JCER Working Paper
AEPR series
No. 2025-2-6

Trade and FDI Policies in an Interdependent World: Lessons from East Asia

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This paper was prepared for the Fortieth Asian Economic Policy Review (AEPR) Conference "Connectivity in Asia: Urbanization, Subregional Integration, and Global Value Chains" October 4, 2025, Tokyo.

October 2025

Asian Economic Policy Review
Japan Center for Economic Research

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Full Cite

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Trade and FDI Policies in an Interdependent World: Lessons from East Asia *

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September 2025

Abstract

In this article, we examine the spillover effects of trade and FDI policy changes on countries that are not directly involved—i.e., third markets. Specifically, we investigate this issue using two cases: anti-dumping tariffs imposed on Chinese exports and China's relaxation of restrictions on inward FDI. Our findings suggest that country-specific tariffs do not necessarily lead to increased exports being redirected to non-sanctioning countries—a phenomenon known as trade deflection. We also find that China's unilateral FDI liberalization prompted structural changes within Japanese multinational firms by reinforcing global value chains. Finally, we discuss how other barriers to trade and FDI flows—such as geopolitical tensions and health shocks—affect the behavior of Japanese multinational and domestic firms.

Keywords. Market interdependence, FDI liberalization, Anti-dumping tariffs, Geopolitical shocks, Covid-19

JEL Classification. F1; F2 F1; F2.

*We thank...

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1 Introduction

The use of policies that encourage or discourage international trade and foreign direct investment (FDI) has surged globally over the past three decades. The enactment of the North American Free Trade Agreement (NAFTA) in 1994 and China's accession to the World Trade Organization (WTO) in 2001 are prominent examples of trade and FDI liberalization. For a long time, it was assumed that trade and FDI liberalization (and globalization in general) was a one-way process—barriers to the flow of goods, services, and investments would continue to decline over time. However, several recent landmark events, such as the U.S.-China trade war, the Trump administration's tariffs on a wide range of countries, and bans by the U.S. and E.U. governments on investments from many Chinese companies, have demonstrated that trade and FDI liberalization is *not* irreversible. In fact, it appears that we may be on a trajectory toward de-globalization. Given that trade and FDI liberalization has proven to be reversible, it is important to explore the impact of policies that either promote or restrict global trade and investment on countries around the world.

Most changes in trade and FDI policies involve only a small number of countries. For example, recent negotiations within NAFTA (now USMCA) have concerned only the U.S., Canada, and Mexico, while the U.S.-China trade war pertains solely to those two nations. However, this does not mean that the effects of such policy changes are limited to the directly involved countries. In reality, many "bystander" or third countries can be significantly affected, as firms adopt complex production strategies that create linkages across borders through Global Value Chains (GVCs) and interdependent entry and exit decisions in the foreign market. These firm-level decisions generate cross-country interdependencies, which in turn influence aggregate variables such as trade flows and employment across a wide range of nations.

This paper focuses on the *spillover effects* of trade and FDI policy changes on third countries. Specifically, we examine how firm-level decisions contribute to country-level interdependence, highlighting the roles of Global Value Chains (GVCs) and interdependent entry decisions into export markets in shaping these linkages. To illustrate these mechanisms, we analyze two policy episodes in East Asia: the rising use of anti-dumping tariffs on Chinese exports during the 2000s and the relaxation of China's inward FDI restrictions in 2002. Additionally, we discuss how intangible barriers to FDI—such

as politically induced uncertainty—affect the operations of multinational corporations (MNCs). We also summarize findings from existing studies on U.S. anti-dumping tariffs on Japanese imports in the 1990s and the recent U.S.-China trade war. Understanding the spillover effects of trade and FDI policies on third countries is especially relevant today, as the current U.S. administration continues to prioritize bilateral negotiations over multilateral approaches in global trade and investment policy.

Existing research has identified two types of spillover effects resulting from country-specific tariffs. The first concerns the impact on exports from the country facing tariffs (i.e., the home country) to third countries. Some studies (e.g., Bown and Crowley (2007), Alfaro and Chor (2023), and Freund et al. (2024)) find that when a country's exports are subject to tariffs, its exports to third countries often increase—an effect known as *trade deflection*. However, other research (e.g., Crowley et al. (2018), Albornoz-Crespo et al. (2021)) shows that the tariffed country may instead experience a decline in exports to third countries—an effect known as *trade destruction*. Notably, recent work by Chen et al. (2025) offers further insights by distinguishing between firm-level trade deflection and aggregate-level trade destruction.

The second type of spillover effect involves exports from third countries to the country imposing the tariffs (i.e., the focal country). The prevailing empirical finding is the *trade creation* effect (Bown and Crowley (2007), Fajgelbaum et al. (2023)), whereby bystander countries increase their exports to the focal country as importers seek substitutes for goods previously sourced from the tariffed country.

There is relatively limited research on the spillover effects of FDI liberalization, partly because restrictions on FDI flows are inherently difficult to measure. A notable exception is Alviarez et al. (2022), which examines a unique FDI policy change in China following its accession to the WTO. This reform reduced barriers to foreign investment in a differentiated manner across manufacturing industries. The authors leverage this variation to assess the impact of this policy change on the operations of Japanese multinational corporations (MNCs) in both China and Japan.

As expected, the policy change had a positive effect on the sales and employment of Japanese MNC affiliates operating in China. More strikingly, however, the study finds no significant impact on the local sales of affiliates that faced reduced restrictions after 2002. By contrast, exports from these affiliates back to Japan—both in absolute levels and as a share of total sales—increased significantly following the liberalization.

In other words, many Japanese affiliates in China began exporting more to their parent firms after the policy change. These findings suggest that the primary effect of China's 2002 FDI liberalization for Japanese MNCs was to facilitate the development of global value chains (GVCs)—or, more precisely, regional value chains.

For Japanese multinational parent firms in Japan, Alviarez et al. (2022) find that this policy change induced a *within-firm* structural transformation. As restrictions on their investment and operations in China were relaxed, manufacturing employment within their domestic operations declined. At the same time, the share (and level) of service-related jobs—such as $R\&D$ personnel and international business roles—within these firms' domestic operations increased following the liberalization. This suggests that overseas manufacturing activities can complement certain types of service jobs performed within parent firms at home. Third, both manufacturing sales and imports (especially from Asia) by Japanese MNC parent firms rose once their manufacturing affiliates in China faced fewer restrictions. Consequently, labor productivity in Japanese MNC parent firms increased after the policy shock.

Taken together, the above findings suggest that the primary effect of China's 2002 FDI liberalization was to facilitate the formation of global value chains (GVCs)—or more precisely, regional value chains. Rather than promoting an expansion of local sales within the Chinese market, the policy shift deepened the Japanese economy's supply-side interdependence with China. As a result, global supply chains emerge as a key mechanism through which international trade and investment generate cross-country economic interdependence.

Importantly, many barriers to FDI flows take the form of invisible costs, such as political tensions or conflicts. These costs are particularly salient in the context of FDI, as foreign investments often entail substantial sunk entry costs. Chen et al. (2022) examine the impact of an unexpected escalation in a territorial dispute in 2012 on the operations of Japanese multinational firms in China. Their findings indicate that, following the escalation, affiliates of Japanese multinationals in China experienced a prolonged decline in both sales and investment—trends that continued until early 2015. Notably, shifts in firm-level expectations appear to have played a critical role. Specifically, Chen et al. (2022) find that the political shock led Japanese affiliates to under-forecast their sales for 2013 and 2014, likely contributing to the observed decline in actual sales and investment.

In Chen et al. (2021), the authors analyze the impact of COVID-19 on Japanese firms and find that the initial outbreak primarily heightened uncertainty among firms with business ties to China. This suggests that a country-specific health shock can generate spillover effects through trade and FDI linkages by influencing firms' expectations.

The deep connections between trade and FDI have drawn considerable attention from trade economists, especially as intra-firm trade of intermediate goods has become a key component of international trade.[1] The literature on *horizontal* FDI emphasizes the substitutability between trade and FDI (see, for example, Markusen (1984) and Helpman et al. (2004)), as they are competing ways of serving a foreign market. The central argument in this literature is the proximity–concentration trade-off, which describes the decision firms face between producing goods in the foreign market via FDI (proximity) to avoid high trade costs, or producing in larger, centralized facilities at home (concentration) and exporting to the foreign market to achieve economies of scale and reduce fixed costs per unit. This theoretical argument has received empirical support from Brainard (1997) and Ramondo et al. (2013).

The literature on *vertical* FDI and export platforms emphasizes the complementarity between trade and FDI, as these types of FDI activities involve either production fragmentation, and thus intra-firm trade (Helpman (1984) and Irarrazabal et al. (2013)), or the shipping of final goods from the FDI host country to the destination market (Tintelnot (2017)).[2] The literature (see Ramondo and Rodríguez-Clare (2013) and Arkolakis et al. (2018)) then incorporates all of the above channels into a unified framework to quantify the gains from globalization, including both trade and FDI liberalizations.

The tariff-jumping effect of country-specific tariffs (e.g., anti-dumping tariffs and countervailing duties) is also closely tied to the connection between trade and FDI. It refers to a corporate strategy whereby a company invests in a foreign country (e.g., by building a local factory) to bypass high import tariffs and restrictions imposed by that country on products from abroad. A well-known example is the U.S.–Japan trade conflict in the 1980s. After the U.S. began imposing tariffs on Japanese imports, many

[1] According to Antràs (2003), over forty percent of the volume of U.S. imports of goods occurred within the boundaries of multinational firms, with the corresponding share for U.S. exports being 36.3 percent.

[2] Another stream of literature emphasizes the *dynamic complementarity* between exporting and FDI in an environment with information frictions. Specifically, an MNC can use exporting to learn the demand for its goods first, and then decide whether to make large-scale sunk investments via FDI. See Conconi et al. (2016) for more details.

Japanese exporters started investing and producing in the U.S., or in Canada and Mexico under the North American Free Trade Agreement. A series of empirical studies has found evidence of tariff jumping, using either industry-level data on FDI flows (e.g., Barrell and Pain (1999) and Blonigen and Feenstra (1996)) or firm-level data (e.g., Belderbos (1997) and Belderbos and Sleuwaegen (1998)) in the case of Japan. Subsequent research extending the analysis to FDI flows from other developed countries into the U.S. (e.g., Blonigen (2002)) also finds supportive evidence of tariff jumping. Since the U.S.–China trade war and the broader wave of global trade conflicts began only recently, and because the tariff-jumping effect takes time to materialize, it remains unclear whether the tariffs imposed by the Trump administration will lead to a substantial tariff-jumping effect.

The increasing use of tariffs and restrictions on foreign investment in recent years reflects a broader global trend toward the resurgence of industrial policy. Examples include the Biden administration's CHIPS and Science Act and its export controls on high-tech goods to China. We expect that similar policies will become more prevalent in the near future. It is our hope that the insights from this paper will contribute to more informed evaluations of trade conflicts.

The remainder of this paper is organized as follows. Section 2 reviews recent research on the impacts of country-specific tariffs. We then introduce the authors' work on anti-dumping tariffs in the same section, which helps reconcile discrepancies in the empirical findings documented in the existing literature. Section 3 presents the authors' research on FDI liberalization in China in 2002. Section 4 examines how political and health shocks affect Japanese MNCs and domestic firms through FDI and trade linkages. Finally, Section 5 concludes the paper.

2 Trade Policies in an Interdependent World

2.1 Data

In this section, we introduce research that examines the *global* impacts of country-specific tariffs in an interdependent world. Prior to the U.S.-China trade war, the most commonly used country-specific tariffs were anti-dumping tariffs and countervailing duties, both of which are permitted under WTO rules. Anti-dumping tariffs (ADTs) and

countervailing duties (CVDs) are import tariffs intended to protect domestic producers from unfair trade practices such as dumping and government subsidies, respectively. ADTs are imposed when foreign firms sell goods in a target market at prices lower than those in their home market and/or below production costs. CVDs, on the other hand, are used to counteract situations in which foreign governments subsidize their exporters, resulting in artificially low export prices. Among all WTO member countries, China's exports have been the most frequently targeted by ADTs and CVDs.

The primary data source for research on anti-dumping (AD) and countervailing duties (CVDs) is the Temporary Trade Barriers Database (TTBD) from Bown et al. (2020), which provides detailed information on AD cases, including the initiating country and date, the targeted country, and the affected products. Products are classified using the most detailed Harmonized System (HS) codes available per country.[3] Our analysis focuses on AD cases initiated against China between 2000 and 2011. Table 1 shows the top 15 countries that filed AD cases against China during this period. India, the United States, and the European Union (EU) were the most active, based on the number of distinct product cases. Notably, the U.S. and EU—China's two largest export markets—each accounted for about 20% of China's total exports from 2000 to 2011. A substantial share of these exports were affected by AD measures; for example, 11% of Chinese exports to the U.S. during this period were subject to U.S.-initiated AD actions.[4]

[3]The Harmonized System is used by customs authorities to classify traded goods. For cross-country consistency, most research uses the HS code at the six digit level.

[4]The sample of our analyses spans from 2000 to 2011, as our transaction-level trade data from China only spans for that period. Since our main point of the interdependence is tied to the extensive margin (the number of exporters), we cannot make this point by extending our sample to years after 2011 even though data of aggregate-level trade flows and TTBD are available for years after 2011.

Table 1: Top 15 investigating countries against China, 2000-2011

		Cases initiated between 2000 and 2011			
Country	% of Chinese exports	# cases	# HS6	% of HS6	% of exports to destination
India	1.97	107	181	3.75	15.99
United States	18.95	92	266	4.84	11.20
European Union	19.32	75	172	3.05	8.19
Turkey	0.70	61	124	2.83	7.41
Argentina	0.30	56	125	3.20	17.93
Brazil	1.12	42	72	1.65	5.72
Canada	1.45	27	85	1.73	4.73
Australia	1.59	26	36	0.73	4.39
Mexico	0.99	25	41	0.96	3.14
Colombia	0.20	25	71	1.86	5.41
South Africa	0.60	22	31	0.68	3.00
Peru	0.16	13	54	1.43	3.69
Korea	4.60	13	27	0.49	0.59
Indonesia	1.22	11	34	0.69	1.70
Thailand	1.11	10	35	0.68	2.01

The data are obtained from the Temporary Trade Barriers Database (TTBD) constructed by Bown et al. (2020).

Since 2000, the use of anti-dumping tariffs (ADTs) against China has followed an upward trend. Table 2 shows the number of AD cases filed against Chinese exports from 2000 to 2011. The data show that the average number of cases rose from fewer than 100 before the global financial crisis to well over 100 in the years that followed. These fluctuations closely align with global economic conditions, with notable surges during downturns such as the 2001 recession, the 2008–2009 financial crisis, and the 2009–2010 European debt crisis. This pattern suggests that political economy factors and rising protectionist pressures play a significant role in the timing and intensity of ADT use.

Table 2: Number of Anti-dumping investigations against China: 2000-2011

Year	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
Number	85	108	79	74	114	89	160	91	173	217	134	97

The data are obtained from the Temporary Trade Barriers Database (TTBD) constructed by Bown et al. (2020).

2.2 Global Impact of Anti-dumping Tariffs and the U.S.-China Trade War

Bown and Crowley (2007) is a seminal paper that examines the global impact of anti-dumping tariffs (ADTs).[5] Using a theoretical model, the paper identifies four effects of ADTs. The first two effects concern the focal country—the country that imposes the ADTs. While exports of the sanctioned product from the home country (i.e., the country facing the ADTs) to the focal country decline, exports of the same product from third countries to the focal country increase due to import substitution. Bown and Crowley refer to these as the trade destruction and trade creation effects, respectively.

The remaining two effects involve interactions between the home country and third countries. First, exports of the sanctioned product from third countries to the home country decline-a phenomenon termed trade depression. This occurs because the ADTs reduce the home country's exports to the focal country, leading to an oversupply of the sanctioned product in the home market, which in turn makes it more difficult for third countries to export to the home country. Second, exports from the home country to third countries increase—a response known as trade deflection. This happens because the reduction in exports to the focal country lowers the marginal cost of production (under the assumption of an increasing marginal cost), making it more cost-effective for the home country to export to third markets.[6] Bown and Crowley (2007) empirically supports these theoretical predictions using data on U.S.-imposed ADTs and CVDs on Japanese exports to 37 countries during the period 1992–2001.

2.2.1 An Illustrate Model

We provide a simple model to illustrate the four effects mentioned above numerically.[7] There are three countries, indexed by $i, j \in \{A, B, C\}$ and $i \neq j$ in the model. Each country is home to a single firm, indexed by the same notation, which produces one homogeneous good for domestic consumption as well as for export. Let m_{ij} denote the good produced in country i and consumed in country j. Hence, exports from firm i

[5] For excellent surveys of this literature, see Prusa (1997) and Blonigen and Prusa (2016).

[6] The model assumes an increasing marginal cost; thus, the trade destruction effect lowers production costs, facilitating exports to third countries.

[7] This subsection is based on the model proposed in Bown and Crowley (2007).

to country j are represented by m_{ij}, while domestic production for home consumption is denoted by m_{ii}. Markets are segmented, firms compete in quantities (a la Cournot competition), and goods produced domestically and those imported are assumed to be strategic substitutes.

On the supply side, firms face an increasing marginal cost. Specifically, the cost of producing output x_i by the firm in country i is given by

$$C(x_i) = \frac{x_i^2}{2},$$

where $x_i \equiv \sum_j m_{ij}$ denotes the firm's total output supplied across all markets. The marginal cost is therefore x_i, which rises with the total quantity sold.[8] On the demand side, we adopt a linear demand system of the form

$$P_i = a - bQ_i,$$

where $Q_i \equiv \sum_j m_{ji}$ is the total supply of the homogeneous good to market i. Parameter b is assumed to be strictly positive, and the parameter a is sufficiently large so that all firms sell positive quantities in all markets. For now, we assume the absence of tariffs and iceberg trade costs between any pair of countries.

We now solve firm i's optimization problem as follows:

$$\pi_i \equiv \max_{m_{ij}} \left[\sum_j (a - bQ_j) m_{ij} \right] - \frac{x_i^2}{2}.$$

The first order condition (FOC) with respect to m_{ij} is

$$\frac{\partial \pi_i}{\partial m_{ij}} = a - bQ_j - bm_{ij} - x_i = 0.$$

In a symmetric equilibrium, we set $m_{ij} = m$ for all i, j. Then we have

$$m_{ij}^* = \frac{a}{4b+3},$$
$$Q_j^* = 3m^* = \frac{3a}{4b+3}. = \frac{3a^2(2b+3)}{2(4b+3)^2}.$$

[8] For simplicity, we assume that all firms share the same cost structure.

We now consider the scenario in which country A imposes an ad valorem tariff, τ_{BA}, on goods imported from country B. Our focus is on how export quantities change across the various country pairs following the enactment of this unilateral tariff. The only firm-level change is that firm B now faces a tax when selling its product to country A. Consequently, the optimization problem for firm B becomes:

$$\pi_B \equiv \max_{m_{Bj}} \left[\sum_j (a - bQ_j) m_{Bj} \right] - \tau_{BA} m_{BA} - \frac{x_B^2}{2}.$$

The optimization problem for the other two firms are the same as before:

$$\pi_i \equiv \max_{m_{ij}} \left[\sum_j (a - bQ_j) m_{ij} \right] - \frac{x_i^2}{2},$$

where $i \in \{A, C\}$. In Appendix A, we derive the solutions of m_{ij} as follows:

$$\begin{aligned}
m_{BA}^{**} &= \frac{a(b+3) - \dfrac{(6b^2+17b+9)}{2b}\tau_{BA}}{(b+3)(4b+3)}, \\
m_{AA}^{**} = m_{CA}^{**} &= \frac{a(b+3) + \dfrac{(2b^2+5b+3)}{2b}\tau_{BA}}{(b+3)(4b+3)}, \\
m_{CC}^{**} = m_{AB}^{**} = m_{AC}^{**} = m_{CB}^{**} &= \frac{a(b+3) - \dfrac{(5b+3)}{4b}\tau_{BA}}{(b+3)(4b+3)}, \\
m_{BB}^{**} = m_{BC}^{**} &= \frac{a(b+3) + \dfrac{(11b+9)}{4b}\tau_{BA}}{(b+3)(4b+3)}.
\end{aligned}$$

Notice that when $\tau_{BA} = 0$, all m_{ij}^{**}s equal $\frac{a}{4b+3}$ which is the same as m_{ij}^{*} in the equilibrium without any tariff.

We now discuss the four effects mentioned above using the numerical example. First, the trade creation effect is indicated by $m_{CA}^{**} > m_{CA}^{*}$. Second, the trade destruction effect is indicated by $m_{BA}^{**} < m_{BA}^{*}$. Third, the trade depression effect is indicated by $m_{CB}^{**} < m_{CB}^{*}$. Finally, the trade deflection effect is indicated by $m_{BC}^{**} > m_{BC}^{*}$. Therefore,

this simple model substantiates all the effects discussed in Bown and Crowley (2007).

2.2.2 Further Evidence

Other studies on anti-dumping tariffs and the U.S.-China trade war provide further empirical support for the theoretical predictions presented in Bown and Crowley (2007). Using transaction-level trade data from China, both Lu et al. (2013) and Bao et al. (2021) find strong evidence of trade destruction at the aggregate level, though the effect appears weaker at the firm level. In the context of the U.S.-China trade war, both Alfaro and Chor (2023) and Freund et al. (2024) document a significant trade destruction effect on Chinese exports to the U.S. market. Notably, the share of U.S. goods imports originating from China declined from 22% in 2017 (the year before the trade war) to 17% in 2022. In addition, Alfaro and Chor (2023) find evidence of a strong trade creation effect in the U.S. market. Specifically, they show that the import shares of countries such as Vietnam and Mexico increased more in product categories where Chinese import shares declined most. This suggests that the U.S.-China trade war led to a shift in sourcing, with U.S. imports increasingly substituting Chinese goods with those from Vietnam and Mexico.

With regard to third-country effects, Freund et al. (2024) provide evidence consistent with the trade deflection effect. Specifically, "bystander" countries such as Vietnam and Mexico have experienced accelerated import growth from China. The study further concludes that although the U.S. economy appears to be more decoupled from China in terms of direct trade, the supply chains of firms exporting to the U.S. have become more reliant on China since the trade war. This suggests that the overall dependence of the U.S. economy on China has not meaningfully declined. Additionally, Fajgelbaum et al. (2023) identify a novel form of trade creation arising from the U.S.-China trade war. They find that exports of products subject to tariffs by either the U.S. or China increased from third countries to the rest of the world (excluding the U.S. and China). This pattern may be driven by Marshallian externalities in production or by the presence of increasing returns to scale in the global production network.

Regarding the trade deflection effect, recent research suggests that the targeted country may also experience a decline in exports to third countries—a finding that contrasts with the conventional understanding of trade deflection. In fact, an earlier study by Bown and Crowley (2010) provides evidence that trade deflection did not

occur in the case of anti-dumping tariffs (ADTs) imposed on Chinese exports during 1992–2001. On the contrary, they find weak evidence of a chilling effect on China's exports to third markets. Specifically, sanctioned goods exported from China to non-sanctioning countries declined slightly following the imposition of the ADTs.

Bown and Crowley argue that the absence of trade deflection in the case of China may stem from the fact that Chinese exports are highly differentiated, with product specifications tailored to specific destination markets. Alternatively, as relatively new entrants into the global economy, Chinese firms may have lacked the networks during the 1992–2001 period to redirect trade to alternative markets. However, neither explanation accounts for instances where sanctioned Chinese exports to third countries *decrease*. In a related study, Crowley et al. (2018) highlight the importance of the extensive margin in shaping trade flows to third markets: Chinese exporters are less likely to enter new foreign markets and more likely to exit existing ones when their products are subject to anti-dumping investigations in the focal country.

More recently, Albornoz-Crespo et al. (2021) examine firm-level responses to the sudden removal of American preferential tariffs on Argentine imports under the Generalized System of Preferences. They identify a trade depression effect at the firm level along the extensive margin: higher tariffs reduced *global* export participation among the affected Argentine firms. Following the tariff shock, these firms were less likely to export not only to the U.S. but also to other international markets.

Albornoz-Crespo et al. (2021) argue that this pattern reflects interdependence in firm-level exports of the same product across countries, indicating the existence of firm-level product complementarity across markets—that is, the cost of exporting to one market decreases as exports to another market increase (i.e., a synergy effect). That is, when the variable cost of exporting a particular product to one market increases (due to the tariff), firms tend to reduce exports of that product not only to the affected market but also to markets where trade costs remain unchanged. However, this mechanism cannot explain why aggregate trade flows to third markets diverge from firm-level patterns following the imposition of anti-dumping tariffs (ADTs). A recent paper by Chen et al. (2025) proposes a unified framework that can reconcile differential responses of trade flows to market-specific tariffs across third markets at both the aggregate and firm levels.

Finally, a recent paper by Sun et al. (2019) examines the third-country effects of

the U.S.-China trade war through the lens of multinational firms. Specifically, the authors use detailed data on Japanese multinational corporations (MNCs) to study the impact of the 2018 U.S.-China trade war on Japanese MNCs' operations in China. They find that, relative to Japanese affiliates in other Asian countries, affiliates in China—particularly those with high exposure to trade with North America (NA)—generally experienced a decline in sales following the onset of the trade war. Moreover, this decline is largely driven by reduced sales to third countries, including the United States. Interestingly, the study also finds that Japanese affiliates in China with high trade exposure to NA have the highest import share from Japan (17%) compared to those with low or no NA trade, suggesting the presence of global supply chains. As a result, a reduction in exports to the U.S. can also impact Japan's exports to China through these supply chain linkages. In conclusion, the authors emphasize that both trade and multinational production linkages should be considered when analyzing the broader impact of such conflicts.

2.3 Trade Deflection v.s. Trade Depression: Chen et al. (2025)

2.3.1 Empirical Findings

In a recent study, Chen et al. (2025) explores the trade deflection effect by distinguishing between aggregate and firm-level export responses to anti-dumping tariffs. They find that while firm-level exports to third countries slightly increase—a sign of trade deflection—total exports to those countries decline, indicating an aggregate-level trade depression effect. This divergence is explained by a key mechanism: anti-dumping tariffs reduce the number of Chinese firms exporting to third markets, which in turn lowers overall export volumes despite the resilience of surviving firms. In contrast, in the targeted (focal) market, both the number of exporting firms and their individual export volumes fall following the tariffs. Overall, the study highlights the critical role of the extensive margin—changes in the number of exporters—in shaping aggregate export trends to both the focal and third-country markets.

The analysis in Chen et al. (2025) draws on three primary datasets. First, it uses Chinese customs data from 2000 to 2011, which contain detailed transaction-level records for all Chinese exporters. Second, it incorporates the Temporary Trade Barriers Database (TTBD) from Bown et al. (2020), as previously discussed. Third, the customs

data are merged with the Annual Survey of Industrial Firms (ASIF), which includes all Chinese industrial firms with annual sales above 5 million RMB (approximately 0.6 million USD). The ASIF offers rich firm-level information on sales, input costs, and wage expenditures for the period 2000 to 2007.

Chen et al. (2025) employs a difference-in-differences (DID) methodology in the analysis. For each product subject to an anti-dumping (AD) investigation, Chen et al. (2025) first identify both focal and third markets, as well as treated and control products. In Chen et al. (2025), a market is defined as a country–HS6 product pair. To evaluate the impact of AD measures on Chinese exports to the investigating country, Chen et al. (2025) define the focal treated market as the specific HS6 product under investigation in that country. The focal control market consists of other products with the same HS4 code but different HS6 codes, also sold in the same country. For the same treated HS6 products, Chen et al. (2025) define the third treated market as exports of a given product to countries that did not initiate an AD investigation. The corresponding control market consists of products with the same HS4 code but different HS6 codes, exported to those same non-investigating countries. They then compare changes in exports to both the focal and third treated markets with changes in their respective control markets following the initiation of an AD investigation. Specifically, Chen et al. (2025) analyze the aggregate effects of ADTs on three outcomes: the total export value, the total export quantity, and the unit value, defined as the ratio of the former two.

The empirical strategy in Chen et al. (2025) adopts an event-study framework to examine the impact of AD investigations. For both focal and third markets, the specification is given by:

$$y_{iht} = \sum_{k=-K}^{K} \beta_k \text{Treated}_{ih} \mathbb{1}\left\{t - E_{ih} = k\right\} + \delta_{ih} + \delta_{is(h)t} + \varepsilon_{iht}. \tag{1}$$

In this equation, E_{ih} denotes the year of the investigation, while t indicates the calendar year. We set $K = 10$ as the maximum time-to-treatment, grouping together all cases with $k \geq K$ or $k \leq -K$. Here, i refers to the destination country, h to the HS6 product, and $s(h)$ to the HS4 category of h. The δ terms represent fixed effects, and standard errors are clustered at the HS6-product (h) level. Using this dynamic DID specification,

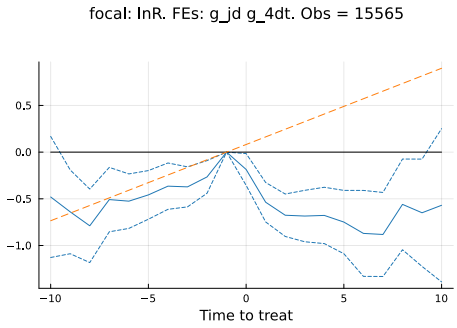
Chen et al. (2025) establish several stylized facts in Figure 1.

The analysis in Chen et al. (2025) shows that AD investigations lead to substantial declines in both the export value and quantity of the targeted products in both focal and third markets, as illustrated in Figure 1, where R and Q represent export value and quantity at the market-year level, respectively. The figure also reveals pronounced pre-existing trends (denoted by the red dashed lines) in the treated products relative to their controls, many of which appear approximately linear. To correct for this, Chen et al. (2025) follow Dobkin et al. (2018) and Khederlarian and Steinbach (2022) by estimating and removing these linear pre-trends before re-estimating the DID models. After this adjustment, Chen et al. (2025) find that, by the fifth year post-investigation, export value and quantity fall by roughly 120% (Figure 1.a) and 125% (Figure 1.c) in the focal market, and by about 20% (Figure 1.b) and 30% (Figure 1.d) in the third market. This finding is noteworthy, as it indicates that focal and third markets may function as complements in the aftermath of AD investigations. By the fifth year after the investigation, the unit price showed little change in the focal market (Figure 1.e) and increased by about 5% in the third market (Figure 1.f).

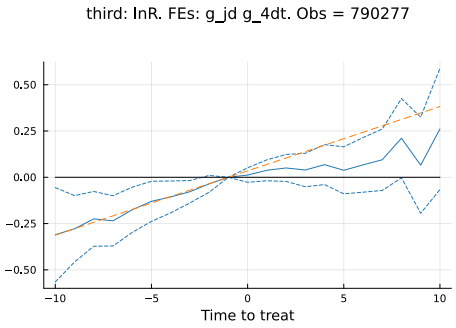
Second, Chen et al. (2025) further show that the decline in total exports in both focal and third markets is largely driven by a reduction in the number of exporting firms, especially in third markets. This finding underscores the central role of the extensive margin in shaping aggregate trade outcomes in an interconnected global economy. Following the initiation of an AD investigation, the number of exporters falls in both focal and third markets. In the focal market, both the extensive and intensive margins contribute to the overall decline in export value, whereas in the third market, the decline is driven solely by the extensive margin.

Finally, Chen et al. (2025) compare aggregate outcomes with firm-level responses. To do this, Chen et al. (2025) aggregate the firm–country–product–year data to the firm–market–product–year level, where each market is defined as either focal or third. Chen et al. (2025) then estimate DID regressions at this level. At the firm level, a decline in export value to the focal market is observed, consistent with the aggregate finding. However, the effect in third markets diverges: firm-level exports increase, despite the overall decline observed at the aggregate level. This contrast indicates that trade deflection can occur at the micro level, even when aggregate trade flows suggest trade depression following the imposition of ADTs.

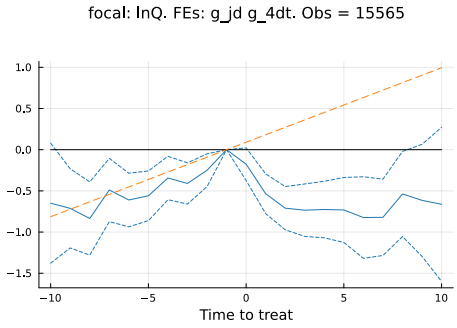
Figure 1: Effect of AD investigations on (the logarithm of) export value (lnR), export quantity (lnQ) and the unit price (lnP) in the focal and the third market



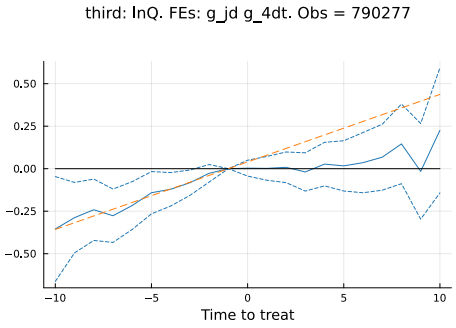
(a)



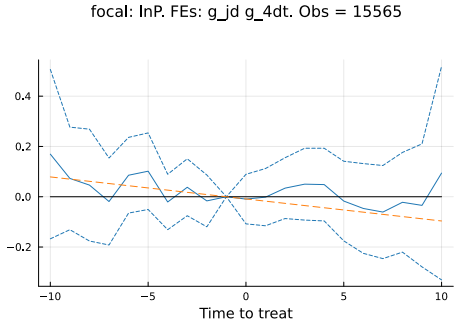
(b)



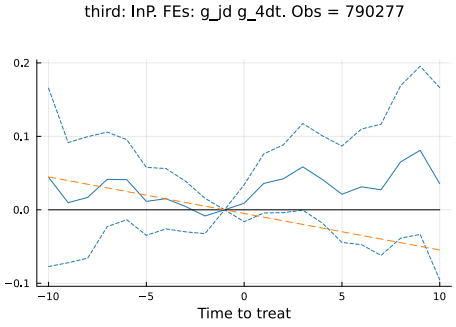
(c)



(d)



(e)



(f)

Notes: FEs denote the types of fixed effects included. Obs refers to the number of observations. All specifications include HS6-product–country fixed effects (g_{jd}) and HS4-product–country–year fixed effects (g_{4dt}). Standard errors are clustered at the HS6-product level. The horizontal axis represents the year difference between the current year and the year of the AD investigation (normalized to zero). The solid blue line plots the log (or %) change in export value, quantity, or unit price of treated products relative to controls. Dashed blue lines show 95% confidence intervals. The dashed red line indicates the extrapolated linear trend.

2.3.2 Insights

Chen et al. (2025) emphasize that the difference between firm-level and aggregate-level responses to tariffs in third markets highlights the importance of using an *equilibrium* framework to analyze the impact of ADTs. Evidence from firm entry patterns provides a microfoundation for the observed coordinated changes in total exports across markets. Based on these findings, Chen et al. (2025) introduce an industry equilibrium model that accounts for firms' simultaneous decisions to enter multiple markets.

The model in Chen et al. (2025) rationalizes the empirical patterns observed, with the entry margin playing a key role. Firms decide whether to export based on expected profits across all markets. Under free entry, these expected profits are determined by a fixed entry cost. When a unilateral tariff lowers profits in the focal market, firms require higher profits in third markets to offset the loss and break even. This explains why firms tend to reduce sales in the focal market while increasing sales in third markets. Nevertheless, because global demand decreases and expected entry profits remain constant (per the free entry condition), the total number of exporters—and exporters in each market—declines. This simultaneous reduction across markets leads to an overall drop in total exports (in all market).

Importantly, the model in Chen et al. (2025) offers new insights into the debate between trade deflection and trade depression. First, the model demonstrates that even when firms face increasing marginal costs, aggregate-level trade-depressing effects still arise, provided that the pass-through rate of the cost shock is sufficiently close to one (i.e., complete pass-through), as in the CES demand system.[9] Next, Chen et al. (2025) incorporate changes in relative wages arising from general equilibrium effects into the model. In this extended framework, where the relative wage of the third country rises, Chen et al. (2025) show that trade deflection *can* occur in the third country following the initiation of ADTs.[10] However, this effect is *not* the conventional trade deflection caused by increasing marginal costs. Instead, it represents a "good news" scenario for the third country, driven by rising wages and improved terms of trade in

[9] In the literature, increasing marginal cost at the firm level is key to generating the trade deflection effect (see Bown and Crowley (2007) and Almunia et al. (2021)).

[10] This scenario is likely when bilateral trade conflicts involve two major trading partners across most traded products (e.g., the U.S.-China trade war). Harsh tariffs on Chinese products reduce aggregate labor demand and wages in China, potentially raising the relative wages of the focal (i.e., the U.S.) and third (e.g., the E.U.) countries.

the third country.

Finally, the importance of *export growth* helps explain why the entry margin is central to understanding the empirical findings in our setting. As is well known, China's exports grew spectacularly during the early to mid-2000s, accompanied by a surge of Chinese firms entering export markets—and consequently experiencing rapid growth. Since ADTs disproportionately target Chinese products with high export growth rates, the entry margin is expected to be significantly affected. We conjecture that if tariffs are levied on Chinese products or industries already suffering from overcapacity and intense domestic competition—and thus beginning to contract—the entry margin is likely to be less relevant. In such cases, the trade deflection effect is more likely to appear.

3 FDI Policies in an Interdependent World

Alviarez et al. (2022) examine a unique foreign direct investment (FDI) policy change in China following its accession to the WTO and study its impact on the operations of Japanese multinational corporations (MNCs) in both China and Japan. They analyze changes in employment, imports, and sales at both the affiliate and parent levels *jointly*, thereby highlighting the interdependence of countries through multinational production linkages.

Their paper presents three particularly noteworthy findings at the parent-firm level. First, as investment and operational restrictions in China were relaxed, employment of manufacturing workers in Japanese MNCs' domestic operations declined—a pattern consistent with the typical job-replacement effect of offshoring. Second, the share (and number) of service-related jobs—such as $R\&D$ and international business roles—increased within the same firms. This suggests that overseas manufacturing activities can complement, rather than substitute for, certain types of service tasks at home. Third, both manufacturing sales and imports (especially from Asia and from affiliates) by Japanese MNC parent firms rose once their manufacturing affiliates in China faced fewer restrictions. Consequently, labor productivity in Japanese MNC parent firms increased after the policy shock.

The contrasting trends in manufacturing employment and sales indicate that Japanese MNCs were building up supply chains in China and relying more heavily on imported in-

termediate goods, thereby substituting domestic manufacturing labor following China's FDI liberalization. In short, China's FDI liberalization triggered a firm-level structural transformation in the domestic operations of Japanese MNCs.

Next, Alviarez et al. (2022) examine the effect of this FDI policy change on Japanese affiliates operating in China. As expected, the policy had a positive impact on both the sales and employment of Japanese MNC affiliates. What is more noteworthy, however, is the channel through which this growth occurred. Alviarez et al. (2022) find no significant effect of China's FDI liberalization on the local sales of Japanese affiliates that faced fewer restrictions after 2002. By contrast, these affiliates' exports to Japan—most of which were directed to their parent firms—increased significantly after the reform. In other words, many Japanese affiliates in China began exporting more to their parent firms or related firms (e.g., members of the same Keiretsu group). This pattern is consistent with our earlier finding that Japanese parent firms expanded imports and manufacturing output in response to China's FDI liberalization.

Three factors help explain why China's FDI liberalization in 2002 fostered the formation of regional value chains rather than boosting sales by Japanese firms within China. First, China's relatively low level of development in the early to mid-2000s meant that domestic demand for the high-quality goods produced by Japanese firms was limited.[11] Second, low labor costs in China during this period incentivized Japanese multinational corporations (MNCs) to relocate labor-intensive stages of production there. Third, the relatively short physical distance between Japan and China—especially compared to that between Japan and the U.S.—kept transportation and logistics costs low, a key factor in the formation of regional value chains.

In summary, these conditions, combined with reduced barriers to inward FDI, encouraged Japanese MNCs to expand intra-firm trade. More broadly, our findings suggest that such dynamics are not unique to China, but may also apply to developing countries located near large developed economies (e.g., Mexico, Vietnam).

[11] According to World Bank data, China's nominal GDP per capita was around 1,300 USD in 2003 (3.3% of the U.S. level). This figure rose to 18.1% in 2021.

4 Political/Health Shocks in a Globalized World

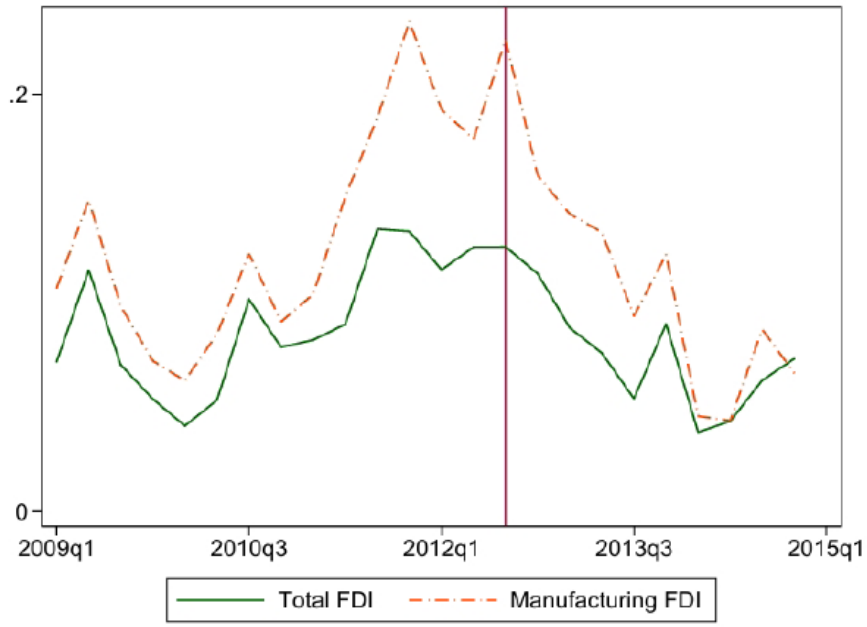
4.1 Territorial Dispute between China and Japan in 2012

In Chen et al. (2022), the authors investigate how an unexpected escalation in a territorial dispute between China and Japan in 2012 affected the operations of Japanese MNCs in China. The two countries have long disputed sovereignty over the uninhabited Senkaku/Diaoyu Islands. In August 2012, the Japanese government announced plans to purchase the islands from a private Japanese owner. This move sparked widespread anger in China, leading to two major waves of anti-Japanese protests: the first in August and a second, more extensive wave in September, which spread across more than 180 Chinese cities.

Using a difference-in-differences (DID) framework, Chen et al. (2022) document two key findings on the economic impact of this political shock. First, the authors find a sharp decline in both sales and investment among Japanese affiliates in China starting in fiscal year 2012. Notably, these declines became even more pronounced in 2013 and 2014, suggesting a sustained negative effect extending more than two years after the onset of the crisis. As illustrated in Figure 2, the share of Japanese FDI in China's total FDI inflows began to decline noticeably following the escalation of the territorial dispute in the third quarter of 2012. Furthermore, Figure 3 shows that the overall FDI inflows into China began to decline roughly after the unexpected escalation of the island dispute (2012-2013).

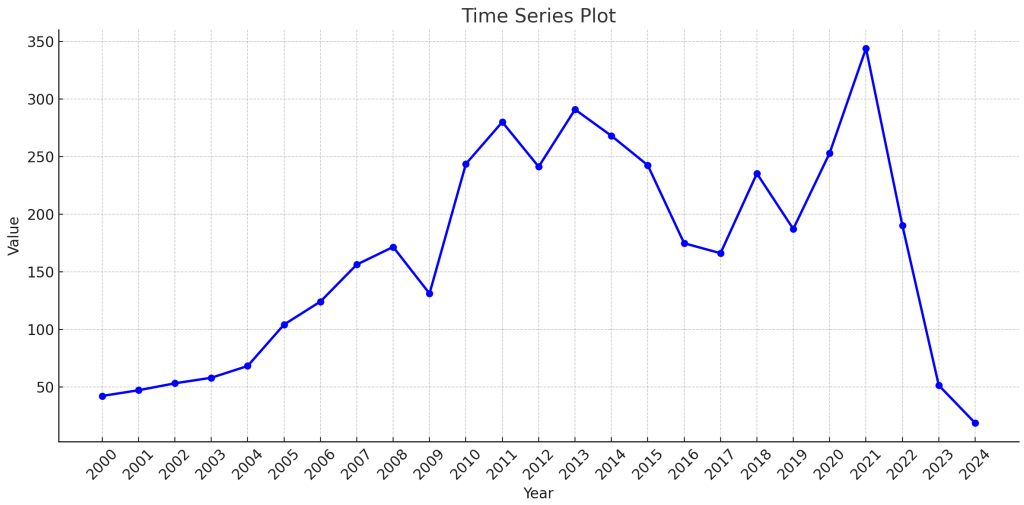
Second, Chen et al. (2022) show that the shock significantly influenced the expectations of Japanese multinational affiliates operating in China. Their analysis relies on the Basic Survey on Overseas Business Activities (BSOBA), administered by the Ministry of Economy, Trade and Industry. The BSOBA provides information on overseas subsidiaries and domestic parent firms of Japanese MNCs, and the unit of analysis is a parent-affiliate-year triplet. Each affiliate reports annual data on employment, total sales, and projected sales (for the following fiscal year). Table 3 presents summary statistics of several key variables, and there are about 18,000 affiliates with non-missing reports of sales per year. Forecast errors are defined as the percentage deviation of

Figure 2: Japan's Share in Total FDI Inflows into China



Note: The vertical line indicates 2012/Q3, the quarter in which the island crisis happened. Japanese quarterly FDI data are obtained from the Bank of Japan. Quarterly total FDI inflows into China are obtained from China Data Online. We partition the quarterly total FDI inflows into manufacturing and non-manufacturing FDI using their ratios in the yearly total FDI inflows.

Figure 3: Overall FDI Inflows into China: 2000-2024



Note: Unit is one billion USD. This figure plots the evolution of the overall FDI inflows into China over time. Data source: World Bank

realized sales from projected sales:

$$FE_{t-1,t} \equiv \frac{Sales_t - E_{t-1}(Sales_t)}{E_{t-1}(Sales_t)} = \frac{Sales_t}{E_{t-1}(Sales_t)} - 1.$$

Table 3: The Basic Survey of Overseas Business Activities (2007-2014)

Variable	Obs.	Mean	Std. Dev.	Min	Max
Affiliate-level:					
Total Sales	145,762	11,539	89,725	0	7,888,623
Sales Forecasts	98,998	9,425	68,816	0	7,407,548
Forecast Errors of Sales	80,310	0.014	0.32	-0.88	3.03
Investment	112,898	422	7,838	0.00	1,435,488
Parent-level:					
Domestic Sales	167,607	902,555	2,435,470	0.00	23,103,043

Notes: Unit of measurement for investment, sales, and equity: one million JPY. Forecast errors are trimmed at the top and bottom one percent. Source: Basic Survey on Overseas Business Activities (BSOBA), Ministry of Economy, Trade and Industry.

Turning to Japanese MNC affiliates in mainland China, Chen et al. (2022) find that, in response to the crisis, these affiliates not only lowered their sales forecasts but also systematically underpredicted actual sales in 2013 and 2014.[12] As shown in Figure 4, both the mean and variance of sales forecast errors rose markedly in 2013 relative to prior years.

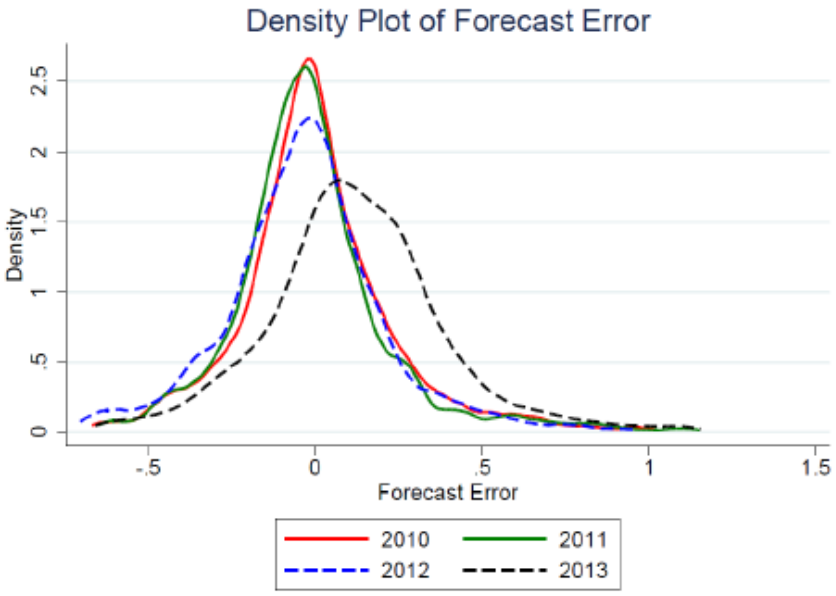
Chen et al. (2022) then quantify the impact of these revised expectations on investment decisions. A back-of-the-envelope calculation suggests that between 30% and 60% of the total decline in investment by Japanese affiliates in China during 2012 and 2013 can be attributed to under-forecasting—highlighting the importance of the expectation-driven channel in shaping MNCs' behavior following geopolitical shocks.

4.2 COVID-19 Outbreak in China and Japanese Firms

In Chen et al. (2021), the authors analyze the impact of COVID-19 on Japanese firms using a firm-level survey that includes the distribution of sales forecasts. The

[12]Between 2010 and 2013, about 5,000 affiliates in China reported realized sales, while roughly 3,500 reported projected sales (for the following fiscal year) in the BSOBA.

Figure 4: Distribution of Sales Forecast Errors



Constructed from our unbalanced panel using the Basic Survey of Overseas Business Activitiesreleased by the Ministry of Economy, Trade and Industry. Forecast error is calculated as $\frac{\text{Realized Sales}-\text{Projected Sales}}{\text{Projected Sales}}$. *Therefore, any positive value of forecast error implies that a firm underestimates its sales and vice versa.*

Research Institute of Economy, Trade and Industry (RIETI) conducted the *Business Plans and Expectations Survey* (BPES) with its first wave in 2017 and the second in 2020. This survey elicits firms' subjective probability distributions over five bins for future sales, allowing us to construct measures of expectations (i.e., the mean of the distribution) and uncertainty (i.e., the standard deviation of the five-bin forecasts).

The second wave of the survey inadvertently began on January 7, 2020, and concluded in mid-February, during which the COVID-19 outbreak was rapidly evolving. On January 23, Wuhan was placed under lockdown, and on January 27, the Japanese government officially designated COVID-19 as an infectious disease. Chen et al. (2021) interpret these developments as information shocks: firms that completed the survey before the week of January 20–26 had limited awareness of the pandemic, whereas those that responded afterward had significantly more information about the situation.[13]

Because the COVID-19 outbreak was unforeseen and had not yet impacted the

[13]Given the sudden and unexpected nature of the COVID-19 escalation, it is unlikely that Japanese firms timed their survey responses based on pandemic developments. Similarly, it is improbable that they adjusted their business relationships with China in anticipation of the outbreak.

Japanese economy by the time our survey concluded in mid-February 2020, Chen et al. (2021) are able to examine its effect on firms' expectations. Specifically, the authors categorize the Japanese firms that participated in both the 2017 and 2020 surveys into two groups: those that responded before January 23, 2020, and those that responded afterward. Additionally, Chen et al. (2021) distinguish between firms with business ties to China—through trade (imports/exports) or affiliated operations—and those without such connections.

Chen et al. (2021) conduct a difference-in-difference-in-differences (DDD) regression analysis to assess the impact of the COVID-19 outbreak. Our results show that firm-level uncertainty rose significantly among treated firms—those with business ties to China that responded after the escalation of the pandemic—between 2017 and 2020, compared to two control groups: (1) firms without ties to China that responded after the outbreak, and (2) firms with ties to China that responded before the outbreak. In short, Chen et al. (2021) find that the initial outbreak of COVID-19 primarily increased uncertainty among Japanese firms with business connections to China. This suggests that a country-specific health shock can produce spillover effects through trade and FDI linkages by altering firms' expectations.[14]

5 Conclusions

In this article, we examine the spillover effects of trade and FDI policy changes on countries that are not directly involved—i.e., third markets. Specifically, we investigate this question using two examples: anti-dumping tariffs (ADTs) levied on Chinese exports, and China's relaxation of restrictions on inward FDI. We find that country-specific tariffs, such as ADTs, do not necessarily result in increased exports being redirected to non-sanctioning countries—a phenomenon known as trade deflection. On the contrary, third markets may experience similar forms of "protection," in the sense that Chinese exports to these markets also decline. Interdependent firm entry decisions in global markets appear to play a decisive role in shaping this outcome.

We also analyze how unilateral FDI liberalization in China prompted the structural

[14]Because real-time data on production and investment were not available for the surveyed firms, Chen et al. (2021) could not assess how increased uncertainty affected firm-level sales or investment in this study.

changes within Japanese multinational firms, contributing to Japan's broader process of the structural transformation. In particular, the deepening of regional supply chains following China's FDI liberalization appears to be responsible for the cross-border co-movement of manufacturing and service employment within multinational firms. Finally, we explore how geopolitical conflicts and health shocks in one country can affect firms in another through their business ties with the impacted economy.

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A Appendix

We provide detailed derivations for the results derived in Section 2.2.1. Based on all the nine FOCs, we have nine equations and nine unknowns:

$$\begin{aligned}
a - b(m_{AA} + m_{BA} + m_{CA}) - bm_{AA} &= m_{AA} + m_{AB} + m_{AC}, \\
a - b(m_{AB} + m_{BB} + m_{CB}) - bm_{AB} &= m_{AA} + m_{AB} + m_{AC}, \\
a - b(m_{AC} + m_{BC} + m_{CC}) - bm_{AC} &= m_{AA} + m_{AB} + m_{AC}, \\
a - b(m_{AA} + m_{BA} + m_{CA}) - bm_{BA} - \tau_{BA} &= m_{BA} + m_{BB} + m_{BC}, \\
a - b(m_{AB} + m_{BB} + m_{CB}) - bm_{BB} &= m_{BA} + m_{BB} + m_{BC}, \\
a - b(m_{AC} + m_{BC} + m_{CC}) - bm_{BC} &= m_{BA} + m_{BB} + m_{BC}, \\
a - b(m_{AA} + m_{BA} + m_{CA}) - bm_{CA} &= m_{CA} + m_{CB} + m_{CC}, \\
a - b(m_{AB} + m_{BB} + m_{CB}) - bm_{CB} &= m_{CA} + m_{CB} + m_{CC}, \\
a - b(m_{AC} + m_{BC} + m_{CC}) - bm_{CC} &= m_{CA} + m_{CB} + m_{CC},
\end{aligned}$$

From the nine equations above, combining the first three with the last three yields the equalities $m_{AA} = m_{CA}$, $m_{AB} = m_{CB}$ and $m_{AC} = m_{CC}$. In other words, firm A and firm C sell the same output in all three markets. Consequently, we are left with six equations and six unknowns.

$$\begin{aligned}
a - b(2m_{AA} + m_{BA}) - bm_{AA} &= m_{AA} + m_{AB} + m_{AC}, \\
a - b(2m_{AB} + m_{BB}) - bm_{AB} &= m_{AA} + m_{AB} + m_{AC}, \\
a - b(2m_{AC} + m_{BC}) - bm_{AC} &= m_{AA} + m_{AB} + m_{AC}, \\
a - b(2m_{AA} + m_{BA}) - bm_{BA} - \tau_{BA} &= m_{BA} + m_{BB} + m_{BC}, \\
a - b(2m_{AB} + m_{BB}) - bm_{BB} &= m_{BA} + m_{BB} + m_{BC}, \\
a - b(2m_{AC} + m_{BC}) - bm_{BC} &= m_{BA} + m_{BB} + m_{BC},
\end{aligned}$$

From the six equations above, it is also evident that $m_{AB} = m_{AC}$ and $m_{BB} = m_{BC}$. Moreover, to ensure that all quantities remain positive, it follows that

$$a > \tau_{BA}.$$

As a result, we only need to solve for the following four equations:

$$\begin{aligned} a - b(2m_{AA} + m_{BA}) - bm_{AA} &= m_{AA} + 2m_{AB}, \\ a - b(2m_{AB} + m_{BB}) - bm_{AB} &= m_{AA} + 2m_{AB}, \\ a - b(2m_{AA} + m_{BA}) - bm_{BA} - \tau_{BA} &= m_{BA} + 2m_{BB} \\ a - b(2m_{AB} + m_{BB}) - bm_{BB} &= m_{BA} + 2m_{BB}, \end{aligned}$$

The first two equations above imply that

$$m_{BB} = m_{BA} + 3(m_{AA} - m_{AB}).$$

The last two equations above imply that

$$m_{BB} = m_{BA} + (m_{AA} - m_{AB}) + \frac{\tau_{BA}}{2b}.$$

Based on these two equations, we derive

$$m_{AA} = m_{AB} + \frac{\tau_{BA}}{4b},$$

and

$$m_{BB} = m_{BA} + \frac{3\tau_{BA}}{4b}.$$

Substituting the expressions of m_{AA} and m_{BB} back to the first and third equations of the above four-equation system leads to

$$a - bm_{BA} - 3bm_{AB} - \frac{3\tau_{BA}}{4} = 3m_{AB} + \frac{\tau_{BA}}{4b},$$

and

$$a - 2bm_{AB} - 2bm_{BA} - \frac{3\tau_{BA}}{2} = 3m_{BA} + \frac{3\tau_{BA}}{2b}.$$

Finally, we obtain the following solutions in the equilibrium with the unilateral tariff:

$$m_{AA}^{**} = m_{CA}^{**} = \frac{a(b+3) - \dfrac{(5b+3)}{4b}\tau_{BA}}{(b+3)(4b+3)} + \frac{\tau_{BA}}{4b},$$

$$m_{AB}^{**} = m_{AC}^{**} = m_{CB}^{**} = m_{CC}^{**} = \frac{a(b+3) - \dfrac{(5b+3)}{4b}\tau_{BA}}{(b+3)(4b+3)},$$

$$m_{BA}^{**} = \frac{a(b+3) - \dfrac{(6b^2+17b+9)}{2b}\tau_{BA}}{(b+3)(4b+3)},$$

$$m_{BB}^{**} = m_{BC}^{**} = \frac{a(b+3) - \dfrac{(6b^2+17b+9)}{2b}\tau_{BA}}{(b+3)(4b+3)} + \frac{3\tau_{BA}}{4b}.$$

Notice that when $\tau_{BA} = 0$, all m_{ij}^{**}s equal $\frac{a}{4b+3}$ which is the same as m_{ij}^{*} in the equilibrium without any tariff.