	0.13	1.13***	0.87***	0.58***
	(0.28)	(0.24)	(0.23)	(0.21)	(0.18)	(0.15)	(0.21)	(0.14)	(0.09)
KIX exporter dummy x Week 5 dummy	-0.13	-0.09	-0.56**	-0.06	0.01	0.03	0.60***	0.53***	0.34***
	(0.26)	(0.23)	(0.24)	(0.22)	(0.18)	(0.15)	(0.18)	(0.13)	(0.11)
KIX exporter dummy x Week 6 dummy	-0.15	0.10	-0.14	-0.08	0.03	0.05	0.33*	0.36***	0.25**
	(0.25)	(0.22)	(0.20)	(0.22)	(0.18)	(0.15)	(0.19)	(0.13)	(0.10)
KIX exporter dummy x Week 7 dummy	-0.16	0.13	-0.40*	-0.17	-0.04	-0.08	0.05	0.19	0.07
	(0.25)	(0.22)	(0.22)	(0.22)	(0.17)	(0.15)	(0.18)	(0.12)	(0.11)
KIX exporter dummy x Week 8 dummy	-0.24	-0.10	-0.35*	-0.12	-0.03	0.02	0.10	0.16	0.15
	(0.24)	(0.21)	(0.21)	(0.22)	(0.18)	(0.15)	(0.19)	(0.14)	(0.11)
KIX exporter dummy x Week 9 dummy	-0.32	-0.16	-0.17	-0.14	0.01	-0.02	0.00	0.19	0.05
	(0.24)	(0.25)	(0.18)	(0.22)	(0.17)	(0.14)	(0.18)	(0.13)	(0.11)
KIX exporter dummy x Week 10 dummy	-0.31	-0.15	-0.02	-0.09	0.00	0.02	0.07	0.09	0.05
	(0.24)	(0.24)	(0.18)	(0.22)	(0.18)	(0.15)	(0.18)	(0.14)	(0.12)
KIX exporter dummy x Week 11 dummy	-0.33	-0.27	-0.51**	-0.08	0.01	-0.01	0.10	0.15	0.04
	(0.23)	(0.21)	(0.20)	(0.21)	(0.17)	(0.14)	(0.18)	(0.13)	(0.09)
KIX exporter dummy x Week 12 dummy	-0.62***	-0.70***	-0.78***	-0.23	-0.11	-0.10	0.02	0.11	-0.03
	(0.22)	(0.19)	(0.20)	(0.22)	(0.18)	(0.18)	(0.19)	(0.14)	(0.09)
KIX exporter dummy x Week 13 dummy	-0.34	-0.41**	-0.49**	-0.22	-0.17	-0.07	-0.10	-0.04	0.04
	(0.22)	(0.19)	(0.23)	(0.21)	(0.17)	(0.14)	(0.18)	(0.12)	(0.08)
KIX exporter dummy x Week 14 dummy	-0.12	-0.09	-0.17	-0.12	-0.07	-0.02	0.06	0.10	0.10
	(0.22)	(0.21)	(0.19)	(0.21)	(0.17)	(0.15)	(0.20)	(0.13)	(0.11)
KIX exporter dummy x Week 15 dummy	-0.30	-0.21	-0.42**	-0.22	-0.10	-0.10	-0.06	0.08	0.01
	(0.22)	(0.19)	(0.19)	(0.21)	(0.17)	(0.14)	(0.19)	(0.13)	(0.09)
KIX exporter dummy x Week 16 dummy	-0.48**	-0.10	-0.24	-0.31	-0.20	-0.17	-0.13	-0.13	-0.08
	(0.22)	(0.18)	(0.18)	(0.20)	(0.16)	(0.13)	(0.18)	(0.11)	(0.09)
KIX exporter dummy x Week 17 dummy	-0.42*	-0.29	-0.29	-0.08	0.02	0.08	0.12	0.12	0.12
	(0.24)	(0.22)	(0.20)	(0.22)	(0.18)	(0.16)	(0.21)	(0.13)	(0.11)
N	716,348	716,348	709,578	716,348	716,348	716,348	716,348	716,348	716,348
N of exporter-sector pairs	13,516	13,516	13,516	13,516	13,516	13,516	13,516	13,516	13,516
N of exporters	8,754	8,754	8,755	8,754	8,754	8,754	8,754	8,754	8,754
Share of treated obs. in cross-section	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10

Notes: Week 1 is the week the typhoon hit, the 36th week of the year 2018. Robust standard errors clustered at the exporter level are in parentheses. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% level, respectively. All regressions include the week -5 to week -2 dummies interacted with the KIX exporter dummies. However, these coefficients are not reported in the table. The regressions also include exporter-sector fixed effects and week-sector fixed effects.

TABLE A4: REGRESSION TABLE FOR FIGURE 4 PART I, EXPORTS, BINARY TREATMENT, LINEAR MODEL WITH ASINH

	KIX		All airports		Non-KIX	
	Without Osaka	With Osaka	Without Osaka	With Osaka	Without Osaka	With Osaka
	(1)	(2)	(3)	(4)	(5)	(6)
KIX exporter dummy x Week -1 dummy	0.11	0.05	0.18	0.16	0.18**	0.13*
	(0.27)	(0.26)	(0.18)	(0.17)	(0.08)	(0.07)
KIX exporter dummy x Week 0 dummy	-0.21	-0.03	-0.3	-0.06	0.14	0.14*
	(0.27)	(0.25)	(0.18)	(0.17)	(0.09)	(0.08)
KIX exporter dummy x Week 1 dummy	-5.70***	-5.56***	-1.68***	-1.86***	4.00***	3.63***
	(0.27)	(0.26)	(0.18)	(0.18)	(0.13)	(0.11)
KIX exporter dummy x Week 2 dummy	-6.06***	-6.15***	-0.1	-0.15	5.65***	5.72***
	(0.28)	(0.26)	(0.18)	(0.18)	(0.16)	(0.12)
KIX exporter dummy x Week 3 dummy	-2.87***	-2.58***	-0.01	-0.03	3.99***	4.02***
	(0.30)	(0.26)	(0.18)	(0.18)	(0.16)	(0.11)
KIX exporter dummy x Week 4 dummy	-2.22***	-1.91***	-0.25	-0.37**	2.86***	2.61***
	(0.29)	(0.26)	(0.18)	(0.18)	(0.15)	(0.11)
KIX exporter dummy x Week 5 dummy	-1.65***	-1.37***	-0.40**	-0.37**	1.87***	1.85***
	(0.29)	(0.26)	(0.18)	(0.18)	(0.14)	(0.11)
KIX exporter dummy x Week 6 dummy	-0.68**	-0.77***	-0.02	-0.14	1.34***	1.06***
	(0.28)	(0.26)	(0.18)	(0.18)	(0.14)	(0.10)
KIX exporter dummy x Week 7 dummy	-0.48*	-0.23	-0.22	-0.07	0.76***	0.82***
	(0.28)	(0.26)	(0.19)	(0.18)	(0.13)	(0.10)
KIX exporter dummy x Week 8 dummy	-0.61**	-0.51*	-0.23	-0.16	1.05***	1.02***
	(0.28)	(0.26)	(0.18)	(0.18)	(0.12)	(0.09)
KIX exporter dummy x Week 9 dummy	-0.46*	-0.24	-0.26	-0.06	0.61***	0.53***
	(0.28)	(0.26)	(0.18)	(0.18)	(0.11)	(0.09)
KIX exporter dummy x Week 10 dummy	-0.65**	-0.35	-0.55***	-0.33*	0.36***	0.09
	(0.28)	(0.26)	(0.18)	(0.18)	(0.12)	(0.09)
KIX exporter dummy x Week 11 dummy	-0.23	-0.3	-0.09	-0.27	0.35***	0.33***
	(0.27)	(0.26)	(0.18)	(0.18)	(0.11)	(0.09)
KIX exporter dummy x Week 12 dummy	-0.85***	-1.01***	-0.49**	-0.63***	0.13	0.18**
	(0.28)	(0.26)	(0.19)	(0.18)	(0.11)	(0.09)
KIX exporter dummy x Week 13 dummy	-0.26	-0.31	-0.27	-0.31*	0.36***	0.35***
	(0.27)	(0.26)	(0.19)	(0.18)	(0.11)	(0.09)
KIX exporter dummy x Week 14 dummy	-0.44	-0.27	-0.29	-0.22	0.61***	0.33***
	(0.28)	(0.26)	(0.19)	(0.18)	(0.10)	(0.09)
KIX exporter dummy x Week 15 dummy	-0.57**	-0.4	-0.45**	-0.30*	0.36***	0.46***
	(0.27)	(0.26)	(0.18)	(0.18)	(0.10)	(0.09)
KIX exporter dummy x Week 16 dummy	-0.43	-0.33	-0.42**	-0.30*	0.27**	0.32***
	(0.27)	(0.26)	(0.19)	(0.18)	(0.11)	(0.09)
KIX exporter dummy x Week 17 dummy	-1.14***	-0.98***	-0.75***	-0.67***	0.12	0.02
	(0.28)	(0.26)	(0.19)	(0.18)	(0.10)	(0.09)
N	536,943	716,348	536,943	716,348	536,943	716,348
N of exporter-sector pairs	10,131	13,516	10,131	13,516	10,131	13,516
N of exporters	6,551	8,754	6,551	8,754	6,551	8,754
Share of treated obs. in cross-section	0.08	0.10	0.08	0.10	0.08	0.10
R-sq.	0.49	0.49	0.55	0.54	0.60	0.59

Notes: Week 1 is the week the typhoon hit, the 36th week of the year 2018. Robust standard errors clustered at the exporter level are in parentheses. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% level, respectively. All regressions include the week -5 to week -2 dummies interacted with the KIX exporter dummies. However, these coefficients are not reported in the table. The regressions also include exporter-sector fixed effects and week-sector fixed effects.

TABLE A5: REGRESSION TABLE FOR FIGURE 4 PART II, EXPORTS, BINARY TREATMENT, PPML

	KIX		All airports		Non-KIX	
	Without Osaka	With Osaka	Without Osaka	With Osaka	Without Osaka	With Osaka
	(1)	(2)	(3)	(4)	(5)	(6)
KIX exporter dummy x Week -1 dummy	-0.32	-0.25	-0.21	-0.15	-0.34	-0.21
	(0.30)	(0.22)	(0.21)	(0.21)	(0.25)	(0.17)
KIX exporter dummy x Week 0 dummy	-0.34	-0.26	-0.22	-0.15	-0.18	-0.11
	(0.31)	(0.22)	(0.21)	(0.21)	(0.25)	(0.19)
KIX exporter dummy x Week 1 dummy	-0.18	-0.06	-0.50**	-0.51**	0.93***	0.82***
	(0.36)	(0.22)	(0.21)	(0.22)	(0.29)	(0.23)
KIX exporter dummy x Week 2 dummy	-0.28	-0.15	-0.13	-0.13	1.38***	1.28***
	(0.34)	(0.21)	(0.21)	(0.21)	(0.28)	(0.23)
KIX exporter dummy x Week 3 dummy	-0.03	-0.02	-0.05	-0.01	1.13***	1.12***
	(0.36)	(0.24)	(0.20)	(0.22)	(0.27)	(0.20)
KIX exporter dummy x Week 4 dummy	-0.19	-0.19	0.12	0.11	1.23***	1.13***
	(0.36)	(0.24)	(0.18)	(0.21)	(0.26)	(0.21)
KIX exporter dummy x Week 5 dummy	-0.16	-0.13	-0.11	-0.06	0.58**	0.60***
	(0.34)	(0.22)	(0.22)	(0.22)	(0.24)	(0.18)
KIX exporter dummy x Week 6 dummy	-0.22	-0.15	-0.15	-0.08	0.22	0.33*
	(0.32)	(0.22)	(0.21)	(0.22)	(0.24)	(0.19)
KIX exporter dummy x Week 7 dummy	-0.18	-0.16	-0.22	-0.17	-0.03	0.05
	(0.33)	(0.22)	(0.22)	(0.22)	(0.26)	(0.18)
KIX exporter dummy x Week 8 dummy	-0.31	-0.24	-0.19	-0.12	0.02	0.10
	(0.32)	(0.22)	(0.21)	(0.22)	(0.26)	(0.19)
KIX exporter dummy x Week 9 dummy	-0.36	-0.32	-0.17	-0.14	-0.02	0.00
	(0.32)	(0.22)	(0.22)	(0.22)	(0.25)	(0.18)
KIX exporter dummy x Week 10 dummy	-0.30	-0.31	-0.13	-0.09	0.00	0.07
	(0.31)	(0.21)	(0.21)	(0.22)	(0.26)	(0.18)
KIX exporter dummy x Week 11 dummy	-0.37	-0.33	-0.14	-0.08	0.04	0.10
	(0.30)	(0.21)	(0.22)	(0.21)	(0.26)	(0.18)
KIX exporter dummy x Week 12 dummy	-0.67**	-0.62***	-0.30	-0.23	-0.03	0.02
	(0.29)	(0.21)	(0.22)	(0.22)	(0.25)	(0.19)
KIX exporter dummy x Week 13 dummy	-0.37	-0.34	-0.26	-0.22	-0.16	-0.10
	(0.29)	(0.21)	(0.18)	(0.21)	(0.25)	(0.18)
KIX exporter dummy x Week 14 dummy	-0.17	-0.12	-0.18	-0.12	-0.02	0.06
	(0.29)	(0.21)	(0.18)	(0.21)	(0.26)	(0.20)
KIX exporter dummy x Week 15 dummy	-0.36	-0.30	-0.25	-0.22	-0.13	-0.06
	(0.28)	(0.21)	(0.21)	(0.21)	(0.26)	(0.19)
KIX exporter dummy x Week 16 dummy	-0.56**	-0.48**	-0.39*	-0.31	-0.16	-0.13
	(0.28)	(0.21)	(0.21)	(0.20)	(0.25)	(0.18)
KIX exporter dummy x Week 17 dummy	-0.50	-0.42**	-0.12	-0.08	0.04	0.12
	(0.31)	(0.21)	(0.20)	(0.22)	(0.27)	(0.21)
N	536,943	716,348	536,943	716,348	536,108	716,348
N of exporter-sector pairs	10,131	13,516	10,131	13,516	10,131	13,516
N of exporters	6,551	8,754	6,551	8,754	6,551	8,754
Share of treated obs. in cross-section	0.08	0.10	0.08	0.10	0.08	0.10

Notes: Week 1 is the week the typhoon hit, the 36th week of the year 2018. Robust standard errors clustered at the exporter level are in parentheses. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% level, respectively. All regressions include the week -5 to week -2 dummies interacted with the KIX exporter dummies. However, these coefficients are not reported in the table. The regressions also include exporter-sector fixed effects and week-sector fixed effects.

TABLE A6: REGRESSION TABLE FOR FIGURE 5 PART I, EXPORTS, CONTINUOUS TREATMENT, LINEAR MODEL WITH ASINH

	KIX		All airports		Non-KIX	
	Without Osaka	With Osaka	Without Osaka	With Osaka	Without Osaka	With Osaka
	(1)	(2)	(3)	(4)	(5)	(6)
KIX exporter dummy x Week -1 dummy	-0.47	-0.41	-0.17	-0.09	0.13	0.21**
	(0.49)	(0.47)	(0.29)	(0.30)	(0.11)	(0.09)
KIX exporter dummy x Week 0 dummy	-0.43	-0.05	-0.30	0.09	0.29**	0.31***
	(0.48)	(0.47)	(0.29)	(0.30)	(0.11)	(0.10)
KIX exporter dummy x Week 1 dummy	-10.44***	-10.10***	-3.28***	-3.52***	5.86***	5.64***
	(0.49)	(0.47)	(0.28)	(0.30)	(0.15)	(0.12)
KIX exporter dummy x Week 2 dummy	-11.00***	-10.88***	-0.22	-0.05	9.08***	9.66***
	(0.50)	(0.47)	(0.29)	(0.30)	(0.18)	(0.14)
KIX exporter dummy x Week 3 dummy	-5.96***	-5.37***	-0.30	-0.17	6.40***	6.68***
	(0.51)	(0.48)	(0.29)	(0.30)	(0.19)	(0.14)
KIX exporter dummy x Week 4 dummy	-4.26***	-3.68***	-0.82***	-0.73**	4.18***	4.08***
	(0.51)	(0.47)	(0.29)	(0.30)	(0.18)	(0.13)
KIX exporter dummy x Week 5 dummy	-3.13***	-2.63***	-0.58*	-0.54*	2.89***	3.00***
	(0.51)	(0.47)	(0.29)	(0.30)	(0.18)	(0.14)
KIX exporter dummy x Week 6 dummy	-1.92***	-1.82***	-0.21	-0.39	2.05***	1.71***
	(0.50)	(0.47)	(0.29)	(0.30)	(0.17)	(0.13)
KIX exporter dummy x Week 7 dummy	-1.22**	-0.87*	-0.60**	-0.50*	1.01***	0.96***
	(0.50)	(0.47)	(0.29)	(0.30)	(0.15)	(0.12)
KIX exporter dummy x Week 8 dummy	-1.30**	-1.00**	-0.35	-0.21	1.55***	1.52***
	(0.50)	(0.47)	(0.29)	(0.30)	(0.15)	(0.12)
KIX exporter dummy x Week 9 dummy	-0.76	-0.48	-0.23	-0.07	0.84***	0.83***
	(0.49)	(0.47)	(0.29)	(0.30)	(0.13)	(0.11)
KIX exporter dummy x Week 10 dummy	-1.03**	-0.63	-1.02***	-0.72**	0.19	-0.10
	(0.49)	(0.47)	(0.29)	(0.30)	(0.14)	(0.11)
KIX exporter dummy x Week 11 dummy	-0.73	-0.75	-0.46	-0.55*	0.40***	0.42***
	(0.49)	(0.47)	(0.29)	(0.30)	(0.13)	(0.11)
KIX exporter dummy x Week 12 dummy	-1.37***	-1.48***	-0.66**	-0.85***	0.16	0.30***
	(0.49)	(0.47)	(0.29)	(0.30)	(0.14)	(0.11)
KIX exporter dummy x Week 13 dummy	-0.62	-0.59	-0.52*	-0.54*	0.45***	0.50***
	(0.49)	(0.47)	(0.29)	(0.30)	(0.13)	(0.11)
KIX exporter dummy x Week 14 dummy	-0.97*	-0.72	-0.81***	-0.61**	0.65***	0.49***
	(0.49)	(0.47)	(0.29)	(0.30)	(0.13)	(0.11)
KIX exporter dummy x Week 15 dummy	-1.20**	-1.01**	-0.81***	-0.70**	0.35***	0.44***
	(0.49)	(0.47)	(0.29)	(0.30)	(0.12)	(0.10)
KIX exporter dummy x Week 16 dummy	-0.88*	-0.68	-0.78**	-0.62**	0.37***	0.38***
	(0.49)	(0.47)	(0.29)	(0.30)	(0.13)	(0.11)
KIX exporter dummy x Week 17 dummy	-2.35***	-2.19***	-1.18***	-1.27***	0.36***	0.18*
	(0.50)	(0.47)	(0.29)	(0.30)	(0.12)	(0.10)
N	536,943	716,348	536,943	716,348	536,943	716,348
N of exporters	6,551	8,754	6,551	8,754	6,551	8,754
N of cross-sectional obs. (exporter-sector pairs)	10,131	13,516	10,131	13,516	10,131	13,516
Share of treated obs. in cross-section	0.20	0.21	0.20	0.21	0.20	0.21
R-sq.	0.50	0.50	0.55	0.54	0.60	0.59

Notes: Week 1 is the week the typhoon hit, the 36th week of the year 2018. Robust standard errors clustered at the exporter level are in parentheses. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% level, respectively. All regressions include the week -5 to week -2 dummies interacted with the KIX exporter dummies. However, these coefficients are not reported in the table. The regressions also include exporter-sector fixed effects and week-sector fixed effects.

TABLE A7: REGRESSION TABLE FOR FIGURE 5 PART II, EXPORTS, CONTINUOUS TREATMENT, PPML

	KIX		All airports		Non-KIX	
	Without Osaka	With Osaka	Without Osaka	With Osaka	Without Osaka	With Osaka
	(1)	(2)	(3)	(4)	(5)	(6)
KIX exporter dummy x Week -1 dummy	-0.64	-0.53	-0.25	-0.21	-0.29	-0.27
	(0.54)	(0.40)	(0.37)	(0.29)	(0.30)	(0.23)
KIX exporter dummy x Week 0 dummy	-0.68	-0.55	-0.28	-0.21	-0.17	-0.14
	(0.54)	(0.41)	(0.37)	(0.29)	(0.29)	(0.23)
KIX exporter dummy x Week 1 dummy	-0.11	-0.04	-0.57	-0.63**	1.47***	1.34***
	(0.58)	(0.43)	(0.37)	(0.30)	(0.38)	(0.32)
KIX exporter dummy x Week 2 dummy	-0.11	-0.14	-0.15	-0.11	2.01***	2.01***
	(0.55)	(0.40)	(0.37)	(0.29)	(0.38)	(0.30)
KIX exporter dummy x Week 3 dummy	0.14	0.09	0.02	0.06	1.73***	1.76***
	(0.59)	(0.42)	(0.38)	(0.31)	(0.37)	(0.30)
KIX exporter dummy x Week 4 dummy	-0.09	-0.20	0.09	0.10	1.56***	1.54***
	(0.60)	(0.43)	(0.37)	(0.30)	(0.35)	(0.27)
KIX exporter dummy x Week 5 dummy	-0.19	-0.26	-0.09	-0.06	0.88***	0.91***
	(0.58)	(0.44)	(0.38)	(0.31)	(0.33)	(0.26)
KIX exporter dummy x Week 6 dummy	-0.28	-0.24	-0.11	-0.06	0.52	0.58**
	(0.54)	(0.42)	(0.38)	(0.30)	(0.33)	(0.27)
KIX exporter dummy x Week 7 dummy	-0.01	-0.06	-0.21	-0.17	0.10	0.18
	(0.55)	(0.43)	(0.39)	(0.31)	(0.33)	(0.25)
KIX exporter dummy x Week 8 dummy	-0.40	-0.36	-0.17	-0.12	0.18	0.22
	(0.54)	(0.40)	(0.38)	(0.31)	(0.34)	(0.28)
KIX exporter dummy x Week 9 dummy	-0.53	-0.53	-0.17	-0.11	0.04	0.19
	(0.55)	(0.42)	(0.38)	(0.30)	(0.32)	(0.26)
KIX exporter dummy x Week 10 dummy	-0.54	-0.58	-0.13	-0.11	0.07	0.09
	(0.54)	(0.41)	(0.38)	(0.30)	(0.34)	(0.27)
KIX exporter dummy x Week 11 dummy	-0.61	-0.55	-0.13	-0.07	0.15	0.15
	(0.53)	(0.41)	(0.37)	(0.30)	(0.33)	(0.26)
KIX exporter dummy x Week 12 dummy	-1.17**	-1.10***	-0.33	-0.27	0.04	0.04
	(0.51)	(0.40)	(0.38)	(0.31)	(0.35)	(0.29)
KIX exporter dummy x Week 13 dummy	-0.63	-0.59	-0.33	-0.27	-0.18	-0.05
	(0.51)	(0.40)	(0.37)	(0.29)	(0.32)	(0.25)
KIX exporter dummy x Week 14 dummy	-0.33	-0.34	-0.21	-0.16	0.09	0.15
	(0.51)	(0.41)	(0.37)	(0.30)	(0.34)	(0.28)
KIX exporter dummy x Week 15 dummy	-0.67	-0.65	-0.34	-0.25	-0.22	0.10
	(0.49)	(0.40)	(0.37)	(0.29)	(0.34)	(0.27)
KIX exporter dummy x Week 16 dummy	-0.70	-0.67*	-0.43	-0.40	-0.21	-0.25
	(0.49)	(0.40)	(0.34)	(0.27)	(0.30)	(0.23)
KIX exporter dummy x Week 17 dummy	-0.80	-0.69*	-0.06	-0.02	0.22	0.27
	(0.53)	(0.42)	(0.38)	(0.31)	(0.34)	(0.27)
N	536,943	716,348	536,943	716,348	536,943	716,348
N of exporters	6,551	8,754	6,551	8,754	6,551	8,754
N of cross-sectional obs. (exporter-sector pairs)	10,131	13,516	10,131	13,516	10,131	13,516
Share of treated obs. in cross-section	0.20	0.21	0.20	0.21	0.20	0.21

Notes: Week 1 is the week the typhoon hit, the 36th week of the year 2018. Robust standard errors clustered at the exporter level are in parentheses. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% level, respectively. All regressions include the week -5 to week -2 dummies interacted with the KIX exporter dummies. However, these coefficients are not reported in the table. The regressions also include exporter-sector fixed effects and week-sector fixed effects.

TABLE A8: REGRESSION TABLE FOR FIGURE 6 PART I, EXPORTS, INTERACTING WITH THE MACHINERY SECTOR DUMMY, BINARY TREATMENT, LINEAR MODEL WITH ASINH

	KIX			All airports			Non-KIX		
	90th	75th	50th	90th	75th	50th	90th	75th	50th
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
KIX exporter dummy x Week -1 dummy	0.29**	-0.02	-0.12*	0.16	0.03	-0.05	-0.26**	0.14**	0.01
	(0.13)	(0.09)	(0.06)	(0.12)	(0.10)	(0.07)	(0.11)	(0.07)	(0.06)
KIX exporter dummy x Week 0 dummy	-0.13	-0.33***	-0.30***	-0.13	-0.25***	0.07	0.71***	0.17**	0.37***
	(0.12)	(0.08)	(0.06)	(0.13)	(0.09)	(0.07)	(0.11)	(0.07)	(0.06)
KIX exporter dummy x Week 1 dummy	0.91***	0.50***	-0.10	0.46***	0.30***	-0.10	-0.36**	-0.01	0.00
	(0.15)	(0.10)	(0.08)	(0.13)	(0.09)	(0.06)	(0.15)	(0.09)	(0.06)
KIX exporter dummy x Week 2 dummy	1.29***	0.15	-0.05	-0.11	-0.53***	-0.35***	-1.14***	-0.73***	-0.34***
	(0.17)	(0.11)	(0.09)	(0.13)	(0.10)	(0.07)	(0.18)	(0.11)	(0.08)
KIX exporter dummy x Week 3 dummy	1.96***	1.50***	0.82***	0.18	0.29***	0.19***	-1.04***	-0.33***	-0.06
	(0.20)	(0.11)	(0.08)	(0.13)	(0.10)	(0.07)	(0.18)	(0.11)	(0.08)
KIX exporter dummy x Week 4 dummy	1.27***	0.58***	0.13*	0.17	-0.30***	-0.18***	-1.28***	-0.87***	-0.20***
	(0.19)	(0.11)	(0.07)	(0.13)	(0.09)	(0.07)	(0.16)	(0.09)	(0.07)
KIX exporter dummy x Week 5 dummy	1.11***	0.48***	0.16**	-0.30**	-0.26**	-0.37***	-1.37***	-0.62***	-0.50***
	(0.19)	(0.11)	(0.07)	(0.13)	(0.10)	(0.07)	(0.18)	(0.10)	(0.07)
KIX exporter dummy x Week 6 dummy	1.01***	0.34***	0.34***	0.08	-0.33***	0.09	-1.03***	-0.79***	-0.20***
	(0.17)	(0.10)	(0.07)	(0.13)	(0.10)	(0.07)	(0.17)	(0.09)	(0.07)
KIX exporter dummy x Week 7 dummy	0.37**	0.12	0.01	-0.33**	-0.25**	-0.17**	-0.90***	-0.44***	-0.21***
	(0.17)	(0.10)	(0.07)	(0.13)	(0.10)	(0.07)	(0.16)	(0.08)	(0.07)
KIX exporter dummy x Week 8 dummy	0.20	0.19*	0.06	-0.20	0.09	0.25***	-0.73***	-0.28***	0.10
	(0.17)	(0.10)	(0.07)	(0.14)	(0.10)	(0.07)	(0.15)	(0.09)	(0.07)
KIX exporter dummy x Week 9 dummy	-0.23	-0.26**	-0.05	-0.51***	-0.41***	-0.15**	-0.56***	-0.29***	-0.14**
	(0.15)	(0.10)	(0.07)	(0.13)	(0.10)	(0.07)	(0.15)	(0.09)	(0.07)
KIX exporter dummy x Week 10 dummy	0.40***	0.18*	0.12*	0.17	0.09	-0.11	-0.72***	-0.38***	-0.46***
	(0.15)	(0.10)	(0.07)	(0.13)	(0.10)	(0.07)	(0.14)	(0.08)	(0.06)
KIX exporter dummy x Week 11 dummy	-0.20	0.01	-0.05	-0.20	-0.03	-0.21***	-0.40***	-0.11	-0.15**
	(0.15)	(0.10)	(0.07)	(0.14)	(0.10)	(0.07)	(0.15)	(0.08)	(0.07)
KIX exporter dummy x Week 12 dummy	-0.22	0.32***	0.15**	-0.29**	0.11	0.08	-0.15	-0.30***	-0.17**
	(0.15)	(0.09)	(0.07)	(0.14)	(0.10)	(0.07)	(0.14)	(0.08)	(0.06)
KIX exporter dummy x Week 13 dummy	-0.41**	-0.25**	0.01	-0.12	0.06	0.09	-0.25*	-0.02	0.04
	(0.15)	(0.10)	(0.07)	(0.15)	(0.10)	(0.08)	(0.14)	(0.08)	(0.07)
KIX exporter dummy x Week 14 dummy	0.52***	0.59***	0.32***	0.36**	0.72***	0.54***	-0.02	0.22***	0.12*
	(0.15)	(0.09)	(0.07)	(0.14)	(0.10)	(0.07)	(0.14)	(0.08)	(0.06)
KIX exporter dummy x Week 15 dummy	0.71***	0.39***	0.06	0.69***	0.28***	-0.06	-0.08	-0.10	-0.29***
	(0.15)	(0.10)	(0.07)	(0.13)	(0.10)	(0.07)	(0.14)	(0.08)	(0.06)
KIX exporter dummy x Week 16 dummy	0.06	0.08	0.07	0.07	-0.04	0.03	0.32**	0.07	-0.03
	(0.15)	(0.10)	(0.07)	(0.14)	(0.10)	(0.07)	(0.14)	(0.08)	(0.06)
KIX exporter dummy x Week 17 dummy	0.45***	0.33***	0.21***	0.35**	0.40***	0.27***	-0.37***	-0.02	-0.02
	(0.15)	(0.09)	(0.07)	(0.14)	(0.09)	(0.07)	(0.13)	(0.08)	(0.07)
N	716,348	716,348	716,348	716,348	716,348	716,348	716,348	716,348	716,348
N of exporter-sector pairs	13,516	13,516	13,516	13,516	13,516	13,516	13,516	13,516	13,516
N of exporters	8,754	8,754	8,754	8,754	8,754	8,754	8,754	8,754	8,754
Share of treated obs. in cross-section	0.10	0.25	0.50	0.10	0.25	0.50	0.10	0.25	0.50
R-sq.	0.49	0.49	0.49	0.54	0.54	0.54	0.59	0.59	0.59

Notes: Week 1 is the week the typhoon hit, the 36th week of the year 2018. Robust standard errors clustered at the exporter level are in parentheses. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% level, respectively. All regressions include the week -5 to week -2 dummies interacted with the KIX exporter dummies. However, these coefficients are not reported in the table. The regressions also include exporter-sector fixed effects and week-sector fixed effects.

TABLE A9: REGRESSION TABLE FOR FIGURE 6 PART II, EXPORTS, INTERACTING WITH THE MACHINERY SECTOR DUMMY, BINARY TREATMENT, PPML

	KIX			All airports			Non-KIX		
	90th	75th	50th	90th	75th	50th	90th	75th	50th
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
KIX exporter dummy x Week -1 dummy	-0.35	-0.42*	-0.26	-0.44*	-0.29	0.04	-0.72***	-0.21	0.26
	(0.30)	(0.26)	(0.20)	(0.24)	(0.25)	(0.25)	(0.24)	(0.18)	(0.28)
KIX exporter dummy x Week 0 dummy	-0.41	-0.27	-0.02	-0.30	-0.31	0.03	-0.21	-0.39*	0.18
	(0.31)	(0.25)	(0.31)	(0.25)	(0.24)	(0.22)	(0.32)	(0.22)	(0.26)
KIX exporter dummy x Week 1 dummy	-0.13	0.29	0.98***	-0.98***	-0.69**	-0.25	-1.22***	-0.56**	0.05
	(0.40)	(0.31)	(0.28)	(0.25)	(0.28)	(0.29)	(0.38)	(0.23)	(0.34)
KIX exporter dummy x Week 2 dummy	-0.70*	0.14	0.21	-0.33	-0.48*	-0.01	-0.47	-0.34*	0.30
	(0.38)	(0.27)	(0.24)	(0.24)	(0.26)	(0.25)	(0.34)	(0.19)	(0.30)
KIX exporter dummy x Week 3 dummy	-0.66*	-0.09	-0.11	-0.68**	-0.54*	-0.31	-1.03***	-0.58**	-0.14
	(0.37)	(0.27)	(0.31)	(0.28)	(0.29)	(0.32)	(0.37)	(0.24)	(0.37)
KIX exporter dummy x Week 4 dummy	-0.45	0.18	0.21	-0.29	-0.12	0.15	-0.29	0.09	0.46
	(0.35)	(0.25)	(0.37)	(0.25)	(0.27)	(0.30)	(0.37)	(0.24)	(0.35)
KIX exporter dummy x Week 5 dummy	-0.72**	-0.29	-0.47	-0.61**	-0.47*	-0.13	-0.82***	-0.49**	0.08
	(0.32)	(0.27)	(0.33)	(0.25)	(0.27)	(0.29)	(0.29)	(0.22)	(0.34)
KIX exporter dummy x Week 6 dummy	-0.49	-0.38	-0.28	-0.62**	-0.55*	-0.15	-0.89***	-0.58***	0.07
	(0.34)	(0.25)	(0.26)	(0.27)	(0.29)	(0.32)	(0.29)	(0.22)	(0.35)
KIX exporter dummy x Week 7 dummy	-0.43	-0.06	-0.27	-0.27	-0.35	-0.02	-0.64**	-0.69***	0.02
	(0.35)	(0.23)	(0.27)	(0.26)	(0.27)	(0.28)	(0.27)	(0.19)	(0.32)
KIX exporter dummy x Week 8 dummy	-0.33	-0.23	-0.04	-0.59**	-0.51*	-0.12	-0.95***	-0.55**	0.11
	(0.32)	(0.23)	(0.37)	(0.27)	(0.29)	(0.32)	(0.32)	(0.25)	(0.36)
KIX exporter dummy x Week 9 dummy	-0.65**	-0.36	-0.01	-0.51***	-0.51*	-0.18	-0.66*	-0.70***	-0.09
	(0.31)	(0.26)	(0.21)	(0.16)	(0.26)	(0.27)	(0.34)	(0.21)	(0.31)
KIX exporter dummy x Week 10 dummy	-0.48	-0.56**	-0.17	-0.74***	-0.67**	-0.20	-0.98***	-0.62***	0.12
	(0.31)	(0.25)	(0.21)	(0.26)	(0.28)	(0.32)	(0.28)	(0.24)	(0.37)
KIX exporter dummy x Week 11 dummy	-0.46	-0.14	0.46*	-0.75***	-0.59**	-0.24	-1.01***	-0.57**	-0.01
	(0.30)	(0.20)	(0.27)	(0.25)	(0.27)	(0.28)	(0.27)	(0.24)	(0.32)
KIX exporter dummy x Week 12 dummy	-0.59**	-0.37*	0.11	-0.70***	-0.56*	-0.16	-0.87**	-0.53**	0.09
	(0.29)	(0.20)	(0.24)	(0.26)	(0.31)	(0.36)	(0.36)	(0.27)	(0.38)
KIX exporter dummy x Week 13 dummy	-0.28	-0.02	0.12	-0.33	-0.37	-0.17	-0.40	-0.52***	-0.06
	(0.29)	(0.22)	(0.41)	(0.26)	(0.26)	(0.28)	(0.32)	(0.18)	(0.32)
KIX exporter dummy x Week 14 dummy	-0.90***	-0.75***	-0.46**	-0.76***	-0.58**	-0.46	-0.50*	-0.32	-0.23
	(0.30)	(0.21)	(0.22)	(0.26)	(0.29)	(0.31)	(0.29)	(0.23)	(0.33)
KIX exporter dummy x Week 15 dummy	-0.61**	-0.56***	-0.74***	-0.63**	-0.71***	-0.51*	-0.62**	-0.81***	-0.37
	(0.29)	(0.18)	(0.22)	(0.25)	(0.27)	(0.29)	(0.28)	(0.26)	(0.33)
KIX exporter dummy x Week 16 dummy	-0.41	-0.05	-0.08	-0.35	-0.09	0.28	-0.47*	0.10	0.61**
	(0.29)	(0.19)	(0.23)	(0.25)	(0.24)	(0.25)	(0.27)	(0.21)	(0.30)
KIX exporter dummy x Week 17 dummy	-0.66**	-0.37*	0.26	-0.59**	-0.36	-0.15	-0.39	-0.05	0.09
	(0.32)	(0.21)	(0.24)	(0.27)	(0.28)	(0.30)	(0.36)	(0.24)	(0.34)
N	711,674	712,510	709,578	716,348	716,348	716,348	715,649	716,348	716,348
N of exporter-sector pairs	13,516	13,516	13,516	13,516	13,516	13,516	13,516	13,516	13,516
N of exporters	8,755	8,755	8,755	8,754	8,754	8,754	8,755	8,754	8,754
Share of treated obs. in cross-section	0.10	0.25	0.50	0.10	0.25	0.50	0.10	0.25	0.50

Notes: Week 1 is the week the typhoon hit, the 36th week of the year 2018. Robust standard errors clustered at the exporter level are in parentheses. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% level, respectively. All regressions include the week -5 to week -2 dummies interacted with the KIX exporter dummies. However, these coefficients are not reported in the table. The regressions also include exporter-sector fixed effects and week-sector fixed effects.

TABLE A10: REGRESSION TABLE FOR FIGURE 7 PART I, EXPORTS, INTERACTING WITH THE MACHINERY SECTOR DUMMY, BINARY TREATMENT, LINEAR MODEL WITH ASINH, EXPORTERS WITH 20 WEEK CONSECUTIVE EXPORTS ONLY

	KIX			All airports			Non-KIX		
	90th	75th	50th	90th	75th	50th	90th	75th	50th
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
KIX exporter dummy x Week -1 dummy	0.06	0.08	-0.11	-0.10	-0.17	-0.35***	-0.45***	-0.19	-0.33**
	(0.15)	(0.15)	(0.14)	(0.13)	(0.11)	(0.12)	(0.15)	(0.14)	(0.14)
KIX exporter dummy x Week 0 dummy	0.04	-0.21	-0.38**	0.27**	0.17	0.15	0.94***	0.54***	0.49***
	(0.14)	(0.14)	(0.15)	(0.12)	(0.11)	(0.12)	(0.15)	(0.14)	(0.13)
KIX exporter dummy x Week 1 dummy	0.56**	1.03***	1.46***	0.55***	0.31***	0.31***	-0.34*	-0.39**	-0.25
	(0.22)	(0.20)	(0.19)	(0.14)	(0.12)	(0.12)	(0.18)	(0.16)	(0.15)
KIX exporter dummy x Week 2 dummy	0.59**	0.82***	1.50***	0.05	-0.34***	-0.46***	-0.91***	-1.17***	-1.11***
	(0.23)	(0.21)	(0.19)	(0.13)	(0.12)	(0.11)	(0.23)	(0.19)	(0.18)
KIX exporter dummy x Week 3 dummy	1.37***	2.04***	1.88***	0.31**	0.00	0.18	-1.05***	-1.03***	-0.48***
	(0.25)	(0.23)	(0.20)	(0.13)	(0.12)	(0.11)	(0.23)	(0.19)	(0.17)
KIX exporter dummy x Week 4 dummy	0.66***	0.97***	1.28***	-0.01	-0.39***	-0.20	-1.56***	-1.69***	-1.14***
	(0.23)	(0.21)	(0.19)	(0.14)	(0.12)	(0.12)	(0.20)	(0.17)	(0.16)
KIX exporter dummy x Week 5 dummy	0.62**	1.13***	1.01***	-0.30**	-0.16	-0.42***	-1.28***	-1.24***	-1.23***
	(0.23)	(0.21)	(0.17)	(0.14)	(0.12)	(0.12)	(0.22)	(0.17)	(0.16)
KIX exporter dummy x Week 6 dummy	1.01***	0.79***	0.62***	0.15	-0.40***	-0.18	-1.18***	-1.41***	-0.85***
	(0.21)	(0.18)	(0.17)	(0.15)	(0.13)	(0.14)	(0.22)	(0.18)	(0.17)
KIX exporter dummy x Week 7 dummy	0.43**	0.29	0.04	-0.32**	-0.33**	-0.19	-1.13***	-1.03***	-0.55***
	(0.21)	(0.18)	(0.17)	(0.14)	(0.13)	(0.14)	(0.20)	(0.17)	(0.17)
KIX exporter dummy x Week 8 dummy	0.49**	0.44**	0.20	-0.11	-0.15	-0.11	-1.01***	-0.84***	-0.67***
	(0.20)	(0.18)	(0.17)	(0.13)	(0.12)	(0.12)	(0.19)	(0.17)	(0.16)
KIX exporter dummy x Week 9 dummy	-0.42**	-0.33*	-0.16	-0.08	0.01	-0.27*	-0.27	-0.21	-0.50***
	(0.18)	(0.17)	(0.17)	(0.14)	(0.13)	(0.15)	(0.19)	(0.17)	(0.18)
KIX exporter dummy x Week 10 dummy	0.20	-0.12	-0.19	0.08	-0.03	-0.05	-0.79***	-0.25	-0.31**
	(0.18)	(0.17)	(0.18)	(0.14)	(0.11)	(0.12)	(0.18)	(0.15)	(0.15)
KIX exporter dummy x Week 11 dummy	-0.05	-0.05	0.15	0.21	0.24*	-0.03	-0.46**	0.06	0.03
	(0.17)	(0.16)	(0.17)	(0.15)	(0.13)	(0.15)	(0.19)	(0.16)	(0.17)
KIX exporter dummy x Week 12 dummy	-0.31*	-0.28	-0.02	-0.21	-0.22*	-0.42***	-0.30*	-0.34**	-0.73***
	(0.18)	(0.17)	(0.18)	(0.14)	(0.13)	(0.15)	(0.18)	(0.15)	(0.17)
KIX exporter dummy x Week 13 dummy	-0.51***	-0.18	0.11	-0.26*	-0.13	0.00	-0.52***	-0.32**	-0.18
	(0.19)	(0.18)	(0.19)	(0.15)	(0.13)	(0.14)	(0.18)	(0.16)	(0.16)
KIX exporter dummy x Week 14 dummy	0.58***	0.05	-0.07	0.64***	0.36***	0.24*	0.27	0.15	0.02
	(0.18)	(0.17)	(0.18)	(0.15)	(0.13)	(0.13)	(0.18)	(0.16)	(0.16)
KIX exporter dummy x Week 15 dummy	0.10	-0.17	-0.40**	0.60***	0.42***	-0.01	-0.08	0.05	-0.31**
	(0.18)	(0.18)	(0.19)	(0.14)	(0.12)	(0.12)	(0.18)	(0.15)	(0.15)
KIX exporter dummy x Week 16 dummy	0.19	-0.07	-0.25	0.01	-0.29**	-0.02	-0.06	-0.05	0.12
	(0.18)	(0.18)	(0.18)	(0.14)	(0.13)	(0.15)	(0.18)	(0.16)	(0.17)
KIX exporter dummy x Week 17 dummy	0.39**	0.32*	0.52***	0.12	0.17	0.32**	-0.86***	-0.51***	-0.25
	(0.19)	(0.17)	(0.18)	(0.16)	(0.14)	(0.13)	(0.17)	(0.16)	(0.15)
N	182,426	182,426	182,426	182,426	182,426	182,426	182,426	182,426	182,426
N of exporter-sector pairs	3,442	3,442	3,442	3,442	3,442	3,442	3,442	3,442	3,442
N of exporters	2,673	2,673	2,673	2,673	2,673	2,673	2,673	2,673	2,673
Share of treated obs. in cross-section	0.33	0.50	0.67	0.33	0.50	0.67	0.33	0.50	0.67
R-sq.	0.57	0.58	0.58	0.42	0.42	0.42	0.57	0.56	0.56

Notes: Week 1 is the week the typhoon hit, the 36th week of the year 2018. Robust standard errors clustered at the exporter level are in parentheses. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% level, respectively. All regressions include the week -5 to week -2 dummies interacted with the KIX exporter dummies. However, these coefficients are not reported in the table. The regressions also include exporter-sector fixed effects and week-sector fixed effects.

TABLE A11: REGRESSION TABLE FOR FIGURE 7 PART II, EXPORTS, INTERACTING WITH THE MACHINERY SECTOR DUMMY, BINARY TREATMENT, LINEAR MODEL WITH ASINH, EXPORTERS WITH 28 WEEK CONSECUTIVE EXPORTS ONLY

	KIX			All airports			Non-KIX		
	90th	75th	50th	90th	75th	50th	90th	75th	50th
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
KIX exporter dummy x Week -1 dummy	0.10	-0.22	-0.83***	-0.22	0.00	-0.06	-0.46*	-0.13	-0.13
	(0.26)	(0.24)	(0.28)	(0.16)	(0.12)	(0.09)	(0.26)	(0.19)	(0.14)
KIX exporter dummy x Week 0 dummy	-0.24	-0.49**	-1.04***	0.01	0.04	0.01	0.23	0.50***	0.36**
	(0.20)	(0.24)	(0.25)	(0.16)	(0.12)	(0.09)	(0.22)	(0.18)	(0.14)
KIX exporter dummy x Week 1 dummy	0.62	1.54***	2.25***	-0.15	0.03	0.09	-1.12**	-0.84**	-0.43
	(0.42)	(0.42)	(0.41)	(0.19)	(0.14)	(0.11)	(0.44)	(0.36)	(0.27)
KIX exporter dummy x Week 2 dummy	-0.13	0.26	1.71***	-0.06	0.09	-0.07	-0.44	-0.48	-0.34
	(0.47)	(0.45)	(0.40)	(0.18)	(0.14)	(0.11)	(0.45)	(0.36)	(0.29)
KIX exporter dummy x Week 3 dummy	-0.77	0.39	1.58***	-0.43**	-0.41**	-0.40**	-0.16	-0.45	-0.34
	(0.52)	(0.50)	(0.46)	(0.19)	(0.15)	(0.16)	(0.40)	(0.32)	(0.28)
KIX exporter dummy x Week 4 dummy	-0.97**	0.17	0.85**	-0.41**	-0.14	0.18	-0.61*	-0.52*	0.07
	(0.41)	(0.41)	(0.39)	(0.17)	(0.13)	(0.12)	(0.36)	(0.27)	(0.22)
KIX exporter dummy x Week 5 dummy	-1.11***	-0.47	0.67**	-0.31	-0.19	-0.07	-0.43	-0.15	-0.03
	(0.41)	(0.37)	(0.31)	(0.20)	(0.17)	(0.19)	(0.41)	(0.32)	(0.27)
KIX exporter dummy x Week 6 dummy	0.01	-0.41	0.58	-0.46**	-0.56***	-0.37*	-0.67*	-0.75***	-0.53**
	(0.40)	(0.40)	(0.41)	(0.19)	(0.16)	(0.19)	(0.36)	(0.28)	(0.25)
KIX exporter dummy x Week 7 dummy	0.27	0.12	1.07***	0.00	0.11	0.11	-0.38	-0.27	-0.21
	(0.34)	(0.36)	(0.39)	(0.21)	(0.17)	(0.18)	(0.36)	(0.28)	(0.24)
KIX exporter dummy x Week 8 dummy	-0.67**	-0.75**	-0.38	-0.10	-0.05	-0.16	-0.53	-0.52**	-0.48**
	(0.30)	(0.32)	(0.34)	(0.16)	(0.12)	(0.12)	(0.32)	(0.25)	(0.21)
KIX exporter dummy x Week 9 dummy	-0.74**	-0.23	0.04	-0.08	0.04	-0.13	-0.35	-0.33	-0.39*
	(0.30)	(0.33)	(0.34)	(0.17)	(0.15)	(0.18)	(0.34)	(0.25)	(0.23)
KIX exporter dummy x Week 10 dummy	-0.45	-0.75**	-0.13	0.03	-0.09	0.08	-1.33***	-0.95***	-0.53***
	(0.30)	(0.32)	(0.37)	(0.20)	(0.15)	(0.14)	(0.32)	(0.25)	(0.19)
KIX exporter dummy x Week 11 dummy	-0.30	0.31	-0.04	0.02	0.15	0.18	-0.14	0.02	0.14
	(0.32)	(0.32)	(0.34)	(0.19)	(0.16)	(0.18)	(0.33)	(0.25)	(0.22)
KIX exporter dummy x Week 12 dummy	-1.30***	-1.23***	-0.55	-0.07	0.17	0.08	-0.57	-0.14	-0.18
	(0.31)	(0.32)	(0.39)	(0.20)	(0.16)	(0.16)	(0.35)	(0.27)	(0.21)
KIX exporter dummy x Week 13 dummy	-0.33	-0.45	-0.49	-0.39**	-0.24	-0.25	-0.21	-0.36	-0.37
	(0.31)	(0.34)	(0.38)	(0.18)	(0.16)	(0.20)	(0.31)	(0.25)	(0.24)
KIX exporter dummy x Week 14 dummy	-0.71**	-0.69**	-0.14	-0.23	-0.17	-0.24	0.44	0.35	0.09
	(0.28)	(0.32)	(0.40)	(0.19)	(0.17)	(0.21)	(0.36)	(0.28)	(0.26)
KIX exporter dummy x Week 15 dummy	-0.76**	-1.28***	-1.58***	-0.07	-0.13	-0.16	-0.05	-0.02	-0.02
	(0.33)	(0.34)	(0.41)	(0.20)	(0.16)	(0.15)	(0.32)	(0.24)	(0.20)
KIX exporter dummy x Week 16 dummy	-0.54*	-0.83**	-1.26***	-0.08	0.08	0.20	0.05	0.21	0.23
	(0.31)	(0.33)	(0.40)	(0.18)	(0.16)	(0.19)	(0.33)	(0.26)	(0.23)
KIX exporter dummy x Week 17 dummy	0.07	0.25	-0.14	-0.21	-0.25	-0.20	0.01	0.08	0.02
	(0.32)	(0.33)	(0.39)	(0.21)	(0.18)	(0.20)	(0.34)	(0.26)	(0.23)
N	52,152	52,152	52,152	52,152	52,152	52,152	52,152	52,152	52,152
N of exporter-sector pairs	984	984	984	984	984	984	984	984	984
N of exporters	820	820	820	820	820	820	820	820	820
Share of treated obs. in cross-section	0.31	0.43	0.60	0.31	0.43	0.60	0.31	0.43	0.60
R-sq.	0.70	0.70	0.70	0.82	0.82	0.82	0.69	0.68	0.68

Notes: Week 1 is the week the typhoon hit, the 36th week of the year 2018. Robust standard errors clustered at the exporter level are in parentheses. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% level, respectively. All regressions include the week -5 to week -2 dummies interacted with the KIX exporter dummies. However, these coefficients are not reported in the table. The regressions also include exporter-sector fixed effects and week-sector fixed effects.

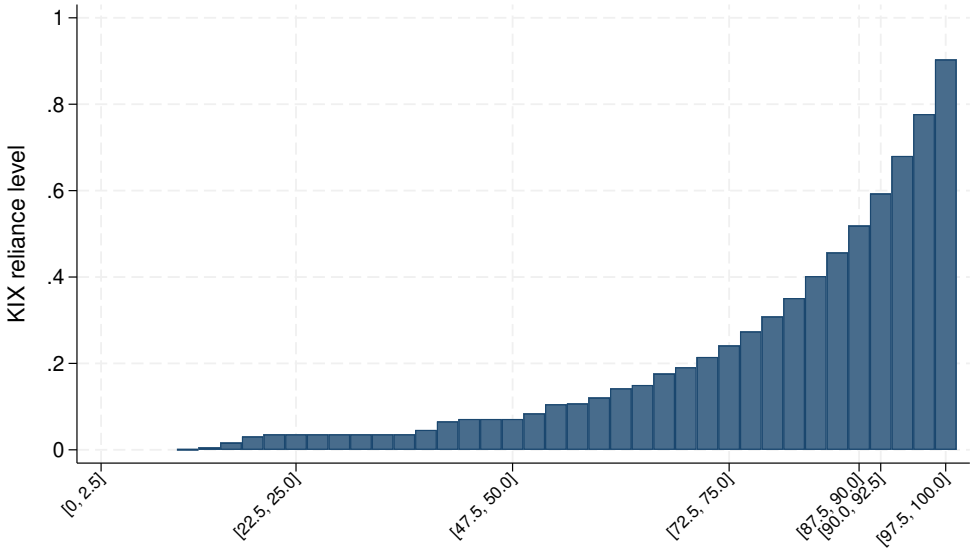
B. Additional Results for the Export-side

This section presents additional results for the export-side. Figure A1 shows the average KIX reliance level–"the value of exports via KIX divided by total air export value" for exporter-sector pairs–in each bin of KIX reliance level's percentiles. Figures A2 and A3 show the effects of the KIX closure on exports through individual major airports, Haneda (HND), Narita (NRT), Fukuoka (FUK), and Nagoya (NGA). While Figure A2 uses the binary treatment based on the 90th-percentile cutoff, Figure A3 uses the continuous treatment variable.

The following regression tables presents estimated coefficients plotted in Figures A2 and A3. Table A12 shows estimated coefficients corresponding to Figure A2 Panel A. Table A13 shows estimated coefficients corresponding to Figure A2 Panel B. Table A14 shows estimated coefficients corresponding to Figure A3 Panel A. Table A15 shows estimated coefficients corresponding to Figure A3 Panel B.

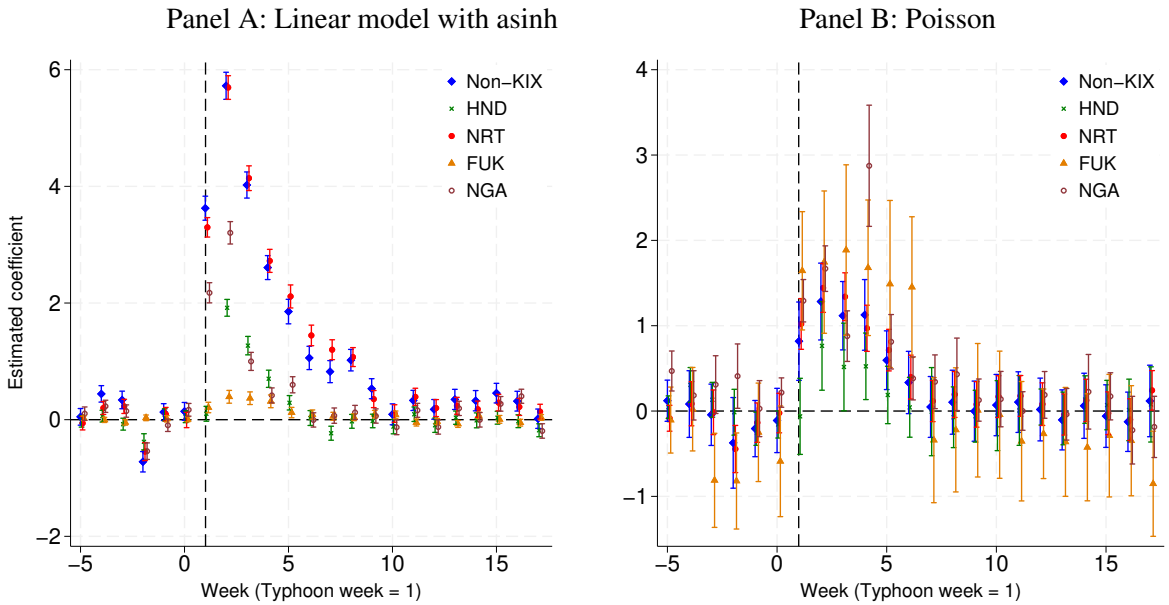
Figure A4 presents robustness checks for the different trade diversion patterns in the machinery sector. These estimates are derived using a binary treatment variable based on the 90th-percentile cutoff, comparing results with and without exporters located in Osaka. Part I employs a linear model, while Part II uses PPML. Across all panels, the results suggest that the differences between including and excluding Osaka are minimal. Figure A5 presents the same robustness checks, comparing results with and without exporters located in Osaka, using the continuous treatment variable. The conclusions are consistent with those from Figure A4.

FIGURE A1: AVERAGE KIX RELIANCE LEVEL BY BIN, EXPORTS



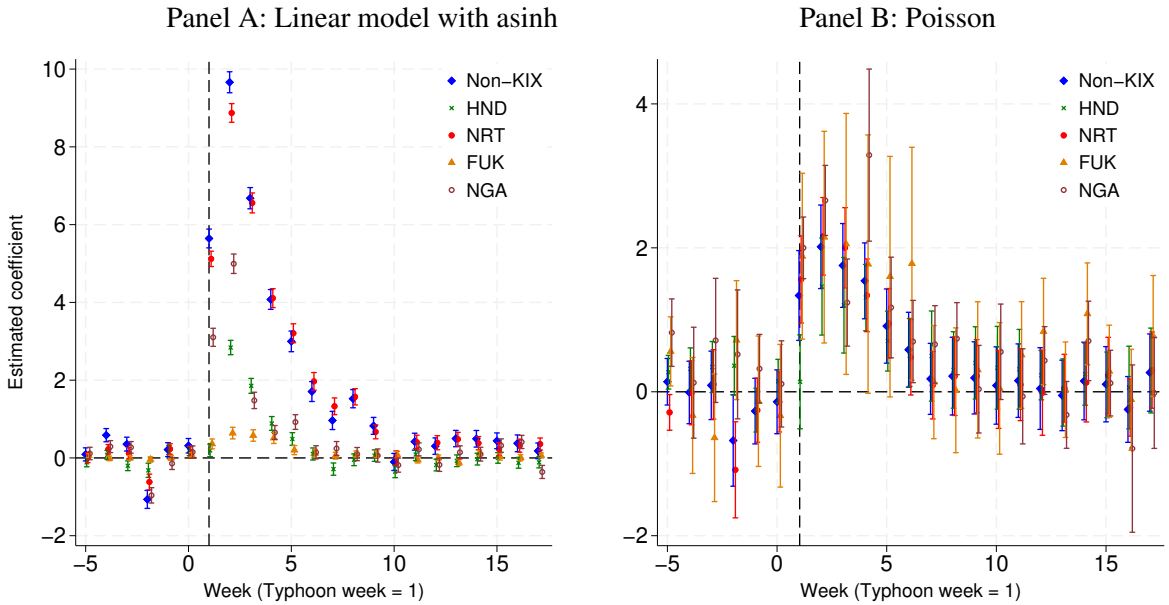
NOTE. The figure shows average KIX reliance levels–"export value of exports via KIX divided by total air export value" at the exporter-sector level–in each bin of KIX reliance level's percentiles.

FIGURE A2: EXPORTS, BINARY TREATMENT, BY AIRPORT



NOTE. Panel A uses the dummy variable measuring the KIX intensity based on the 90th percentile cutoff. The bands are 95 percent confidence intervals. Standard errors are clustered at the exporter level. See Table A12 for regression results shown in Panel A. See Table A13 for regression results shown in Panel B.

FIGURE A3: EXPORTS, CONTINUOUS TREATMENT, BY AIRPORT



NOTE. Panel A uses the dummy variable measuring the KIX intensity based on the 90th percentile cutoff. The bands are 95 percent confidence intervals. Standard errors are clustered at the exporter level. See Table A14 for regression results shown in Panel A. See Table A15 for regression results shown in Panel B.

TABLE A12: REGRESSION TABLE FOR FIGURE A2 PANEL A, EFFECTS ON EXPORTS, BINARY TREATMENT, LINEAR MODEL WITH ASINH

	Non-KIX	HND	NRT	FUK	NGA
	(1)	(2)	(3)	(4)	(5)
KIX exporter dummy x Week -1 dummy	0.13*	0.08	0.09	0.01	-0.10*
	(0.07)	(0.05)	(0.06)	(0.03)	(0.05)
KIX exporter dummy x Week 0 dummy	0.14*	0.05	-0.01	0.01	0.17***
	(0.08)	(0.05)	(0.07)	(0.02)	(0.06)
KIX exporter dummy x Week 1 dummy	3.63***	0.10	3.30***	0.21***	2.18***
	(0.11)	(0.07)	(0.09)	(0.05)	(0.09)
KIX exporter dummy x Week 2 dummy	5.72***	1.92***	5.69***	0.39***	3.20***
	(0.12)	(0.07)	(0.10)	(0.06)	(0.10)
KIX exporter dummy x Week 3 dummy	4.02***	1.27***	4.14***	0.37***	1.00***
	(0.11)	(0.08)	(0.11)	(0.06)	(0.08)
KIX exporter dummy x Week 4 dummy	2.61***	0.70***	2.72***	0.31***	0.42***
	(0.11)	(0.08)	(0.10)	(0.06)	(0.07)
KIX exporter dummy x Week 5 dummy	1.85***	0.29***	2.11***	0.12***	0.60***
	(0.11)	(0.06)	(0.10)	(0.05)	(0.07)
KIX exporter dummy x Week 6 dummy	1.06***	0.03	1.44***	0.09**	0.00
	(0.10)	(0.07)	(0.09)	(0.04)	(0.06)
KIX exporter dummy x Week 7 dummy	0.82***	-0.23***	1.20***	0.06	0.07
	(0.10)	(0.06)	(0.09)	(0.04)	(0.07)
KIX exporter dummy x Week 8 dummy	1.02***	-0.03	1.07***	0.04	0.12*
	(0.09)	(0.06)	(0.08)	(0.03)	(0.06)
KIX exporter dummy x Week 9 dummy	0.53***	-0.02	0.35***	0.09***	0.06
	(0.09)	(0.06)	(0.08)	(0.03)	(0.06)
KIX exporter dummy x Week 10 dummy	0.09	-0.12*	0.11	0.08**	-0.13**
	(0.09)	(0.06)	(0.08)	(0.03)	(0.07)
KIX exporter dummy x Week 11 dummy	0.33***	0.09	0.39***	-0.05	0.16**
	(0.09)	(0.06)	(0.08)	(0.03)	(0.06)
KIX exporter dummy x Week 12 dummy	0.18**	-0.10	0.20***	-0.03	-0.13**
	(0.09)	(0.06)	(0.07)	(0.03)	(0.06)
KIX exporter dummy x Week 13 dummy	0.35***	0.03	0.24***	-0.07**	0.19***
	(0.09)	(0.06)	(0.07)	(0.03)	(0.06)
KIX exporter dummy x Week 14 dummy	0.33***	-0.01	0.18**	0.07**	0.00
	(0.09)	(0.07)	(0.07)	(0.03)	(0.06)
KIX exporter dummy x Week 15 dummy	0.46***	0.03	0.29***	0.01	0.27***
	(0.09)	(0.06)	(0.07)	(0.03)	(0.06)
KIX exporter dummy x Week 16 dummy	0.32***	-0.03	0.22***	-0.05*	0.40***
	(0.09)	(0.06)	(0.08)	(0.03)	(0.06)
KIX exporter dummy x Week 17 dummy	0.02	-0.18***	0.14**	0.04	-0.19***
	(0.09)	(0.06)	(0.06)	(0.03)	(0.06)
N	716,348	716,348	716,348	716,348	716,348
N of exporter-sector pairs	13,516	13,516	13,516	13,516	13,516
N of exporters	8,754	8,754	8,754	8,754	8,754
Share of treated obs. in cross-section	0.10	0.10	0.10	0.10	0.10
R-sq.	0.59	0.54	0.60	0.61	0.51

Notes: Week 1 is the week the typhoon hit, the 36th week of the year 2018. Robust standard errors clustered at the exporter level are in parentheses. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% level, respectively. All regressions include the week -5 to week -2 dummies interacted with the KIX exporter dummies. However, these coefficients are not reported in the table. The regressions also include exporter-sector fixed effects and week-sector fixed effects.

TABLE A13: REGRESSION TABLE FOR FIGURE A2 PANEL B, EFFECTS ON EXPORTS, BINARY TREATMENT, PPML

	Non-KIX	HND	NRT	FUK	NGA
	(1)	(2)	(3)	(4)	(5)
KIX exporter dummy x Week -1 dummy	-0.21	-0.21**	-0.14	-0.25	0.03
	(0.17)	(0.10)	(0.12)	(0.29)	(0.17)
KIX exporter dummy x Week 0 dummy	-0.11	-0.16*	-0.02	-0.59*	0.22**
	(0.19)	(0.08)	(0.12)	(0.33)	(0.09)
KIX exporter dummy x Week 1 dummy	0.82***	-0.06	1.02***	1.64***	1.29***
	(0.23)	(0.23)	(0.15)	(0.35)	(0.13)
KIX exporter dummy x Week 2 dummy	1.28***	0.76***	1.44***	1.75***	1.67***
	(0.23)	(0.27)	(0.15)	(0.43)	(0.14)
KIX exporter dummy x Week 3 dummy	1.12***	0.52**	1.34***	1.89***	0.88***
	(0.20)	(0.26)	(0.14)	(0.51)	(0.15)
KIX exporter dummy x Week 4 dummy	1.13***	0.52***	0.97***	1.68***	2.87***
	(0.21)	(0.20)	(0.14)	(0.41)	(0.36)
KIX exporter dummy x Week 5 dummy	0.60***	0.19	0.71***	1.49***	0.81***
	(0.18)	(0.17)	(0.12)	(0.50)	(0.16)
KIX exporter dummy x Week 6 dummy	0.33*	0.04	0.40***	1.45***	0.38***
	(0.19)	(0.18)	(0.13)	(0.42)	(0.13)
KIX exporter dummy x Week 7 dummy	0.05	-0.01	0.12	-0.34	0.34**
	(0.18)	(0.26)	(0.12)	(0.37)	(0.16)
KIX exporter dummy x Week 8 dummy	0.10	-0.07	0.19	-0.22	0.43**
	(0.19)	(0.18)	(0.14)	(0.37)	(0.22)
KIX exporter dummy x Week 9 dummy	0.00	-0.06	0.08	0.01	0.13
	(0.18)	(0.16)	(0.14)	(0.40)	(0.13)
KIX exporter dummy x Week 10 dummy	0.07	-0.05	0.17	-0.04	0.14
	(0.18)	(0.21)	(0.13)	(0.38)	(0.17)
KIX exporter dummy x Week 11 dummy	0.10	0.01	0.18	-0.35	0.00
	(0.18)	(0.21)	(0.12)	(0.36)	(0.12)
KIX exporter dummy x Week 12 dummy	0.02	0.05	0.08	-0.27	0.19
	(0.19)	(0.11)	(0.13)	(0.27)	(0.14)
KIX exporter dummy x Week 13 dummy	-0.10	-0.09	-0.04	-0.36	-0.04
	(0.18)	(0.16)	(0.12)	(0.33)	(0.15)
KIX exporter dummy x Week 14 dummy	0.06	0.13	0.12	-0.43	0.23
	(0.20)	(0.14)	(0.13)	(0.32)	(0.22)
KIX exporter dummy x Week 15 dummy	-0.06	0.07	-0.03	-0.29	0.17
	(0.19)	(0.15)	(0.13)	(0.37)	(0.14)
KIX exporter dummy x Week 16 dummy	-0.13	0.01	-0.10	-0.35	-0.22
	(0.18)	(0.18)	(0.13)	(0.33)	(0.20)
KIX exporter dummy x Week 17 dummy	0.12	0.08	0.24**	-0.85***	-0.19
	(0.21)	(0.23)	(0.12)	(0.31)	(0.18)
N	716,348	378,716	605,737	72,329	328,458
N of exporter-sector pairs	13,516	7,283	11,429	1,369	6,216
N of exporters	8,754	4,922	7,564	983	4,287
Share of treated obs. in cross-section	0.10	0.13	0.12	0.17	0.16

Notes: Week 1 is the week the typhoon hit, the 36th week of the year 2018. Robust standard errors clustered at the exporter level are in parentheses. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% level, respectively. All regressions include the week -5 to week -2 dummies interacted with the KIX exporter dummies. However, these coefficients are not reported in the table. The regressions also include exporter-sector fixed effects and week-sector fixed effects.

TABLE A14: REGRESSION TABLE FOR FIGURE A3 PANEL A, EFFECTS ON EXPORTS, CONTINUOUS TREATMENT, LINEAR MODEL WITH ASINH

	Non-KIX	HND	NRT	FUK	NGA
	(1)	(2)	(3)	(4)	(5)
KIX exporter dummy x Week -1 dummy	0.21**	0.21***	0.23***	0.00	-0.14*
	(0.09)	(0.06)	(0.07)	(0.03)	(0.08)
KIX exporter dummy x Week 0 dummy	0.31***	0.18***	0.14*	0.08***	0.15*
	(0.10)	(0.06)	(0.08)	(0.03)	(0.08)
KIX exporter dummy x Week 1 dummy	5.64***	0.19**	5.12***	0.36***	3.10***
	(0.12)	(0.08)	(0.10)	(0.07)	(0.12)
KIX exporter dummy x Week 2 dummy	9.66***	2.84***	8.87***	0.64***	4.99***
	(0.14)	(0.09)	(0.12)	(0.08)	(0.13)
KIX exporter dummy x Week 3 dummy	6.68***	1.85***	6.56***	0.58***	1.48***
	(0.14)	(0.10)	(0.13)	(0.08)	(0.11)
KIX exporter dummy x Week 4 dummy	4.08***	0.89***	4.11***	0.51***	0.66***
	(0.13)	(0.09)	(0.12)	(0.07)	(0.09)
KIX exporter dummy x Week 5 dummy	3.00***	0.49***	3.21***	0.20***	0.92***
	(0.14)	(0.08)	(0.12)	(0.06)	(0.10)
KIX exporter dummy x Week 6 dummy	1.71***	0.10	1.97***	0.12**	0.14
	(0.13)	(0.08)	(0.12)	(0.05)	(0.09)
KIX exporter dummy x Week 7 dummy	0.96***	-0.29***	1.33***	0.06	0.24***
	(0.12)	(0.08)	(0.11)	(0.05)	(0.09)
KIX exporter dummy x Week 8 dummy	1.52***	-0.05	1.57***	0.10**	0.10
	(0.12)	(0.08)	(0.11)	(0.04)	(0.09)
KIX exporter dummy x Week 9 dummy	0.83***	0.06	0.67***	0.09**	0.06
	(0.11)	(0.08)	(0.09)	(0.04)	(0.09)
KIX exporter dummy x Week 10 dummy	-0.10	-0.35***	0.00	0.09*	-0.18*
	(0.11)	(0.08)	(0.09)	(0.04)	(0.09)
KIX exporter dummy x Week 11 dummy	0.42***	0.09	0.41***	-0.05	0.22**
	(0.11)	(0.08)	(0.09)	(0.04)	(0.09)
KIX exporter dummy x Week 12 dummy	0.30***	-0.18**	0.39***	0.00	-0.18**
	(0.11)	(0.08)	(0.09)	(0.04)	(0.09)
KIX exporter dummy x Week 13 dummy	0.50***	-0.07	0.48***	-0.11***	0.14*
	(0.11)	(0.08)	(0.09)	(0.04)	(0.08)
KIX exporter dummy x Week 14 dummy	0.49***	-0.03	0.38***	0.13***	0.10
	(0.11)	(0.08)	(0.09)	(0.04)	(0.09)
KIX exporter dummy x Week 15 dummy	0.44***	0.00	0.23***	0.03	0.32***
	(0.10)	(0.07)	(0.08)	(0.05)	(0.09)
KIX exporter dummy x Week 16 dummy	0.38***	-0.13*	0.32***	0.01	0.41***
	(0.11)	(0.07)	(0.09)	(0.04)	(0.09)
KIX exporter dummy x Week 17 dummy	0.18*	-0.11	0.36***	0.06*	-0.36***
	(0.10)	(0.07)	(0.08)	(0.03)	(0.09)
N	716,348	716,348	716,348	716,348	716,348
N of exporter-sector pairs	13,516	13,516	13,516	13,516	13,516
N of exporters	8,754	8,754	8,754	8,754	8,754
R-sq.	0.59	0.54	0.61	0.61	0.51

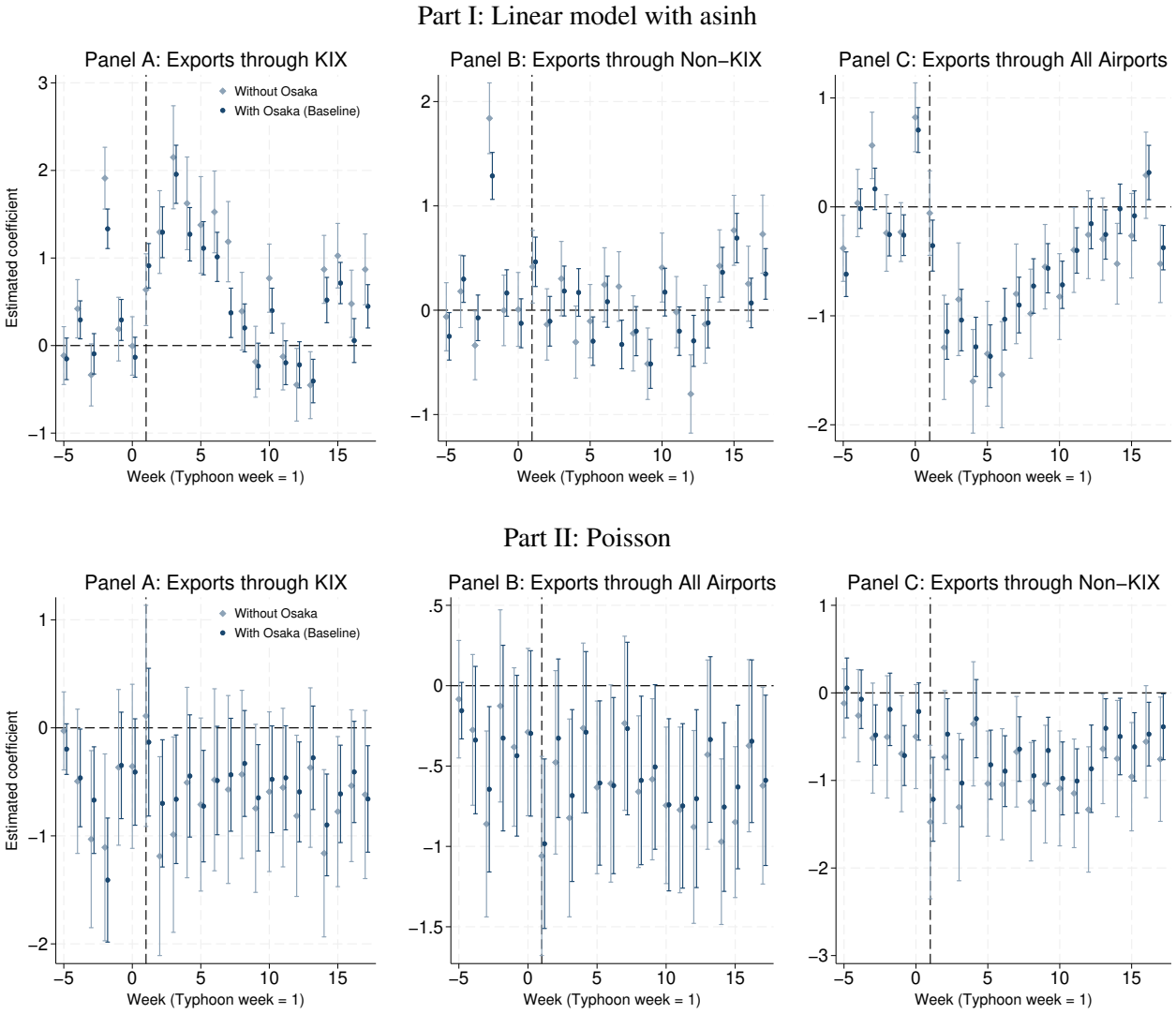
Notes: Week 1 is the week the typhoon hit, the 36th week of the year 2018. Robust standard errors clustered at the exporter level are in parentheses. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% level, respectively. All regressions include the week -5 to week -2 dummies interacted with the KIX exporter dummies. However, these coefficients are not reported in the table. The regressions also include exporter-sector fixed effects and week-sector fixed effects.

TABLE A15: REGRESSION TABLE FOR FIGURE A3 PANEL B, EFFECTS ON EXPORTS, CONTINUOUS TREATMENT, POISSON

	Non-KIX	HND	NRT	FUK	NGA
	(1)	(2)	(3)	(4)	(5)
KIX exporter dummy x Week -1 dummy	-0.27	-0.25	-0.26	-0.13	0.32
	(0.23)	(0.16)	(0.16)	(0.41)	(0.31)
KIX exporter dummy x Week 0 dummy	-0.14	0.15	-0.14	-0.33	0.11
	(0.23)	(0.16)	(0.18)	(0.43)	(0.35)
KIX exporter dummy x Week 1 dummy	1.34***	0.14	1.56***	1.88***	2.00***
	(0.32)	(0.33)	(0.23)	(0.55)	(0.26)
KIX exporter dummy x Week 2 dummy	2.01***	1.46***	2.16***	2.15***	2.66***
	(0.30)	(0.34)	(0.20)	(0.55)	(0.21)
KIX exporter dummy x Week 3 dummy	1.76***	1.20***	2.00***	2.05***	1.24***
	(0.30)	(0.34)	(0.22)	(0.72)	(0.30)
KIX exporter dummy x Week 4 dummy	1.54***	1.31***	1.34***	1.77**	3.29***
	(0.27)	(0.24)	(0.20)	(0.78)	(0.55)
KIX exporter dummy x Week 5 dummy	0.91***	0.70***	0.95***	1.60**	1.17***
	(0.26)	(0.21)	(0.19)	(0.67)	(0.32)
KIX exporter dummy x Week 6 dummy	0.58**	0.55**	0.48**	1.78***	0.70***
	(0.27)	(0.24)	(0.21)	(0.62)	(0.26)
KIX exporter dummy x Week 7 dummy	0.18	0.50	0.09	0.13	0.66**
	(0.25)	(0.32)	(0.20)	(0.46)	(0.30)
KIX exporter dummy x Week 8 dummy	0.22	0.30	0.22	0.02	0.74***
	(0.28)	(0.27)	(0.23)	(0.34)	(0.29)
KIX exporter dummy x Week 9 dummy	0.19	0.40	0.22	0.30	0.04
	(0.26)	(0.26)	(0.18)	(0.42)	(0.28)
KIX exporter dummy x Week 10 dummy	0.09	0.33	0.03	0.05	0.56
	(0.27)	(0.29)	(0.21)	(0.34)	(0.37)
KIX exporter dummy x Week 11 dummy	0.15	0.31	0.10	0.51	-0.06
	(0.26)	(0.28)	(0.21)	(0.37)	(0.30)
KIX exporter dummy x Week 12 dummy	0.04	0.23	-0.01	0.84**	0.43*
	(0.29)	(0.18)	(0.23)	(0.38)	(0.25)
KIX exporter dummy x Week 13 dummy	-0.05	-0.01	0.05	0.03	-0.32
	(0.25)	(0.24)	(0.18)	(0.36)	(0.31)
KIX exporter dummy x Week 14 dummy	0.15	0.24	0.13	1.08***	0.71***
	(0.28)	(0.22)	(0.23)	(0.36)	(0.26)
KIX exporter dummy x Week 15 dummy	0.10	0.10	0.23	0.29	0.12
	(0.27)	(0.23)	(0.24)	(0.41)	(0.26)
KIX exporter dummy x Week 16 dummy	-0.25	0.06	-0.22	-0.11	-0.79*
	(0.23)	(0.29)	(0.15)	(0.33)	(0.46)
KIX exporter dummy x Week 17 dummy	0.27	0.30	0.30	0.78*	-0.02
	(0.27)	(0.30)	(0.20)	(0.46)	(0.36)
N	716,348	378,716	605,737	72,557	323,721
N of exporter-sector pairs	13,516	7,283	11,429	1,369	6,216
N of exporters	8,754	4,922	7,564	983	4,287

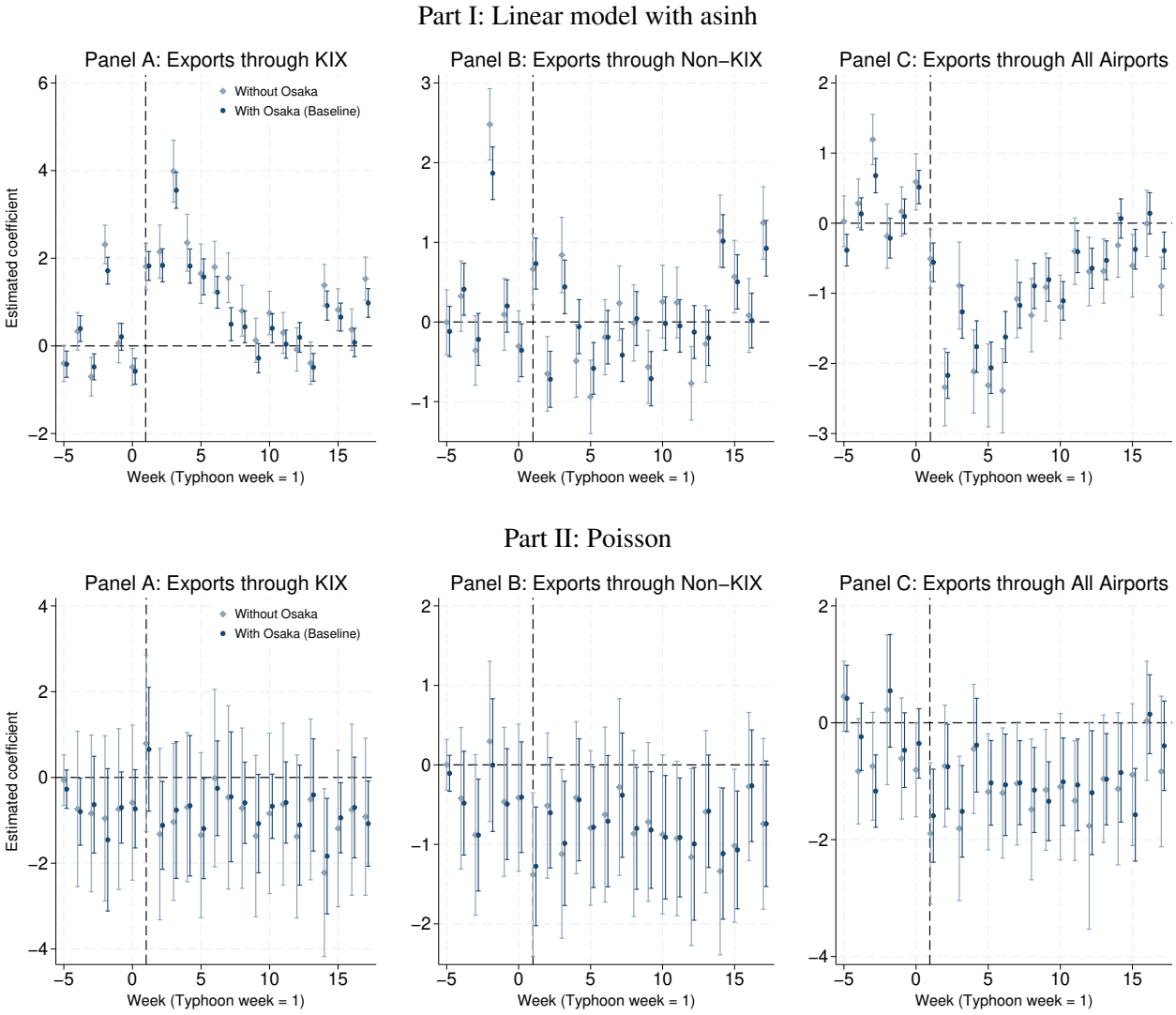
Notes: Week 1 is the week the typhoon hit, the 36th week of the year 2018. Robust standard errors clustered at the exporter level are in parentheses. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% level, respectively. All regressions include the week -5 to week -2 dummies interacted with the KIX exporter dummies. However, these coefficients are not reported in the table. The regressions also include exporter-sector fixed effects and week-sector fixed effects.

FIGURE A4: EXPORTS, INTERACTING WITH THE MACHINERY SECTOR DUMMY, BINARY TREATMENT, WITH/WITHOUT OSAKA



NOTE. The binary treatment variable is based on the 90th-percentile cutoff. The bands are 95 percent confidence intervals. See Table A16 for coefficients shown in Panel A. See Table A17 for coefficients shown in Panel B.

FIGURE A5: EXPORTS, INTERACTING WITH THE MACHINERY SECTOR DUMMY, CONTINUOUS TREATMENT, WITH/WITHOUT OSAKA



NOTE. The bands are 95 percent confidence intervals. See Table A18 for coefficients shown in Panel A. See Table A19 for coefficients shown in Panel B.

TABLE A16: REGRESSION TABLE FOR FIGURE A4 PART I, INTERACTING WITH THE MACHINERY SECTOR DUMMY, BINARY TREATMENT, WITH/WITHOUT OSAKA, LINEAR MODEL WITH ASINH

	KIX		All airports		Non-KIX	
	Without Osaka	With Osaka	Without Osaka	With Osaka	Without Osaka	With Osaka
	(1)	(2)	(3)	(4)	(5)	(6)
KIX exporter dummy x Week -1 dummy	0.19	0.29**	0.00	0.16	-0.23*	-0.26***
	(0.19)	(0.12)	(0.17)	(0.11)	(0.14)	(0.10)
KIX exporter dummy x Week 0 dummy	0.00	-0.13	0.01	-0.13	0.82***	0.71***
	(0.17)	(0.12)	(0.18)	(0.12)	(0.16)	(0.11)
KIX exporter dummy x Week 1 dummy	0.64***	0.91***	0.42**	0.46***	-0.06	-0.36***
	(0.21)	(0.13)	(0.18)	(0.12)	(0.20)	(0.12)
KIX exporter dummy x Week 2 dummy	1.30***	1.29***	-0.14	-0.11	-1.29***	-1.14***
	(0.24)	(0.15)	(0.17)	(0.12)	(0.24)	(0.13)
KIX exporter dummy x Week 3 dummy	2.15***	1.96***	0.30	0.18	-0.85***	-1.04***
	(0.30)	(0.17)	(0.18)	(0.12)	(0.26)	(0.14)
KIX exporter dummy x Week 4 dummy	1.62***	1.27***	-0.31*	0.17	-1.60***	-1.28***
	(0.27)	(0.16)	(0.18)	(0.12)	(0.24)	(0.14)
KIX exporter dummy x Week 5 dummy	1.38***	1.11***	-0.11	-0.30**	-1.35***	-1.37***
	(0.28)	(0.16)	(0.18)	(0.12)	(0.25)	(0.15)
KIX exporter dummy x Week 6 dummy	1.53***	1.01***	0.24	0.08	-1.54***	-1.03***
	(0.24)	(0.14)	(0.18)	(0.13)	(0.25)	(0.14)
KIX exporter dummy x Week 7 dummy	1.19***	0.37**	0.23	-0.33***	-0.80***	-0.90***
	(0.23)	(0.14)	(0.17)	(0.12)	(0.23)	(0.13)
KIX exporter dummy x Week 8 dummy	0.39*	0.20	-0.22	-0.20	-0.98***	-0.73***
	(0.23)	(0.14)	(0.18)	(0.12)	(0.21)	(0.13)
KIX exporter dummy x Week 9 dummy	-0.18	-0.23*	-0.51***	-0.51***	-0.55***	-0.56***
	(0.21)	(0.13)	(0.18)	(0.12)	(0.20)	(0.12)
KIX exporter dummy x Week 10 dummy	0.77***	0.40***	0.41**	0.17	-0.82***	-0.72***
	(0.20)	(0.13)	(0.17)	(0.12)	(0.20)	(0.11)
KIX exporter dummy x Week 11 dummy	-0.13	-0.20	-0.02	-0.20*	-0.40*	-0.40***
	(0.19)	(0.13)	(0.17)	(0.12)	(0.20)	(0.11)
KIX exporter dummy x Week 12 dummy	-0.45**	-0.22	-0.80***	-0.29**	-0.26	-0.15
	(0.21)	(0.13)	(0.19)	(0.13)	(0.21)	(0.12)
KIX exporter dummy x Week 13 dummy	-0.45**	-0.41***	-0.13	-0.12	-0.30	-0.25**
	(0.20)	(0.13)	(0.19)	(0.12)	(0.19)	(0.12)
KIX exporter dummy x Week 14 dummy	0.87***	0.52***	0.42**	0.36***	-0.52***	-0.02
	(0.20)	(0.13)	(0.18)	(0.12)	(0.19)	(0.12)
KIX exporter dummy x Week 15 dummy	1.03***	0.71***	0.77***	0.69***	-0.26	-0.08
	(0.19)	(0.12)	(0.17)	(0.12)	(0.20)	(0.12)
KIX exporter dummy x Week 16 dummy	0.48**	0.06	0.25	0.07	0.29	0.32**
	(0.20)	(0.13)	(0.18)	(0.12)	(0.20)	(0.13)
KIX exporter dummy x Week 17 dummy	0.87***	0.45***	0.73***	0.35***	-0.52***	-0.37***
	(0.21)	(0.13)	(0.19)	(0.12)	(0.18)	(0.10)
N	536,943	716,348	536,943	716,348	536,943	716,348
N of exporter-sector pairs	10,131	13,516	10,131	13,516	10,131	13,516
N of exporters	6,551	8,754	6,551	8,754	6,551	8,754
Share of treated obs. in cross-section	0.08	0.10	0.08	0.10	0.08	0.10
R-sq.	0.49	0.49	0.55	0.54	0.60	0.59

Notes: Week 1 is the week the typhoon hit, the 36th week of the year 2018. Robust standard errors clustered at the exporter level are in parentheses. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% level, respectively. All regressions include the week -5 to week -2 dummies interacted with the KIX exporter dummies. However, these coefficients are not reported in the table. The regressions also include exporter-sector fixed effects and week-sector fixed effects.

TABLE A17: REGRESSION TABLE FOR FIGURE A4 PART II, INTERACTING WITH THE MACHINERY SECTOR DUMMY, BINARY TREATMENT, WITH/WITHOUT OSAKA, PPML

	KIX		All airports		Non-KIX	
	Without Osaka	With Osaka	Without Osaka	With Osaka	Without Osaka	With Osaka
	(1)	(2)	(3)	(4)	(5)	(6)
KIX exporter dummy x Week -1 dummy	-0.37	-0.35	-0.38	-0.44*	-0.69**	-0.72***
	(0.37)	(0.25)	(0.25)	(0.26)	(0.34)	(0.18)
KIX exporter dummy x Week 0 dummy	-0.36	-0.41	-0.29	-0.30	-0.50*	-0.21
	(0.39)	(0.25)	(0.27)	(0.26)	(0.30)	(0.17)
KIX exporter dummy x Week 1 dummy	0.11	-0.13	-1.06***	-0.98***	-1.47***	-1.22***
	(0.52)	(0.35)	(0.32)	(0.27)	(0.45)	(0.25)
KIX exporter dummy x Week 2 dummy	-1.19**	-0.70**	-0.48	-0.33	-0.73*	-0.47**
	(0.47)	(0.30)	(0.29)	(0.25)	(0.39)	(0.21)
KIX exporter dummy x Week 3 dummy	-0.99**	-0.66**	-0.82***	-0.68**	-1.30***	-1.03***
	(0.46)	(0.30)	(0.31)	(0.27)	(0.43)	(0.25)
KIX exporter dummy x Week 4 dummy	-0.51	-0.45	-0.26	-0.29	-0.35	-0.29
	(0.45)	(0.29)	(0.27)	(0.26)	(0.36)	(0.23)
KIX exporter dummy x Week 5 dummy	-0.71*	-0.72***	-0.63**	-0.61**	-1.04***	-0.82***
	(0.41)	(0.26)	(0.27)	(0.26)	(0.31)	(0.20)
KIX exporter dummy x Week 6 dummy	-0.48	-0.49*	-0.61*	-0.62**	-1.04***	-0.89***
	(0.43)	(0.26)	(0.31)	(0.28)	(0.32)	(0.21)
KIX exporter dummy x Week 7 dummy	-0.57	-0.43	-0.23	-0.27	-0.67**	-0.64***
	(0.44)	(0.27)	(0.28)	(0.27)	(0.32)	(0.19)
KIX exporter dummy x Week 8 dummy	-0.43	-0.33	-0.66***	-0.59**	-1.24***	-0.95***
	(0.40)	(0.25)	(0.24)	(0.27)	(0.35)	(0.20)
KIX exporter dummy x Week 9 dummy	-0.75*	-0.65***	-0.58**	-0.51*	-1.04***	-0.66***
	(0.40)	(0.25)	(0.26)	(0.26)	(0.34)	(0.19)
KIX exporter dummy x Week 10 dummy	-0.59	-0.48*	-0.74***	-0.74***	-1.09***	-0.98***
	(0.38)	(0.25)	(0.25)	(0.27)	(0.34)	(0.21)
KIX exporter dummy x Week 11 dummy	-0.55	-0.46*	-0.77***	-0.75***	-1.15***	-1.01***
	(0.38)	(0.25)	(0.26)	(0.26)	(0.32)	(0.19)
KIX exporter dummy x Week 12 dummy	-0.81**	-0.59**	-0.88***	-0.70**	-1.33***	-0.87***
	(0.38)	(0.24)	(0.31)	(0.28)	(0.37)	(0.26)
KIX exporter dummy x Week 13 dummy	-0.37	-0.28	-0.43	-0.33	-0.64**	-0.40**
	(0.38)	(0.24)	(0.30)	(0.26)	(0.32)	(0.17)
KIX exporter dummy x Week 14 dummy	-1.16***	-0.90***	-0.97***	-0.76***	-0.75**	-0.50**
	(0.40)	(0.24)	(0.26)	(0.27)	(0.34)	(0.22)
KIX exporter dummy x Week 15 dummy	-0.78**	-0.61***	-0.85***	-0.63**	-0.96***	-0.62***
	(0.35)	(0.23)	(0.24)	(0.26)	(0.32)	(0.20)
KIX exporter dummy x Week 16 dummy	-0.54	-0.41*	-0.37	-0.35	-0.56*	-0.47**
	(0.36)	(0.24)	(0.27)	(0.26)	(0.33)	(0.19)
KIX exporter dummy x Week 17 dummy	-0.62	-0.66***	-0.62**	-0.59**	-0.76**	-0.39**
	(0.40)	(0.25)	(0.31)	(0.27)	(0.36)	(0.19)
N	533,257	711,674	536,943	716,348	536,108	714,946
N of exporter-sector pairs	10,131	13,516	10,131	13,516	10,131	13,516
N of exporters	6,551	8,755	6,551	8,754	6,551	8,755
Share of treated obs. in cross-section	0.08	0.10	0.08	0.10	0.08	0.10

Notes: Week 1 is the week the typhoon hit, the 36th week of the year 2018. Robust standard errors clustered at the exporter level are in parentheses. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% level, respectively. All regressions include the week -5 to week -2 dummies interacted with the KIX exporter dummies. However, these coefficients are not reported in the table. The regressions also include exporter-sector fixed effects and week-sector fixed effects.

TABLE A18: REGRESSION TABLE FOR FIGURE A5 PART I, INTERACTING WITH THE MACHINERY SECTOR DUMMY, CONTINUOUS TREATMENT, WITH/WITHOUT OSAKA, LINEAR MODEL WITH ASINH

	KIX		All airports		Non-KIX	
	Without Osaka	With Osaka	Without Osaka	With Osaka	Without Osaka	With Osaka
	(1)	(2)	(3)	(4)	(5)	(6)
KIX exporter dummy x Week -1 dummy	0.07	0.21	0.09	0.20	0.17	0.10
	(0.23)	(0.16)	(0.23)	(0.17)	(0.18)	(0.13)
KIX exporter dummy x Week 0 dummy	-0.48**	-0.58***	-0.30	-0.36**	0.59***	0.52***
	(0.21)	(0.15)	(0.23)	(0.17)	(0.20)	(0.12)
KIX exporter dummy x Week 1 dummy	1.81***	1.82***	0.66***	0.73***	-0.51**	-0.56***
	(0.27)	(0.17)	(0.23)	(0.16)	(0.21)	(0.14)
KIX exporter dummy x Week 2 dummy	2.15***	1.84***	-0.65***	-0.72***	-2.34***	-2.17***
	(0.31)	(0.19)	(0.24)	(0.18)	(0.28)	(0.17)
KIX exporter dummy x Week 3 dummy	3.99***	3.55***	0.84***	0.44**	-0.89***	-1.26***
	(0.36)	(0.21)	(0.24)	(0.17)	(0.32)	(0.19)
KIX exporter dummy x Week 4 dummy	2.35***	1.82***	-0.49**	-0.06	-2.11***	-1.76***
	(0.33)	(0.20)	(0.23)	(0.17)	(0.30)	(0.19)
KIX exporter dummy x Week 5 dummy	1.65***	1.57***	-0.94***	-0.58***	-2.31***	-2.06***
	(0.35)	(0.21)	(0.24)	(0.17)	(0.30)	(0.19)
KIX exporter dummy x Week 6 dummy	1.80***	1.22***	-0.19	-0.19	-2.39***	-1.62***
	(0.30)	(0.19)	(0.24)	(0.17)	(0.31)	(0.19)
KIX exporter dummy x Week 7 dummy	1.55***	0.50**	0.24	-0.42**	-1.08***	-1.17***
	(0.29)	(0.19)	(0.24)	(0.17)	(0.28)	(0.17)
KIX exporter dummy x Week 8 dummy	0.80***	0.43**	-0.01	0.04	-1.31***	-0.89***
	(0.30)	(0.19)	(0.24)	(0.17)	(0.27)	(0.16)
KIX exporter dummy x Week 9 dummy	0.13	-0.28	-0.56**	-0.71***	-0.91***	-0.81***
	(0.26)	(0.17)	(0.23)	(0.17)	(0.25)	(0.16)
KIX exporter dummy x Week 10 dummy	0.75***	0.40**	0.25	-0.02	-1.19***	-1.11***
	(0.25)	(0.17)	(0.23)	(0.17)	(0.23)	(0.14)
KIX exporter dummy x Week 11 dummy	0.30	0.04	0.24	-0.05	-0.40	-0.40**
	(0.24)	(0.16)	(0.23)	(0.17)	(0.24)	(0.15)
KIX exporter dummy x Week 12 dummy	-0.08	0.19	-0.77***	-0.13	-0.69***	-0.64***
	(0.25)	(0.17)	(0.24)	(0.17)	(0.25)	(0.15)
KIX exporter dummy x Week 13 dummy	-0.39	-0.49***	-0.28	-0.20	-0.68***	-0.53***
	(0.25)	(0.16)	(0.25)	(0.18)	(0.23)	(0.14)
KIX exporter dummy x Week 14 dummy	1.38***	0.92***	1.14***	1.02***	-0.31	0.07
	(0.24)	(0.17)	(0.23)	(0.17)	(0.23)	(0.14)
KIX exporter dummy x Week 15 dummy	0.82***	0.66***	0.57**	0.50***	-0.61**	-0.37**
	(0.24)	(0.16)	(0.23)	(0.17)	(0.23)	(0.15)
KIX exporter dummy x Week 16 dummy	0.37	0.08	0.08	0.02	0.00	0.14
	(0.24)	(0.17)	(0.24)	(0.18)	(0.24)	(0.15)
KIX exporter dummy x Week 17 dummy	1.53***	0.98***	1.24***	0.92***	-0.90***	-0.39***
	(0.25)	(0.17)	(0.23)	(0.18)	(0.21)	(0.13)
N	536,943	716,348	536,943	716,348	536,943	716,348
N of exporter-sector pairs	10,131	13,516	10,131	13,516	10,131	13,516
N of exporters	6,551	8,754	6,551	8,754	6,551	8,754
Share of treated obs. in cross-section	0.16	0.19	0.16	0.19	0.16	0.19
R-sq.	0.50	0.50	0.55	0.54	0.60	0.59

Notes: Week 1 is the week the typhoon hit, the 36th week of the year 2018. Robust standard errors clustered at the exporter level are in parentheses. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% level, respectively. All regressions include the week -5 to week -2 dummies interacted with the KIX exporter dummies. However, these coefficients are not reported in the table. The regressions also include exporter-sector fixed effects and week-sector fixed effects.

TABLE A19: REGRESSION TABLE FOR FIGURE A5 PART II, INTERACTING WITH THE MACHINERY SECTOR DUMMY, CONTINUOUS TREATMENT, WITH/WITHOUT OSAKA, PPML

	KIX		All airports		Non-KIX	
	Without Osaka	With Osaka	Without Osaka	With Osaka	Without Osaka	With Osaka
	(1)	(2)	(3)	(4)	(5)	(6)
KIX exporter dummy x Week -1 dummy	-0.74	-0.70*	-0.46	-0.49	-0.61	-0.47
	(0.96)	(0.42)	(0.48)	(0.36)	(0.53)	(0.33)
KIX exporter dummy x Week 0 dummy	-0.59	-0.73	-0.41	-0.41	-0.81**	-0.35
	(0.92)	(0.47)	(0.47)	(0.36)	(0.41)	(0.30)
KIX exporter dummy x Week 1 dummy	0.79	0.66	-1.38***	-1.28***	-1.89***	-1.59***
	(1.05)	(0.74)	(0.53)	(0.38)	(0.62)	(0.41)
KIX exporter dummy x Week 2 dummy	-1.32	-1.12**	-0.51	-0.60*	-0.74	-0.75**
	(1.02)	(0.52)	(0.47)	(0.35)	(0.53)	(0.37)
KIX exporter dummy x Week 3 dummy	-1.04	-0.76	-1.12**	-0.99**	-1.81***	-1.52***
	(0.93)	(0.81)	(0.54)	(0.40)	(0.63)	(0.40)
KIX exporter dummy x Week 4 dummy	-0.69	-0.66	-0.41	-0.44	-0.45	-0.38
	(0.89)	(0.84)	(0.49)	(0.39)	(0.56)	(0.41)
KIX exporter dummy x Week 5 dummy	-1.35	-1.19**	-0.79	-0.78**	-1.18**	-1.03***
	(0.98)	(0.60)	(0.50)	(0.39)	(0.51)	(0.37)
KIX exporter dummy x Week 6 dummy	-0.02	-0.25	-0.62	-0.71*	-1.20**	-1.06**
	(1.06)	(0.56)	(0.56)	(0.42)	(0.57)	(0.44)
KIX exporter dummy x Week 7 dummy	-0.46	-0.45	-0.28	-0.38	-1.04*	-1.03***
	(1.09)	(0.77)	(0.57)	(0.40)	(0.54)	(0.37)
KIX exporter dummy x Week 8 dummy	-0.72	-0.59	-0.86	-0.80**	-1.48**	-1.15***
	(0.95)	(0.48)	(0.53)	(0.39)	(0.62)	(0.37)
KIX exporter dummy x Week 9 dummy	-1.37	-1.08*	-0.72	-0.82**	-1.15**	-1.34***
	(0.96)	(0.59)	(0.51)	(0.37)	(0.53)	(0.35)
KIX exporter dummy x Week 10 dummy	-0.84	-0.67*	-0.88*	-0.91**	-1.09*	-1.01***
	(0.96)	(0.38)	(0.51)	(0.40)	(0.64)	(0.38)
KIX exporter dummy x Week 11 dummy	-0.63	-0.59	-0.93*	-0.91**	-1.33**	-1.06***
	(0.96)	(0.48)	(0.50)	(0.38)	(0.52)	(0.40)
KIX exporter dummy x Week 12 dummy	-1.38	-1.11	-1.16**	-0.99**	-1.76*	-1.20**
	(0.97)	(0.71)	(0.57)	(0.49)	(0.90)	(0.54)
KIX exporter dummy x Week 13 dummy	-0.51	-0.41	-0.59	-0.58	-0.96*	-0.97**
	(0.96)	(0.67)	(0.52)	(0.36)	(0.56)	(0.40)
KIX exporter dummy x Week 14 dummy	-2.22**	-1.84***	-1.34**	-1.12***	-1.13*	-0.85**
	(1.00)	(0.69)	(0.54)	(0.42)	(0.66)	(0.43)
KIX exporter dummy x Week 15 dummy	-1.19	-0.94**	-1.02**	-1.07***	-0.89	-1.57***
	(0.93)	(0.42)	(0.49)	(0.38)	(0.62)	(0.40)
KIX exporter dummy x Week 16 dummy	-0.75	-0.70	-0.27	-0.26	0.03	0.15
	(1.02)	(0.60)	(0.48)	(0.36)	(0.52)	(0.35)
KIX exporter dummy x Week 17 dummy	-0.92	-1.08**	-0.74	-0.74*	-0.83	-0.39
	(0.93)	(0.51)	(0.55)	(0.40)	(0.66)	(0.39)
N	532,920	716,348	536,943	716,348	536,943	716,348
N of exporter-sector pairs	10,131	13,516	10,131	13,516	10,131	13,516
N of exporters	6,551	8,754	6,551	8,754	6,551	8,754
Share of treated obs. in cross-section	0.16	0.19	0.16	0.19	0.16	0.19

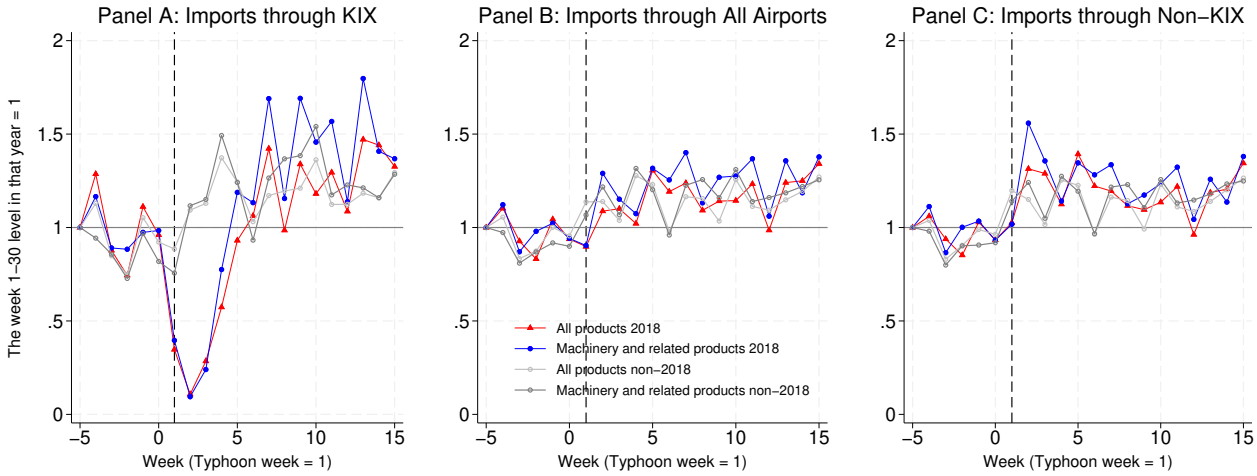
Notes: Week 1 is the week the typhoon hit, the 36th week of the year 2018. Robust standard errors clustered at the exporter level are in parentheses. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% level, respectively. All regressions include the week -5 to week -2 dummies interacted with the KIX exporter dummies. However, these coefficients are not reported in the table. The regressions also include exporter-sector fixed effects and week-sector fixed effects.

C. Results for the Import-side

Figure A6 illustrates the average dynamics of total imports and machinery imports—defined as imports of products within the machinery and transport equipment sector—by all firms in 2018, compared to the average for non-2018 years (i.e., 2014–2017 and 2019).

Panel A shows that the average values of total imports and machinery imports declined during the week of the KIX closure but recovered by week 6. In contrast, as expected, no such decline in imports occurred during the same week in non-2018 years. Panel B reveals a slight decline in total air imports and machinery air imports during the week of the typhoon, with levels approximately 20 percentage points lower than those in non-2018 years. However, both total air imports and machinery air imports rebounded by week 2. Panel C examines imports through non-KIX airports. In week 1, there was no noticeable difference between 2018 and non-2018 years. However, in week 2, non-KIX imports were higher in 2018 compared to non-2018 years, indicating import diversion to non-KIX airports. By week 4, the level of non-KIX imports had returned to the average level observed in non-2018 years.

FIGURE A6: IMPORTS, MEAN DYNAMICS



NOTE. The "non-2018 years" include 2014–2017 and 2019. The import values are normalized by dividing them by the average import value during the 1st to 31st weeks (i.e., January 1st to August 8th) in that year.

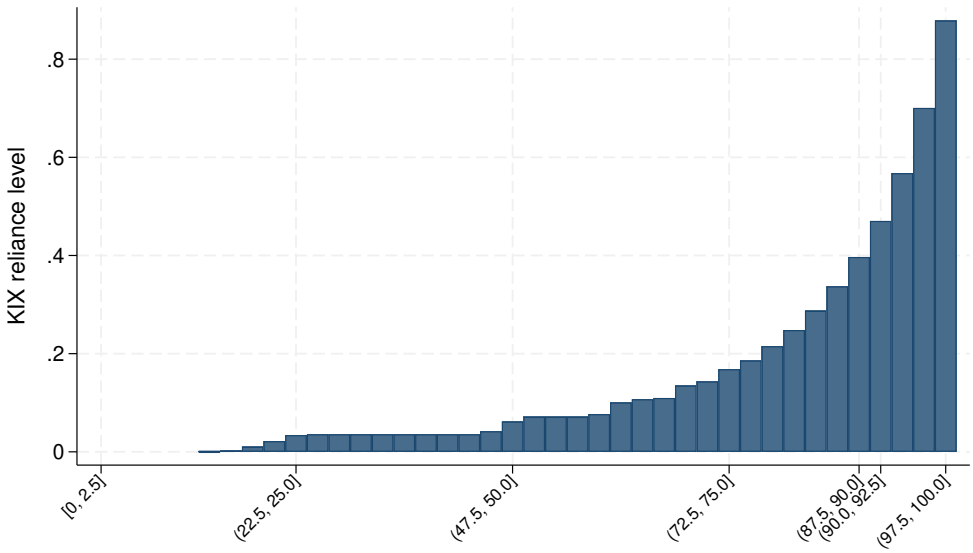
Table A20 presents summary statistics of the variables used in import-side regressions. Figure A7 shows the average KIX reliance levels–"the value of imports via KIX divided by total air imports"–in each bin of importer-sector pairs' KIX reliance levels. Table A21 displays the correlation matrix for the explanatory variables used in the import-side regressions.

TABLE A20: SUMMARY STATISTICS OF THE IMPORT-SIDE VARIABLES

				Mean in each percentile bin					
	Obs	Mean	Std. dev.	0-10th	10-25th	25-50th	50-75th	75-90th	90-100th
(1) Imports from KIX, asinh	2,339,473	2.40	5.21	0	0	0	0	6.07	14.94
(2) Imports from all airports, asinh	2,339,473	5.25	6.89	0	0	0	5.79	14.03	16.98
(3) Imports from nonKIX airports, asinh	2,339,473	3.82	6.36	0	0	0	0.95	12.85	16.59
(4) Imports from HND, asinh	2,339,473	0.92	3.47	0	0	0	0	0	9.18
(5) Imports from NRT, asinh	2,339,473	2.96	5.82	0	0	0	0	9.02	16.13
(6) Imports from FUK, asinh	2,339,473	0.12	1.36	0	0	0	0	0	1.23
(7) Imports from NGA, asinh	2,339,473	0.76	3.14	0	0	0	0	0	7.64
(8) Imports from KIX, raw data	2,339,473	1.37	71.50	0	0	0	0	0.04	13.71
(9) Imports from all airports, raw data	2,339,473	7.36	232.00	0	0	0	0.03	0.81	72.54
(10) Imports from nonKIX airports, raw data	2,339,473	5.99	184.00	0	0	0	0.00	0.34	59.55
(11) Imports from HND, raw data	2,339,473	0.72	27.80	0	0	0	0	0	7.25
(12) Imports from NRT, raw data	2,339,473	4.70	169.00	0	0	0	0	0.13	46.94
(13) Imports from FUK, raw data	2,339,473	0.17	16.10	0	0	0	0	0	1.72
(14) Imports from NGA, raw data	2,339,473	0.30	18.20	0	0	0	0	0	3.03
(15) KIX importer dummy, based on 90th pc	44,141	0.11	0.31						
(16) KIX reliance level	44,141	0.15	0.20						
(17) Machinery sector dummy	44,141	0.35	0.48						

Notes: The number of importers included in the sample is 29,136 for all variables. The unit of variables (8)-(14) are million JPY. The summary statistics of variables (15)-(17) are based on the cross-sectional observations.

FIGURE A7: AVERAGE KIX RELIANCE LEVEL BY BIN, IMPORTS



NOTE. The figure shows average KIX reliance levels–"the value of imports via KIX divided by total air import values" at the importer-sector level–in each bin of KIX reliance level's percentiles.

TABLE A21: CORRELATION MATRIX FOR THE KEY EXPLANATORY VARIABLES IN THE IMPORT-SIDE

	(a)	(b)	(c)
(a) KIX importer dummy, based on 90th pc	1		
(b) KIX reliance level	0.85	1	
(c) Machinery sector dummy	0.05	0.06	1

Notes: The sample size is 44,141.

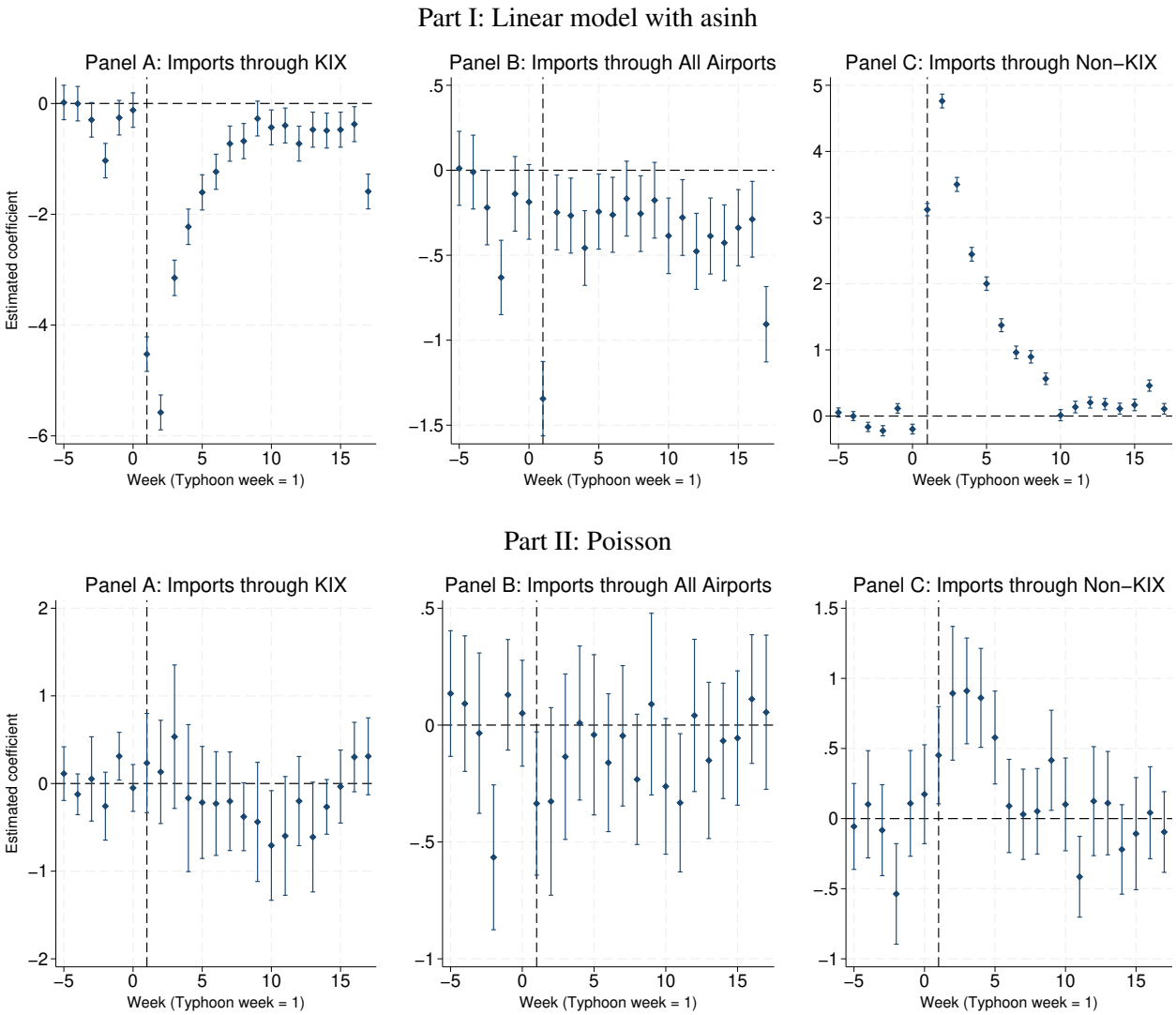
Figure A8 displays the effects of the KIX closure on imports through KIX in Panel A, imports through all airports in Panel B, and imports from non-KIX airports in Panel C. According to the linear model presented in Part I, imports through KIX declined in week 1, and this lower level of imports persisted until week 8. However, total imports through all airports only declined during week 1. Additionally, the figure shows an increase in imports through non-KIX airports in week 1, with statistically significant higher levels continuing until week 9.

In contrast, the PPML estimates shown in Figure A8 Part II indicate that there was no greater decline in imports through KIX for KIX-reliant importers, and the overall decline in air imports during week 1 was only marginally statistically significant. Nevertheless, there was greater import diversion to non-KIX airports by KIX-reliant importers, which persisted for about five weeks. Table A22 summarizes the coefficients plotted in the figure.

Figure A9 plots estimated coefficients of the triple interaction terms, capturing the (potentially) different reactions to the KIX closure in the machinery sector. Unlike the case of exports, the results show a less clear difference between the machinery sector and the other sectors. Table A23 summarizes the coefficients plotted in the figure.

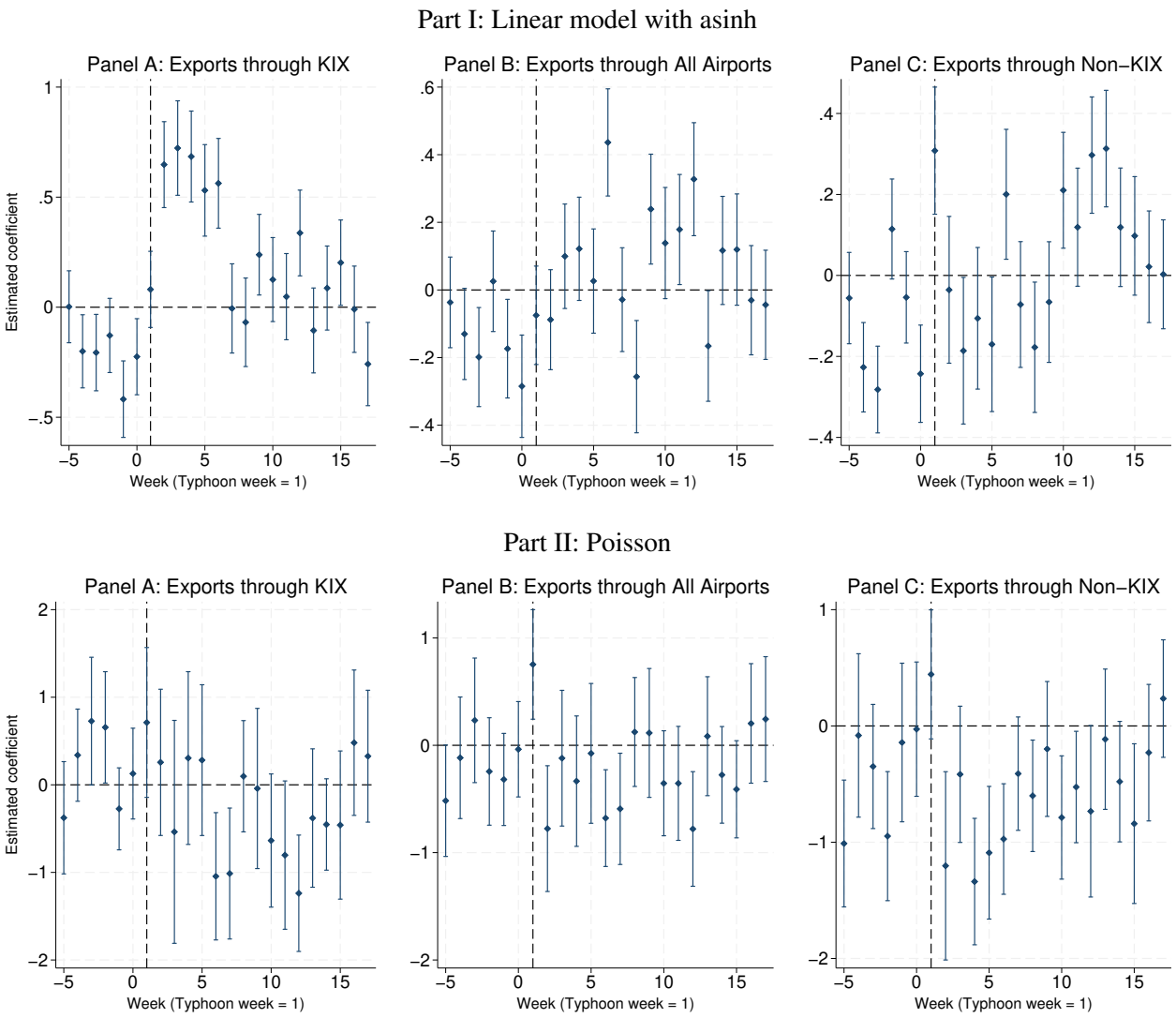
Figure A10 displays import diversions by airport with the binary treatment variable. Table A24 summarizes regression results shown in Panel A, and Table A25 summarizes regression results shown in Panel B. Figure A11 displays import diversions by airport with the continuous treatment variable. Table A26 summarizes regression results shown in Panel A, and Table A27 summarizes regression results shown in Panel B.

FIGURE A8: EFFECTS OF KIX CLOSURE ON IMPORTS, WITH THE BINARY TREATMENT



NOTE. The bands are 95 percent confidence intervals. Standard errors are clustered at the importer level. See Table A22 for the coefficients plotted in the figure.

FIGURE A9: IMPORTS, INTERACTING WITH THE MACHINERY SECTOR DUMMY, BINARY TREATMENT



NOTE. The bands are 95 percent confidence intervals. Standard errors are clustered at the importer level. See Table A23 for the coefficients plotted in the figure.

TABLE A22: REGRESSION TABLE FOR FIGURE A8, IMPORTS, WITH THE BINARY TREATMENT

	Part I: Linear model			Part II: PPML		
	KIX	All airports	Non-KIX	KIX	All airports	Non-KIX
	(1)	(2)	(3)	(4)	(5)	(6)
KIX exporter dummy x Week -1 dummy	-0.26	-0.14	0.12***	0.31**	0.13	0.11
	(0.16)	(0.11)	(0.04)	(0.14)	(0.12)	(0.19)
KIX exporter dummy x Week 0 dummy	-0.12	-0.19	-0.20***	-0.05	0.05	0.17
	(0.16)	(0.11)	(0.04)	(0.14)	(0.12)	(0.18)
KIX exporter dummy x Week 1 dummy	-4.52***	-1.34***	3.12***	0.23	-0.34**	0.45**
	(0.16)	(0.11)	(0.05)	(0.29)	(0.16)	(0.18)
KIX exporter dummy x Week 2 dummy	-5.58***	-0.25**	4.76***	0.13	-0.33	0.89***
	(0.16)	(0.11)	(0.05)	(0.30)	(0.21)	(0.24)
KIX exporter dummy x Week 3 dummy	-3.15***	-0.27**	3.50***	0.53	-0.14	0.91***
	(0.16)	(0.11)	(0.05)	(0.42)	(0.18)	(0.19)
KIX exporter dummy x Week 4 dummy	-2.23***	-0.46***	2.45***	-0.17	0.01	0.86***
	(0.16)	(0.11)	(0.05)	(0.43)	(0.17)	(0.18)
KIX exporter dummy x Week 5 dummy	-1.60***	-0.24**	2.00***	-0.22	-0.04	0.58***
	(0.16)	(0.11)	(0.05)	(0.33)	(0.18)	(0.17)
KIX exporter dummy x Week 6 dummy	-1.23***	-0.26**	1.37***	-0.23	-0.16	0.09
	(0.16)	(0.11)	(0.05)	(0.30)	(0.15)	(0.17)
KIX exporter dummy x Week 7 dummy	-0.73***	-0.17	0.96***	-0.20	-0.05	0.03
	(0.16)	(0.11)	(0.05)	(0.29)	(0.15)	(0.16)
KIX exporter dummy x Week 8 dummy	-0.68***	-0.26**	0.90***	-0.38*	-0.23	0.05
	(0.16)	(0.11)	(0.05)	(0.20)	(0.14)	(0.16)
KIX exporter dummy x Week 9 dummy	-0.27*	-0.18	0.56***	-0.44	0.09	0.42**
	(0.16)	(0.11)	(0.05)	(0.35)	(0.20)	(0.18)
KIX exporter dummy x Week 10 dummy	-0.43***	-0.39***	0.01	-0.71**	-0.26*	0.10
	(0.16)	(0.11)	(0.04)	(0.32)	(0.15)	(0.17)
KIX exporter dummy x Week 11 dummy	-0.40**	-0.28**	0.14***	-0.60*	-0.33**	-0.42***
	(0.16)	(0.11)	(0.05)	(0.35)	(0.15)	(0.15)
KIX exporter dummy x Week 12 dummy	-0.73***	-0.48***	0.20***	-0.20	0.04	0.12
	(0.16)	(0.11)	(0.04)	(0.26)	(0.17)	(0.20)
KIX exporter dummy x Week 13 dummy	-0.47***	-0.39***	0.18***	-0.61*	-0.15	0.11
	(0.16)	(0.11)	(0.04)	(0.32)	(0.17)	(0.19)
KIX exporter dummy x Week 14 dummy	-0.49***	-0.43***	0.11**	-0.27*	-0.07	-0.22
	(0.16)	(0.11)	(0.04)	(0.16)	(0.13)	(0.16)
KIX exporter dummy x Week 15 dummy	-0.47***	-0.34***	0.17***	-0.03	-0.06	-0.11
	(0.16)	(0.11)	(0.05)	(0.21)	(0.15)	(0.20)
KIX exporter dummy x Week 16 dummy	-0.37**	-0.29**	0.46***	0.30	0.11	0.04
	(0.16)	(0.11)	(0.04)	(0.20)	(0.14)	(0.17)
KIX exporter dummy x Week 17 dummy	-1.59***	-0.91***	0.11**	0.31	0.06	-0.10
	(0.16)	(0.11)	(0.04)	(0.22)	(0.17)	(0.15)
N	2,339,473	2,339,473	2,339,473	2,339,420	2,339,473	2,339,420
N of importer-sector pairs	44,141	44,141	44,141	44,140	44,141	44,140
N of importers	29,136	29,136	29,136	29,135	29,136	29,135
Share of treated obs. in cross-section	0.11	0.11	0.11	0.11	0.11	0.11
R-sq.	0.45	0.52	0.56			

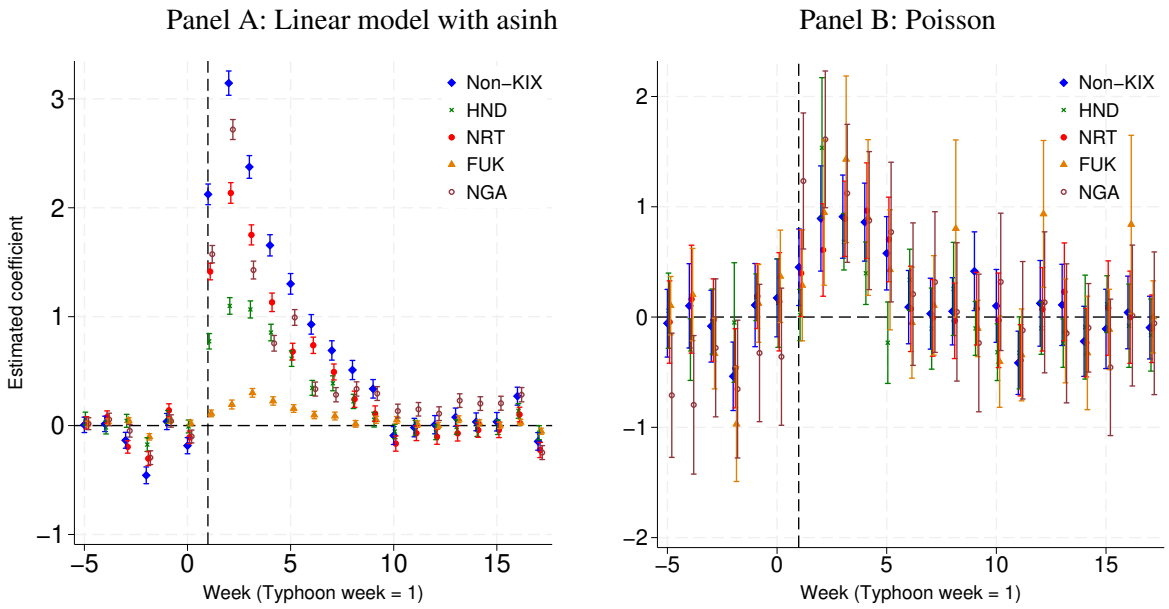
Notes: Week 1 is the week the typhoon hit, the 36th week of the year 2018. Robust standard errors clustered at the importer level are in parentheses. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% level, respectively. All regressions include the week -5 to week -2 dummies interacted with the KIX importer dummies. However, these coefficients are not reported in the table. The regressions also include importer-sector fixed effects and week-sector fixed effects.

TABLE A23: REGRESSION TABLE FOR FIGURE A9, IMPORTS, INTERACTING WITH THE MACHINERY SECTOR DUMMY, BINARY TREATMENT

	Part I: Linear model			Part II: PPML		
	KIX	All airports	Non-KIX	KIX	All airports	Non-KIX
	(1)	(2)	(3)	(4)	(5)	(6)
KIX exporter dummy x Week -1 dummy	-0.42***	-0.17**	-0.05	-0.27	-0.32	-0.14
	(0.09)	(0.07)	(0.06)	(0.24)	(0.22)	(0.35)
KIX exporter dummy x Week 0 dummy	-0.22**	-0.28***	-0.24***	0.13	-0.04	-0.03
	(0.09)	(0.08)	(0.06)	(0.26)	(0.23)	(0.30)
KIX exporter dummy x Week 1 dummy	0.08	-0.08	0.31***	0.71	0.75***	0.44
	(0.09)	(0.07)	(0.08)	(0.44)	(0.26)	(0.28)
KIX exporter dummy x Week 2 dummy	0.65***	-0.09	-0.04	0.26	-0.78***	-1.20***
	(0.10)	(0.08)	(0.09)	(0.43)	(0.30)	(0.41)
KIX exporter dummy x Week 3 dummy	0.72***	0.10	-0.19**	-0.54	-0.12	-0.42
	(0.11)	(0.08)	(0.09)	(0.65)	(0.32)	(0.30)
KIX exporter dummy x Week 4 dummy	0.68***	0.12	-0.11	0.31	-0.33	-1.34***
	(0.11)	(0.08)	(0.09)	(0.50)	(0.31)	(0.28)
KIX exporter dummy x Week 5 dummy	0.53***	0.03	-0.17*	0.28	-0.08	-1.09***
	(0.11)	(0.08)	(0.09)	(0.44)	(0.33)	(0.29)
KIX exporter dummy x Week 6 dummy	0.56***	0.44***	0.20**	-1.04***	-0.68***	-0.97***
	(0.10)	(0.08)	(0.08)	(0.37)	(0.23)	(0.24)
KIX exporter dummy x Week 7 dummy	-0.01	-0.03	-0.07	-1.01***	-0.59**	-0.41*
	(0.10)	(0.08)	(0.08)	(0.38)	(0.26)	(0.25)
KIX exporter dummy x Week 8 dummy	-0.07	-0.26***	-0.18**	0.10	0.12	-0.60**
	(0.10)	(0.09)	(0.08)	(0.32)	(0.26)	(0.25)
KIX exporter dummy x Week 9 dummy	0.24**	0.24***	-0.07	-0.04	0.12	-0.20
	(0.09)	(0.08)	(0.08)	(0.47)	(0.31)	(0.30)
KIX exporter dummy x Week 10 dummy	0.13	0.14	0.21***	-0.64	-0.35	-0.79***
	(0.10)	(0.08)	(0.07)	(0.39)	(0.25)	(0.27)
KIX exporter dummy x Week 11 dummy	0.05	0.18**	0.12	-0.80*	-0.35	-0.53**
	(0.10)	(0.08)	(0.07)	(0.43)	(0.27)	(0.25)
KIX exporter dummy x Week 12 dummy	0.34***	0.33***	0.30***	-1.24***	-0.78***	-0.73*
	(0.10)	(0.09)	(0.07)	(0.34)	(0.27)	(0.38)
KIX exporter dummy x Week 13 dummy	-0.11	-0.17*	0.31***	-0.38	0.08	-0.11
	(0.10)	(0.08)	(0.07)	(0.40)	(0.28)	(0.31)
KIX exporter dummy x Week 14 dummy	0.09	0.12	0.12	-0.45*	-0.28	-0.48*
	(0.10)	(0.08)	(0.08)	(0.27)	(0.23)	(0.26)
KIX exporter dummy x Week 15 dummy	0.20**	0.12	0.10	-0.46	-0.41*	-0.84**
	(0.10)	(0.08)	(0.08)	(0.43)	(0.23)	(0.35)
KIX exporter dummy x Week 16 dummy	-0.01	-0.03	0.02	0.48	0.20	-0.23
	(0.10)	(0.08)	(0.07)	(0.42)	(0.28)	(0.30)
KIX exporter dummy x Week 17 dummy	-0.26***	-0.04	0.00	0.33	0.24	0.24
	(0.10)	(0.08)	(0.07)	(0.38)	(0.30)	(0.26)
N	2,339,473	2,339,473	2,339,473	2,339,420	2,339,473	2,339,420
N of importer-sector pairs	44,141	44,141	44,141	44,140	44,141	44,140
N of importers	29,136	29,136	29,136	29,135	29,136	29,135
Share of treated obs. in cross-section	0.11	0.11	0.11	0.11	0.11	0.11
R-sq.	0.45	0.52	0.57			

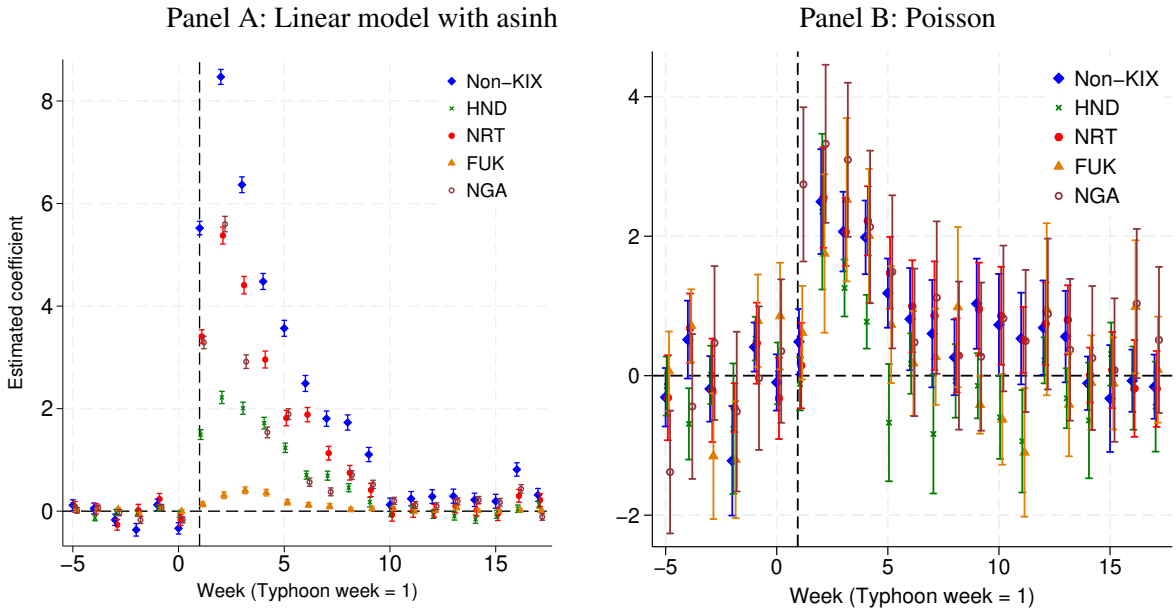
Notes: Week 1 is the week the typhoon hit, the 36th week of the year 2018. Robust standard errors clustered at the importer level are in parentheses. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% level, respectively. All regressions include the week -5 to week -2 dummies interacted with the KIX importer dummies. However, these coefficients are not reported in the table. The regressions also include importer-sector fixed effects and week-sector fixed effects.

FIGURE A10: IMPORTS, BINARY TREATMENT, BY AIRPORT



NOTE. Panel A uses the dummy variable measuring the KIX intensity based on the 90th percentile cutoff. The bands are 95 percent confidence intervals. Standard errors are clustered at the importer level. See Table A24 for regression results shown in Panel A. See Table A25 for regression results shown in Panel B.

FIGURE A11: IMPORTS, CONTINUOUS TREATMENT, BY AIRPORT



NOTE. Panel A uses the dummy variable measuring the KIX intensity based on the 90th percentile cutoff. The bands are 95 percent confidence intervals. Standard errors are clustered at the importer level. See Table A26 for regression results shown in Panel A. See Table A27 for regression results shown in Panel B.

TABLE A24: REGRESSION TABLE FOR FIGURE A10 PANEL A, EFFECTS ON IMPORTS, BINARY TREATMENT, LINEAR MODEL WITH ASINH

	Non-KIX	HND	NRT	FUK	NGA
	(1)	(2)	(3)	(4)	(5)
KIX importer dummy x Week -1 dummy	0.04	0.08***	0.14***	0.05***	0.04
	(0.04)	(0.03)	(0.03)	(0.01)	(0.03)
KIX importer dummy x Week 0 dummy	-0.18***	-0.01	-0.11***	0.02*	-0.10***
	(0.04)	(0.03)	(0.03)	(0.01)	(0.03)
KIX importer dummy x Week 1 dummy	2.12***	0.77***	1.41***	0.11***	1.57***
	(0.05)	(0.04)	(0.04)	(0.02)	(0.04)
KIX importer dummy x Week 2 dummy	3.14***	1.10***	2.14***	0.19***	2.72***
	(0.06)	(0.04)	(0.05)	(0.02)	(0.05)
KIX importer dummy x Week 3 dummy	2.37***	1.07***	1.75***	0.30***	1.43***
	(0.05)	(0.04)	(0.05)	(0.02)	(0.04)
KIX importer dummy x Week 4 dummy	1.66***	0.85***	1.13***	0.23***	0.76***
	(0.05)	(0.04)	(0.04)	(0.02)	(0.04)
KIX importer dummy x Week 5 dummy	1.30***	0.61***	0.68***	0.16***	0.99***
	(0.05)	(0.04)	(0.04)	(0.02)	(0.04)
KIX importer dummy x Week 6 dummy	0.93***	0.35***	0.74***	0.10***	0.34***
	(0.05)	(0.04)	(0.04)	(0.02)	(0.03)
KIX importer dummy x Week 7 dummy	0.69***	0.39***	0.49***	0.09***	0.28***
	(0.05)	(0.04)	(0.04)	(0.02)	(0.03)
KIX importer dummy x Week 8 dummy	0.51***	0.22***	0.24***	0.02	0.34***
	(0.05)	(0.03)	(0.04)	(0.02)	(0.03)
KIX importer dummy x Week 9 dummy	0.34***	0.05	0.11***	0.05***	0.29***
	(0.04)	(0.04)	(0.04)	(0.02)	(0.03)
KIX importer dummy x Week 10 dummy	-0.09**	-0.05	-0.17***	0.05***	0.13***
	(0.04)	(0.03)	(0.04)	(0.02)	(0.03)
KIX importer dummy x Week 11 dummy	-0.02	-0.02	-0.07*	0.01	0.15***
	(0.04)	(0.03)	(0.04)	(0.02)	(0.03)
KIX importer dummy x Week 12 dummy	0.01	-0.06*	-0.10***	0.00	0.11***
	(0.04)	(0.04)	(0.04)	(0.02)	(0.03)
KIX importer dummy x Week 13 dummy	0.08*	-0.01	-0.07*	0.06***	0.23***
	(0.04)	(0.03)	(0.04)	(0.02)	(0.03)
KIX importer dummy x Week 14 dummy	0.03	-0.03	-0.04	0.02*	0.20***
	(0.04)	(0.03)	(0.03)	(0.01)	(0.03)
KIX importer dummy x Week 15 dummy	0.04	-0.02	-0.04	0.00	0.21***
	(0.04)	(0.03)	(0.04)	(0.02)	(0.03)
KIX importer dummy x Week 16 dummy	0.27***	0.13***	0.10***	0.03**	0.28***
	(0.04)	(0.03)	(0.03)	(0.01)	(0.03)
KIX importer dummy x Week 17 dummy	-0.15***	-0.07*	-0.22***	-0.05***	-0.25***
	(0.04)	(0.03)	(0.04)	(0.01)	(0.03)
N	2,339,473	2,339,473	2,339,473	2,339,473	2,339,473
N of importer-sector pairs	44,141	44,141	44,141	44,141	44,141
N of importers	29,136	29,136	29,136	29,136	29,136
Share of treated obs. in cross-section	0.14	0.14	0.14	0.14	0.14
R-sq.	0.56	0.46	0.59	0.53	0.49

Notes: Week 1 is the week the typhoon hit, the 36th week of the year 2018. Robust standard errors clustered at the importer level are in parentheses. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% level, respectively. All regressions include the week -5 to week -2 dummies interacted with the KIX importer dummies. However, these coefficients are not reported in the table. The regressions also include importer-sector fixed effects and week-sector fixed effects.

TABLE A25: REGRESSION TABLE FOR FIGURE A10 PANEL B, EFFECTS ON IMPORTS, BINARY TREATMENT, PPML

	Non-KIX	HND	NRT	FUK	NGA
	(1)	(2)	(3)	(4)	(5)
KIX importer dummy x Week -1 dummy	0.11	0.18*	0.19	0.12	-0.33
	(0.19)	(0.11)	(0.15)	(0.18)	(0.32)
KIX importer dummy x Week 0 dummy	0.17	0.13	0.14	0.37*	-0.36
	(0.18)	(0.21)	(0.23)	(0.21)	(0.32)
KIX importer dummy x Week 1 dummy	0.45**	0.02	0.40**	0.29	1.23***
	(0.18)	(0.12)	(0.20)	(0.26)	(0.32)
KIX importer dummy x Week 2 dummy	0.89***	1.53***	0.61***	0.95***	1.61***
	(0.24)	(0.33)	(0.21)	(0.34)	(0.32)
KIX importer dummy x Week 3 dummy	0.91***	0.68***	0.89***	1.43***	1.12***
	(0.19)	(0.13)	(0.17)	(0.39)	(0.32)
KIX importer dummy x Week 4 dummy	0.86***	0.40***	0.96***	0.90**	0.87***
	(0.18)	(0.15)	(0.22)	(0.36)	(0.32)
KIX importer dummy x Week 5 dummy	0.58***	-0.23	0.70***	0.43	0.77**
	(0.17)	(0.19)	(0.20)	(0.28)	(0.32)
KIX importer dummy x Week 6 dummy	0.09	0.34**	0.07	-0.05	0.21
	(0.17)	(0.14)	(0.20)	(0.26)	(0.33)
KIX importer dummy x Week 7 dummy	0.03	-0.10	-0.01	0.11	0.32
	(0.16)	(0.19)	(0.18)	(0.23)	(0.33)
KIX importer dummy x Week 8 dummy	0.05	0.26	-0.03	0.80*	0.05
	(0.16)	(0.22)	(0.18)	(0.41)	(0.32)
KIX importer dummy x Week 9 dummy	0.42**	-0.10	0.08	-0.10	-0.24
	(0.18)	(0.13)	(0.17)	(0.13)	(0.32)
KIX importer dummy x Week 10 dummy	0.10	-0.32**	-0.03	-0.40*	0.32
	(0.17)	(0.13)	(0.22)	(0.21)	(0.32)
KIX importer dummy x Week 11 dummy	-0.42***	-0.32*	-0.39**	-0.34	-0.12
	(0.15)	(0.17)	(0.17)	(0.21)	(0.32)
KIX importer dummy x Week 12 dummy	0.12	-0.10	0.07	0.93***	0.13
	(0.20)	(0.12)	(0.19)	(0.34)	(0.33)
KIX importer dummy x Week 13 dummy	0.11	-0.24**	0.23	-0.13	-0.15
	(0.19)	(0.11)	(0.23)	(0.24)	(0.32)
KIX importer dummy x Week 14 dummy	-0.22	-0.09	-0.23	-0.33	-0.10
	(0.16)	(0.24)	(0.16)	(0.26)	(0.21)
KIX importer dummy x Week 15 dummy	-0.11	0.12	0.08	-0.11	-0.46
	(0.18)	(0.13)	(0.22)	(0.19)	(0.32)
KIX importer dummy x Week 16 dummy	0.04	-0.08	0.00	0.84**	0.01
	(0.17)	(0.19)	(0.21)	(0.41)	(0.33)
KIX importer dummy x Week 17 dummy	-0.10	-0.16	-0.11	0.00	-0.06
	(0.15)	(0.17)	(0.16)	(0.17)	(0.33)
N	2,339,420	1,105,103	1,952,626	151,580	934,619
N of importer-sector pairs	44,140	20,851	36,842	2,860	17,690
N of importers	29,135	15,344	25,036	2,171	12,773
Share of treated obs. in cross-section	0.11	0.13	0.11	0.18	0.17

Notes: Week 1 is the week the typhoon hit, the 36th week of the year 2018. Robust standard errors clustered at the importer level are in parentheses. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% level, respectively. All regressions include the week -5 to week -2 dummies interacted with the KIX importer dummies. However, these coefficients are not reported in the table. The regressions also include importer-sector fixed effects and week-sector fixed effects.

TABLE A26: REGRESSION TABLE FOR FIGURE A11 PANEL C, EFFECTS ON IMPORTS, CONTINUOUS TREATMENT, LINEAR MODEL WITH ASINH

	Non-KIX	HND	NRT	FUK	NGA
	(1)	(2)	(3)	(4)	(5)
KIX importer dummy x Week -1 dummy	0.12**	0.06*	0.24***	0.05***	0.07**
	(0.06)	(0.03)	(0.06)	(0.01)	(0.03)
KIX importer dummy x Week 0 dummy	-0.33***	-0.06**	-0.17***	0.00	-0.17***
	(0.06)	(0.03)	(0.05)	(0.02)	(0.03)
KIX importer dummy x Week 1 dummy	5.52***	1.49***	3.41***	0.13***	3.29***
	(0.07)	(0.05)	(0.07)	(0.02)	(0.06)
KIX importer dummy x Week 2 dummy	8.47***	2.22***	5.38***	0.31***	5.60***
	(0.07)	(0.06)	(0.09)	(0.03)	(0.08)
KIX importer dummy x Week 3 dummy	6.37***	2.01***	4.41***	0.41***	2.92***
	(0.08)	(0.06)	(0.09)	(0.03)	(0.07)
KIX importer dummy x Week 4 dummy	4.48***	1.72***	2.96***	0.36***	1.54***
	(0.08)	(0.06)	(0.08)	(0.03)	(0.05)
KIX importer dummy x Week 5 dummy	3.57***	1.24***	1.82***	0.17***	1.89***
	(0.08)	(0.05)	(0.08)	(0.03)	(0.05)
KIX importer dummy x Week 6 dummy	2.49***	0.70***	1.88***	0.12***	0.57***
	(0.08)	(0.04)	(0.07)	(0.02)	(0.04)
KIX importer dummy x Week 7 dummy	1.80***	0.69***	1.13***	0.10***	0.38***
	(0.08)	(0.05)	(0.07)	(0.03)	(0.04)
KIX importer dummy x Week 8 dummy	1.73***	0.46***	0.75***	0.03	0.71***
	(0.08)	(0.04)	(0.07)	(0.02)	(0.04)
KIX importer dummy x Week 9 dummy	1.10***	0.18***	0.41***	0.05**	0.52***
	(0.07)	(0.05)	(0.07)	(0.02)	(0.04)
KIX importer dummy x Week 10 dummy	0.13*	-0.02	-0.07	0.05**	0.20***
	(0.07)	(0.04)	(0.06)	(0.02)	(0.04)
KIX importer dummy x Week 11 dummy	0.24***	0.04	0.01	-0.01	0.12***
	(0.07)	(0.04)	(0.07)	(0.02)	(0.03)
KIX importer dummy x Week 12 dummy	0.28***	-0.06	0.01	0.02	0.10***
	(0.07)	(0.04)	(0.06)	(0.02)	(0.03)
KIX importer dummy x Week 13 dummy	0.29***	-0.10**	0.10	0.07***	0.19***
	(0.07)	(0.04)	(0.07)	(0.02)	(0.04)
KIX importer dummy x Week 14 dummy	0.22***	-0.16***	0.02	0.01	0.22***
	(0.07)	(0.04)	(0.06)	(0.02)	(0.04)
KIX importer dummy x Week 15 dummy	0.19***	-0.06	-0.06	0.00	0.17***
	(0.07)	(0.04)	(0.06)	(0.02)	(0.04)
KIX importer dummy x Week 16 dummy	0.81***	0.05	0.30***	0.02	0.44***
	(0.07)	(0.04)	(0.06)	(0.02)	(0.04)
KIX importer dummy x Week 17 dummy	0.32***	0.13***	0.22***	0.01	-0.11***
	(0.06)	(0.04)	(0.07)	(0.02)	(0.03)
N	2,339,473	2,339,473	2,339,473	2,339,473	2,339,473
N of importer-sector pairs	44,141	44,141	44,141	44,141	44,141
N of importers	29,136	29,136	29,136	29,136	29,136
R-sq.	0.57	0.46	0.59	0.53	0.49

Notes: Week 1 is the week the typhoon hit, the 36th week of the year 2018. Robust standard errors clustered at the importer level are in parentheses. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% level, respectively. All regressions include the week -5 to week -2 dummies interacted with the KIX importer dummies. However, these coefficients are not reported in the table. The regressions also include importer-sector fixed effects and week-sector fixed effects.

TABLE A27: REGRESSION TABLE FOR FIGURE A11 PANEL D, EFFECTS ON IMPORTS, CONTINUOUS TREATMENT, PPML

	Non-KIX	HND	NRT	FUK	NGA
	(1)	(2)	(3)	(4)	(5)
KIX exporter dummy x Week -1 dummy	0.41**	0.53***	0.47	0.79**	-0.04
	(0.18)	(0.16)	(0.30)	(0.34)	(0.53)
KIX exporter dummy x Week 0 dummy	-0.10	0.03	-0.32	0.85**	0.35
	(0.21)	(0.23)	(0.30)	(0.39)	(0.53)
KIX exporter dummy x Week 1 dummy	0.49**	-0.12	0.15	0.62*	2.74***
	(0.24)	(0.19)	(0.31)	(0.34)	(0.56)
KIX exporter dummy x Week 2 dummy	2.50***	2.35***	2.55***	1.75***	3.33***
	(0.38)	(0.57)	(0.37)	(0.58)	(0.58)
KIX exporter dummy x Week 3 dummy	2.07***	1.26***	2.06***	2.52***	3.10***
	(0.29)	(0.21)	(0.25)	(0.60)	(0.56)
KIX exporter dummy x Week 4 dummy	1.98***	0.77***	2.22***	2.01***	2.13***
	(0.27)	(0.20)	(0.25)	(0.49)	(0.56)
KIX exporter dummy x Week 5 dummy	1.18***	-0.67	1.47***	0.73*	1.49***
	(0.25)	(0.43)	(0.26)	(0.43)	(0.56)
KIX exporter dummy x Week 6 dummy	0.81**	0.17	1.00***	0.18	0.48
	(0.37)	(0.22)	(0.34)	(0.38)	(0.54)
KIX exporter dummy x Week 7 dummy	0.60	-0.84*	0.86**	0.27	1.12**
	(0.39)	(0.44)	(0.40)	(0.35)	(0.56)
KIX exporter dummy x Week 8 dummy	0.26	-0.08	0.29	0.98*	0.29
	(0.28)	(0.27)	(0.27)	(0.59)	(0.54)
KIX exporter dummy x Week 9 dummy	1.03***	-0.14	0.96***	-0.42**	0.27
	(0.33)	(0.24)	(0.34)	(0.21)	(0.54)
KIX exporter dummy x Week 10 dummy	0.73*	-0.60**	0.86**	-0.63*	0.82
	(0.37)	(0.30)	(0.36)	(0.33)	(0.53)
KIX exporter dummy x Week 11 dummy	0.53	-0.94**	0.51**	-1.10**	0.50
	(0.34)	(0.38)	(0.24)	(0.47)	(0.52)
KIX exporter dummy x Week 12 dummy	0.69**	0.22	0.74**	0.95	0.88
	(0.35)	(0.17)	(0.30)	(0.63)	(0.55)
KIX exporter dummy x Week 13 dummy	0.56*	-0.32	0.80***	-0.41	0.37
	(0.33)	(0.22)	(0.25)	(0.38)	(0.52)
KIX exporter dummy x Week 14 dummy	-0.11	-0.64	0.01	-0.10	0.25
	(0.20)	(0.42)	(0.20)	(0.35)	(0.53)
KIX exporter dummy x Week 15 dummy	-0.33	0.31	0.08	-0.11	0.08
	(0.39)	(0.23)	(0.28)	(0.34)	(0.53)
KIX exporter dummy x Week 16 dummy	-0.07	-0.18	-0.18	0.99**	1.03*
	(0.23)	(0.30)	(0.35)	(0.49)	(0.55)
KIX exporter dummy x Week 17 dummy	-0.16	-0.44	-0.19	0.09	0.51
	(0.24)	(0.33)	(0.28)	(0.39)	(0.53)
N	2,339,420	1,105,103	1,952,626	151,580	937,570
N of importer-sector pairs	44,140	20,851	36,842	2,860	17,690
N of exporters	29,135	15,344	25,036	2,171	12,773

Notes: Week 1 is the week the typhoon hit, the 36th week of the year 2018. Robust standard errors clustered at the importer level are in parentheses. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% level, respectively. All regressions include the week -5 to week -2 dummies interacted with the KIX importer dummies. However, these coefficients are not reported in the table. The regressions also include importer-sector fixed effects and week-sector fixed effects.