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KIYOTA, Kozo
RIETI

NAKAJIMA, Kentaro
RIETI

TAKIZAWA, Miho
Gakushuin University

The Research Institute of Economy, Trade and Industry
https://www.rieti.go.jp/en/

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Effects of Outward Manufacturing FDI on Local Employment: Evidence from Matched Data on Foreign Affiliates, Domestic Parents, and Domestic Plants in Japan*

Kozo Kiyota†　Kentaro Nakajima‡　Miho Takizawa§

Abstract

This study examines the effects of outward manufacturing foreign direct investment (FDI) on the local labor market. One of its contributions is investigating possible spillover effects from FDI firms to non-FDI firms. To do so, we develop unique matched data on foreign affiliates, domestic parents, and domestic plants in Japan from 2001 to 2016. Our results suggest that outward manufacturing FDI positively affects local manufacturing employment in Japan. Specifically, we find that a 1 percent increase in foreign manufacturing employment leads to a 0.9 percent increase in local employment. However, this positive employment effect is observed in non-FDI firms, not FDI firms. Outward FDI by FDI firms positively affects the output, exports, and employment of non-FDI firms in the same local market.

Keywords: Foreign direct investment, Local labor market, Manufacturing, Spillovers, Import competition
JEL classification: F16, F23, F66, R23, J23, L60

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† Keio University and RIETI. E-mail: kiyota@keio.jp

‡ Hitotsubashi University and RIETI. E-mail: nakajima.kentaro@gmail.com

§ Corresponding Author: Gakushuin University. E-mail: miho.takizawa@gakushuin.ac.jp

1 Introduction

Outward manufacturing foreign direct investment (FDI), or offshoring, is considered one of the greatest threats to production workers in many developed countries because it involves moving manufacturing operations and business functions abroad.[1] Despite the importance of this issue, "there is little agreement among academic economists regarding the sign of offshoring's effects on domestic labor market outcomes, let alone the magnitude" (Kovak, Oldenski, and Sly, 2021, p.381).

Kovak et al.'s (2021) claim is more applicable to the impact on domestic local labor markets because only a few studies have investigated this issue. The local impacts of the globalization have been discussed extensively in the literature on the so-called 'China shock.' Following the seminal study by Autor, Dorn, and Hanson (2013), a number of studies have examined the impact of the rapid increases in imports from China on local labor markets.[2] These studies indicate that Chinese import competition has significant negative effects on various labor market outcomes, though the effects differ between local markets. While these studies presented important findings, to our knowledge, none of the previous studies have taken the effects of outward FDI into account.

In contrast, several studies have investigated the effects of outward manufacturing FDI on manufacturing employment in the home country.[3] However, to our knowledge, only a few studies have examined the local labor market effects of FDI.[4] Federico and Minerva (2008) examined the effects of Italy's outward FDI on local employment growth from 1996 to 2001 across 12 manufac-

[1] Our definition of outward manufacturing FDI aligns with Feenstra's (2010) narrow definition of offshoring: "When a firm sends a portion of its production process abroad but keeps it in-house" (p. 6). In our study, we use the terms FDI and (narrow) offshoring interchangeably to describe a firm's decision to locate part of its production process abroad.

[2] For the literature review of China shock studies, see Autor, Dorn, Hanson, Jones, and Setzler (2025). Sasahara (2022) also provides an excellent literature review.

[3] Previous studies on Japan have found either positive or insignificant effects. See, for example, Yamashita and Fukao (2010); Hayakawa, Matsuura, Motohashi, and Obashi (2013); Kambayashi and Kiyota (2015); and Kiyota and Maruyama (2017).

[4] For *inward* FDI, some studies such as Axarloglou and Pournarakis (2007) and Figlio and Blonigen (2000) have investigated local market effects.

turing industries and 103 administrative provinces.[5] They found that FDI led to faster local employment growth than the national industry average. Jofre-Monseny, Sánchez-Vidal, and Viladecans-Marsal (2017) investigated the effects of big plant closures that relocated abroad on local employment in Spain between 2001 and 2005. They found that the impacts of big plant closures on local employment were limited due to employment expansion in local incumbent firms. Kovak et al. (2021) studied the effects of offshoring exposure by U.S. multinationals on local employment from 1987 to 2007. They defined the local labor market as a metropolitan area and measured local offshoring using the weighted average of industry-level foreign affiliate employment across all industries. They found that a metro area whose industries experienced an average 10 percent increase in affiliate employment exhibited a 0.17 percent increase in metro-area employment. Im, Shen, and Yoo (2024) analyzed the effects of offshoring on wages in U.S. commuting zones from 2006 to 2018. They found that commuting zone-level offshoring shocks had significant negative effects on wages. While these studies made significant contributions to the literature, they did not account for the China shock.

Our study contributes to the two aforementioned strands of literature on local labor market: China shock and FDI/offshoring. Although these studies have presented important findings, none have considered the other strand of literature. This study attempts to fill this gap. We investigate the impact of outward manufacturing FDI exposure on the local labor market, while controlling for the effect of the China shock.[6] A key challenge of this research is measuring manufacturing employment and the FDI exposure of manufacturing activities at the local level. To address this issue, we focus on Japan for three reasons. First, detailed confidential foreign affiliate-, parent firm-, and domestic plant-

[5] However, their paper does not explain how they measured local-level FDI.

[6] Similar to Kovak et al. (2021), we describe the potential threats that FDI exposure poses to the local labor market, which differs from actual FDI. As we will discuss in Section 2, the FDI exposure that each local market faces is measured, using predicted values. The same argument can be applied to import exposure. Section 2 explains this point in detail.

level data allow us to measure the manufacturing FDI more precisely and investigate possible mechanisms more thoroughly. Second, Japan is one of the largest investor countries (Krugman, Obstfeld, and Melitz, 2023). Third, like many other high-income countries, Japan has experienced a decline in manufacturing activity (Kiyota, 2023).

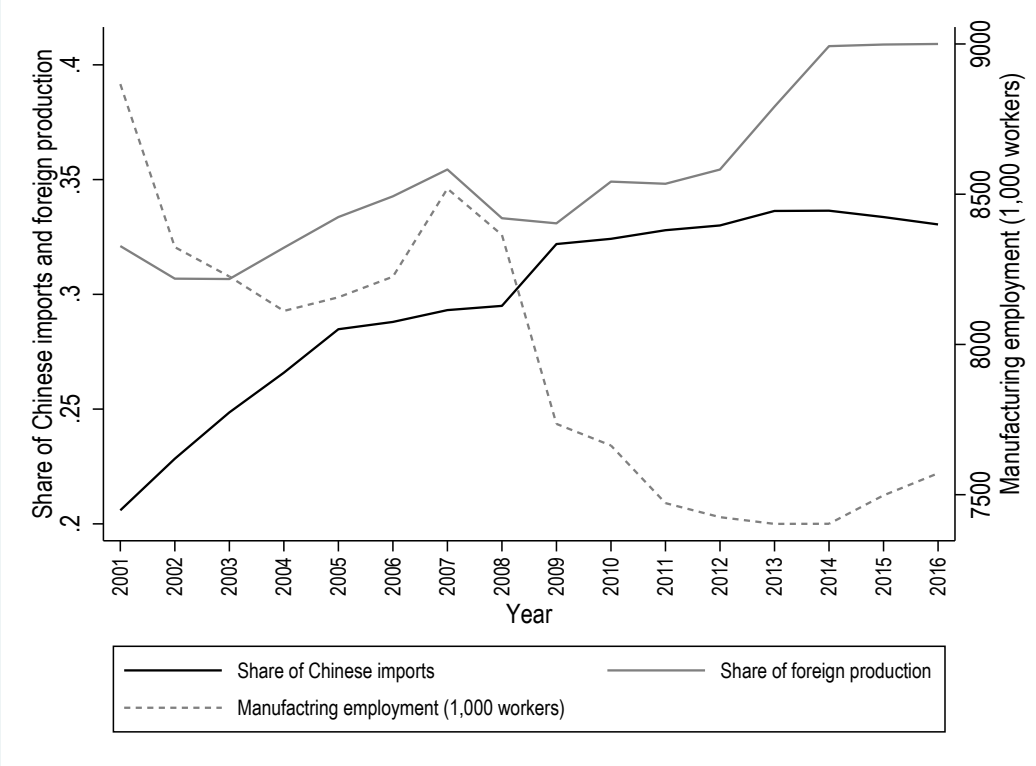
Figure 1 presents the changes in manufacturing employment and the share of foreign production in total Japanese production from 2001 to 2016.[7] The figure shows that, while manufacturing employment declined from 8.9 million to 7.6 million workers during this period,[8] the share of Chinese imports to total manufacturing imports increased from 20.6 percent to 33.0 percent. At the same time, the share of foreign production increased from 32.1 percent to 40.9 percent. Figure 1 suggests that manufacturing FDI, as well as import competition, might lead to a decline in manufacturing employment. In other words, controlling these two effects simultaneously is essential when analyzing their impact on local labor market outcomes.

Another important contribution of this paper is that we investigate possible spillover effects from firms that engage in FDI (hereafter referred to as FDI firms) to those that do not engage in FDI (hereafter referred to as non-FDI firms). As mentioned above, previous studies did not find significant negative effects of outward FDI on local employment. However, the mechanisms behind these positive effects are not necessarily clear. To clarify possible mechanisms, a more granular viewpoint is necessary. To this end, we develop matched data on foreign affiliates, domestic parents, and domestic plants. As we will discuss in Section 2.2, plant-level data, rather than firm-level data, are needed to examine local labor market effects because many firms have more than one plant in dif-

[7] The share of foreign production is defined as the foreign sales divided by the total (domestic and foreign) sales of manufacturing firms in Japan. This definition follows that of the Ministry of Economy, Trade and Industry's (METI) *Basic Survey on Overseas Business Activities*.

[8] Increases in manufacturing in 2007–2008 reflect the labor hoarding behavior of Japanese firms during the global financial crisis. For more details, see Hijzen, Kambayashi, Teruyama, and Genda (2015).

Figure 1: Changes in Manufacturing Employment, Share of Foreign Production, and Share of Chinese Imports, 2001–2016



Notes: The share of foreign production is defined as the foreign sales to total (domestic and foreign) sales of manufacturing firms in Japan.
Sources: Manufacturing employment is obtained from *the Census of Manufacture* (METI) and *the Economic Census for Business Activity* (MIC and METI); Share of foreign production is from *the Basic Survey on Overseas Business Activities* (METI); and the share of Chinese imports is from the JIP 2018 database (RIETI).

ferent locations.[9] In other words, some firms have multiple plants in different locations. In that case, we need plant-level data because the location and employment of a plant are not identified by the location of the headquarters. Additionally, we need firm-level data to identify firms that engage in FDI because firms (or the headquarters), not plants, make decisions to engage in FDI activities. Furthermore, FDI by a manufacturing firm could include not only manufacturing activities but also non-manufacturing activities (sales, R&D, etc.). To identify the manufacturing activity of foreign affiliates, one needs foreign affiliate-level data. Matched data enables us to precisely measure local-level employment and manufacturing FDI.

Our sample period is from 2001 to 2016. During this time, the Japanese economy experienced a decline in manufacturing employment and an increase in outward FDI. As we will explain in Section 2, we define the local labor market as the urban employment area (UEA). UEAs are a more accurate definition than jurisdictional areas, such as cities, because labor markets sometimes extend beyond jurisdictional boundaries, particularly in urban areas with good public transportation.

Our results indicate that exposure to outward FDI positively affects local manufacturing employment. This finding is robust even when controlling for the effects of imports (and exports) from China or when excluding the Tokyo Metropolitan Area. Quantitatively, our baseline results show that a 1 percent increase in foreign manufacturing employment leads to a 0.9 percent increase in local employment. Additionally, we find that employment increases are observed among non-FDI firms, rather than FDI firms. Outward FDI by FDI firms increases the output and exports of non-FDI firms, which leads to increased labor demand by non-FDI firms. Several studies such as Kovak et al. (2021) have found the positive effects of FDI/offshoring on local employment. Kovak et al. (2021) also pointed out the possibility of cross-industry spillovers. Our study

[9] In 2016, for example, for more than one-third of the plants in our sample were located in areas different from that of the headquarters.

builds on their work by presenting the potential spillover effects.

The remainder of this paper is organized as follows. Section 2 presents the analytical framework. Section 3 presents our estimation results. Section 4 presents the results of the robustness check. Section 5 discusses our main results in more detail, focusing on the differences between FDI firms and non-FDI firms in the same local labor market. Section 6 summarizes our findings and their implications.

2 Methodology and Data

2.1 Methodology

Our approach builds on the analysis of Dorn, Kircher, and Salzmann (2023) who used leave-(one-)out Bartik instruments to address endogeneity.[10] We apply this framework to examine the impact of FDI and Chinese import exposures.

Let $L_{j,t}$ be manufacturing employment in UEA j in year t. Let $\text{FDI}_{j,t}$ be FDI from UEA j in Japan to foreign countries in year t. Following Autor, Dorn, and Hanson (2013), we take the long difference from the initial year.[11] The regression equation is as follows:

$$\Delta L_{j,t} = \alpha_t + \beta \Delta \text{FDI}_{j,t} + \gamma \Delta \text{Imports}_{j,t} + \delta X_{j,0} + \varepsilon_{j,t}, \tag{1}$$

where $\Delta L_{j,t}$ and $\Delta \text{FDI}_{j,t}$ are the long difference in $L_{j,t}$ and $\text{FDI}_{j,t}$ from the initial year (i.e., $t = 0$) to year t, respectively; $X_{j,0}$ is a set of control variables; and $\varepsilon_{j,t}$ is the error term.

As Figure 1 shows, the share of foreign production in total production by Japanese firms increased from 32.1 percent to 40.9 percent between 2001 and

[10] For more information on these instruments, see Baum-Snow and Ferreira (2015, Section 1.5.2) and Borusyak, Hull, and Jaravel (2025, Appendix A.12).

[11] As we will explain in Section 2.2, our sample period is from 2001 to 2016. We focus on mid-/long-run changes rather than short-run changes because adjustments in labor markets take some time.

2016. During the same period, the share of Chinese imports in total manufacturing imports increased from 20.6 percent to 33.0 percent. To estimate the impact of outward manufacturing FDI on local labor markets, it is essential to control for the effect of imports from China. Therefore, we include long difference in imports from China to UEA j, $\Delta\text{Imports}_{j,t}$, in the regression equation. This specification enables us to examine the effects of FDI exposure while controlling for the effects of Chinese import competition.

There are two remarks regarding this equation. First, manufacturing employment $L_{j,t}$ includes both the employment at both FDI and non-FDI firms. Therefore, we examine the impact of FDI on the local labor market. We expect a significantly negative (positive) β if FDI negatively (positively) affects UEA-level employment. Second, we focus on the 'net effect' of Chinese imports. While the imports of final goods may negatively affect employment, imports of intermediate goods could have a positive effect, as Taniguchi (2018) and Kiyota, Taniguchi, and Maruyama (2021) have pointed out. However, distinguishing between the two requires non-competitive type input–output table data from 2001 to 2016 that are not available. Thus, in this study, we use total imports, acknowledging the difference between the imports of final goods and those of intermediate inputs.

For the dependent variable, we normalize the long difference by the initial employment:

$$\Delta L_{j,t} = \frac{L_{j,t} - L_{j,0}}{L_{j,0}}. \tag{2}$$

For the independent variables, one issue is that neither FDI nor import exposure is available at the UEA level in Japan. Following Autor, Dorn, and Hanson (2013), we calculate the UEA-level FDI exposure as follows:

$$\Delta\text{FDI}_{j,t} = \sum_i \frac{L_{ij,0}}{L_{i,0}} \frac{\Delta\text{FDI}_{i,t}}{L_{j,0}} = \sum_i \frac{L_{ij,0}}{L_{j,0}} \frac{\Delta\text{FDI}_{i,t}}{L_{i,0}} = \sum_i s_{ij,0} \frac{\Delta\text{FDI}_{i,t}}{L_{i,0}}, \tag{3}$$

where i indicates the industry of the foreign affiliate, $s_{ij,0} (= L_{ij,0}/L_{j,0})$ is the

share of industry i's employment in UEA j in total employment in UEA j in the initial year (i.e., $t = 0$), and $\Delta\text{FDI}_{i,t}$ is the change in industry i's FDI from the initial year (i.e., $t = 0$) to year t, which is constructed by aggregating affiliate-level FDI:

$$\text{FDI}_{i,t} = \sum_{a \in i} \text{FDI}_{a,t}, \tag{4}$$

where a indicates foreign affiliate.

In our main analysis, we measure FDI based on the employment of manufacturing foreign affiliates. Note that even if a parent firm is in the manufacturing sector, its foreign affiliates' main activity may not be manufacturing. For instance, if a manufacturing firm establishes a sales branch in another country, the foreign affiliate's primary activity is classified as a service rather than manufacturing. Therefore, aggregating all foreign affiliates overestimates manufacturing activity. Indeed, during our sample period, over 10 percent of the labor force in foreign affiliates worked in non-manufacturing industries, even though their parent firms are in the manufacturing sector.[12] Accordingly, we measure FDI industry by the industry of foreign affiliates rather than that of domestic parent firms. A detailed description of the data is provided in Section 2.2.

Similarly, the UEA-level import exposure is constructed as follows:

$$\Delta\text{Imports}_{j,t} = \sum_{i} s_{ij,0} \frac{\Delta\text{Imports}_{i,t}}{L_{i,0}}, \tag{5}$$

where i indicates the industry, $s_{ij,0} (= L_{ij,0}/L_{j,0})$ is the share of industry i's employment in UEA j in total employment in UEA j in the initial year (i.e., $t = 0$), and $\Delta\text{Imports}_{i,t}$ is the change in imports from China in industry i from the initial year (i.e., $t = 0$) to year t.

For the control variables, $X_{j,0}$, we use the log of the manufacturing employment in the initial year, $\ln(L_{j,0})$; the ratio of manufacturing employment to total

[12] For more details, see Table A1.

working population in the initial year, $s^L_{j,0}$; and the ratio of Chinese imports to total imports in the initial year, $s^{IM}_{j,0}$.

A concern when estimating equation (1) is possible endogeneity. Generally, local labor market conditions can influence a firm's FDI decisions. For instance, if a manufacturing firm cannot secure local employment due to tight labor market conditions, it may decide to relocate abroad to continue its production activity. Similarly, productive firms may cluster in a local market and increase their productivity through spillovers, leading them to engage in FDI.[13] It is also possible that some unobservable local factors affect local labor market conditions and firms' decisions to engage in FDI. A similar argument can be applied to imports.

To address this issue, we employ an instrumental variable (IV) method. We use a leave-(one-)out Bartik instrument (Dorn, Kircher, and Salzmann, 2023) that reflects overall FDI from Japan or imports from China, while excluding the UEA currently concerned (i.e., UEA j). This is because FDI and imports of UEA j could directly affect its employment, which would violate the exclusion restriction.

In the first stage, we estimate the following equations:[14]

$$\Delta\text{FDI}_{j,t} = \zeta_t + \phi_1 \Delta\text{FDI}^{\text{JP}}_{j,t} + \phi_2 \Delta\text{Imports}^{\text{JP}}_{j,t} + \theta X_{j,0} + u_{j,t} \tag{6}$$

and

$$\Delta\text{Imports}_{j,t} = \xi_t + \psi_1 \Delta\text{FDI}^{\text{JP}}_{j,t} + \psi_2 \Delta\text{Imports}^{\text{JP}}_{j,t} + \kappa X_{j,0} + v_{j,t}, \tag{7}$$

where $\Delta\text{FDI}^{\text{JP}}_{j,t}$ and $\Delta\text{Imports}^{\text{JP}}_{j,t}$ are the leave-(one-)out Bartik instruments and

[13] For example, Helpman, Melitz, and Yeaple (2004) and Kimura and Kiyota (2006) found that large and productive firms are more likely to engage in FDI in the United States and Japan, respectively.

[14] See Woodridge (2021, Chapter 15-3d) for the estimation of multiple endogenous explanatory variables.

are respectively defined as follows:

$$\Delta \text{FDI}^{\text{JP}}_{j,t} = \sum_i s_{ij,0} \frac{\Delta \text{FDI}_{i,-j,t}}{L_{i,0}} \tag{8}$$

and

$$\Delta \text{Imports}^{\text{JP}}_{j,t} = \sum_i s_{ij,0} \frac{\Delta \text{Imports}_{i,-j,t}}{L_{i,0}} \tag{9}$$

where $s_{ij,0} (= L_{ij,0}/L_{j,0})$ is the share of industry i's employment in UEA j in total employment in UEA j in the initial year (i.e., $t = 0$); $\Delta \text{FDI}_{i,-j,t}$ is the change in industry i's FDI from the initial year (i.e., $t = 0$) to year t, excluding FDI from UEA j; and $\Delta \text{Imports}_{i,-j,t}$ is the change in industry i's imports from China between the initial year (i.e., $t = 0$) and year t, excluding the imports of UEA j; $u_{j,t}$ and $v_{j,t}$ are error terms.

Because we use not actual but estimated $\Delta \text{FDI}_{j,t}$ and $\Delta \text{Imports}_{j,t}$ in estimating equation (1), they are referred to as FDI and import exposures, respectively, rather than FDI and imports. The next section explains the data used to estimate these equations.

2.2 Data

2.2.1 Definition of the local labor market

In this study, we define the local labor market as a UEA. As mentioned above, UEA in Japan corresponds to the metropolitan statistical area (MSA) in the United States. We use this definition, following Kovak et al. (2021) that utilized MSA. UEAs comprise a set of municipalities and represent an intermediate spatial scale between prefectures and municipalities in Japan. Japan has 47 prefectures and approximately 1,700 municipalities. While some studies, such as Taniguchi (2018), have defined the local labor market at the prefecture level, it is common to commute from one prefecture to another within an urban area in Japan. For instance, many people working in central Tokyo commute from

the neighboring prefectures of Chiba, Kanagawa, and Saitama. Conversely, in many rural areas, the prefecture is too large to represent the local market. Therefore, prefectures do not necessarily represent the local markets as geographical units. Municipalities are too small to cover the local labor market, as many workers can easily commute from one municipality to another in both rural and urban areas.[15]

This study examines the 224 UEAs proposed by Kanemoto and Tokuoka (2002). UEAs are regional units comparable to MSAs in the United States. Each UEA consists of a core city and surrounding suburban municipalities in which more than 10 percent of the workers commute to the core city. UEAs can be classified by the size of the core city and are divided into two categories. The first category is the metropolitan employment areas, which have central cities with densely inhabited districts (DIDs) with populations exceeding 50,000. The second category is micropolitan employment areas, which have a DID population between 10,000 and 50,000. Data were obtained from the UEA website, which is maintained by the Center for Spatial Information Science at the University of Tokyo.[16] Of the 224 UEAs, 213 had manufacturing employment over the study period.[17]

2.2.2 Data sources

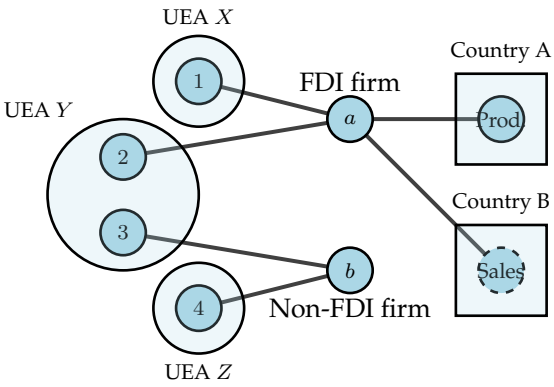
To measure employment and manufacturing FDI at the local level, we need information on the parent firm, its domestic plants, and its foreign affiliates. Figure 2 presents the conceptual framework of our dataset. This figure shows that

[15] Another advantage of using the UEA is its high reliability as it is widely used in the literature. A recent study by Adachi, Fukai, Kawaguchi, and Saito (2021) proposed the measure of commuting zones in Japan. Some studies such as Kainuma and Saito (2022) have started to utilize the commuting zone data, although the measure of commuting zones has not yet been established.

[16] https://www.csis.u-tokyo.ac.jp/UEA/index_e.htm

[17] Some may be concerned that UEAs do not cover all rural areas. For the period between 2001 and 2016, our dataset covered 81.7 percent of the manufacturing employment in the *the Census of Manufacture*. Therefore, we can conclude that UEAs cover most manufacturing employment in Japan. Nonetheless, we conducted a prefecture-level (instead of UEA-level) analysis that covers all the manufacturing employment. For more details, see Appendix A.3.

Figure 2: Conceptual Framework of Our Dataset



Notes: UEA stands for Urban Employment Area, which is the local labor market in this study. 1, 2, 3, and 4 indicate plants, while a and b indicate firms. Prod. (Production) and Sales indicate production and sales affiliates located in country A and country B, respectively. The dashed circle indicates that it is not included in our analysis. For more details, see Section 2.2.
Sources: Authors' representation.

firm a owns domestic plants 1 and 2 in UEA X and UEA Y, respectively. Additionally, firm a has foreign affiliates in countries A and B. However, the foreign affiliate in country A specializes in production activities, while the affiliate in country B specializes in sales activities. Since our focus is on the manufacturing activity at the firm and plant levels, we focus on the production affiliates in country A. Firm a is classified as an FDI firm because it does not have any foreign production affiliates. In contrast, firm b owns domestic plants 3 and 4 in UEA Y and UEA Z, respectively. Since firm b does not have any foreign production affiliates, it is classified as a non-FDI firm.

There are three remarks. First, in order to examine the effects on the local labor market, we need plant-level data rather than firm-level data. Generally, the location of the firm is defined by the location of its headquarters. For example, suppose the firm has its headquarters in Tokyo but has plants in Tokyo and another metropolitan area. Using firm-level data would record employment in the other metropolitan area as Tokyo's employment because the firm's location is defined by its headquarters' location.

Second, in addition, we need firm-level data to identify which firms engage

in FDI because the decision to engage in FDI is made at the firm level, not at the plant level. This, in turn, means that we need to match plant-level data with firm-level data. Finally, we need foreign affiliate-level data to identify the activities of foreign affiliates. Note that the foreign affiliates of manufacturing firms engage in non-manufacturing activities (e.g., sales, financing) as well as manufacturing activities (i.e., production). To estimate the relationship between domestic and foreign production activities, we must exclude non-production activities from foreign activities. Thus, this study focuses only on the manufacturing employment of foreign affiliates owned by Japanese manufacturing firms, which we refer to as FDI.[18] In other words, this study excludes the effects of foreign affiliates' non-manufacturing activities from the analysis. In short, matching domestic firms with their domestic plants and foreign affiliates is essential to analyzing the local labor market effect of FDI.

For the parent firm-level information, we utilize the confidential firm-level database of *Kigyou Katsudou Kihon Chousa Houkokusyo* (*the Basic Survey of Japanese Business Structure and Activities: BSJBSA*), which is prepared annually by the Research and Statistics Department, METI (2001–2016). The survey is mandatory for manufacturing, wholesale trade, and retail trade firms with more than 50 employees and capital exceeding 30 million yen.

As foreign affiliate-level data, we utilize the confidential foreign affiliate-level database of *Kaigai Jigyou Katsudou Kihon Chousa Houkokusyo* (*the Basic Survey on Overseas Business Activities: BSOBA*). The Research and Statistics Department of the Ministry of Economy, Trade and Industry (METI) conducts this survey annually. The BSOBA covers all firms with foreign affiliates except those in the insurance, finance, and real estate industries. In the survey, a foreign affiliate is defined as a company abroad in which the Japanese parent firm has a share of investment above 10 percent or in which other foreign affiliates have an equity share above 50 percent.

[18] We share the same approach as Alfaro and Charlton (2009), who estimated the share of vertical FDI, using the detailed industry information of multinational subsidiaries.

For plant-level data, we use the confidential plant-level database of *Kogyo Toukei Chousa* (*the Census of Manufacture: CM*).[19] The CM is conducted annually and covers all Japanese manufacturing plants with more than four workers. Additionally, information on the ratio of exports to total sales is available from 2001.[20] Using this ratio and total sales, we calculate the value of exports at the plant level.

We construct matched data on foreign affiliates, domestic parents, and domestic plants from 2001 to 2016 using the concordance developed by the Research Institute of Economy, Trade and Industry (RIETI).[21] This allowed us to capture employment and FDI at the local level. Using our dataset, we can distinguish employment at plants belonging to FDI firms from employment at plants belonging to non-FDI firms. This is essential for analyzing the spillover effects of FDI (Section 5).

Since we use matched data on foreign affiliates, domestic parent, and domestic plants, we limit our sample to those that belong to firms with at least 50 employees and capital exceeding 30 million yen. In other words, as long as domestic plants and foreign affiliates belong to these firms, they are included in our analysis, even when the size of the plant is small (e.g., a plant with four workers). As mentioned in footnote 17, our dataset covers 81.7 percent of domestic manufacturing employment, even when focusing on firms with at least 50 employees and capital exceeding 30 million yen.

2.3 Measurement of local level employment, FDI, and imports

The employment of industry i's in UEA j in year t, $L_{ij,t}$, is computed by aggregating the employment of plants at the UEA and industry levels. Local employment $L_{j,t}$ is then obtained by aggregating employment at the UEA level:

[19] The CM is conducted under the same scheme as *the Economic Census for Business Activity* when the latter is conducted.

[20] We cannot disaggregate the exports by destination country. Furthermore, the CM does not collect information on imports.

[21] Because of the availability of concordances, the data could not be extended as of the day of writing this paper.

Table 1: Summary Statistics: 2001–2016

	ΔL	ΔFDI	ΔImports	ΔFDI^{JP}	ΔImports^{JP}
Mean	0.309	0.096	1.464	0.095	1.450
SD	0.920	0.104	0.845	0.103	0.834
p5	-0.324	-0.014	0.499	-0.015	0.499
p50	0.057	0.075	1.268	0.073	1.260
p95	1.782	0.291	3.141	0.272	3.074
N	213	213	213	213	213

Notes: ΔL indicates manufacturing employment growth from 2001 to 2016. ΔImports and ΔFDI are based on equations (3) and (5), respectively. SD, p5, p50, and p95 indicate standard deviation, the 5 percentile, median, and 95 percentiles, respectively. N means the number of observations.
Source: For the data sources, see Section 2.2.

$L_{j,t} = \sum_i L_{ij,t}$. As mentioned in Section 2.1, FDI and imports are not available at the UEA level. UEA-level FDI is constructed, based on equations (3)–(4) and UEA-level imports are based on equation (5).[22]

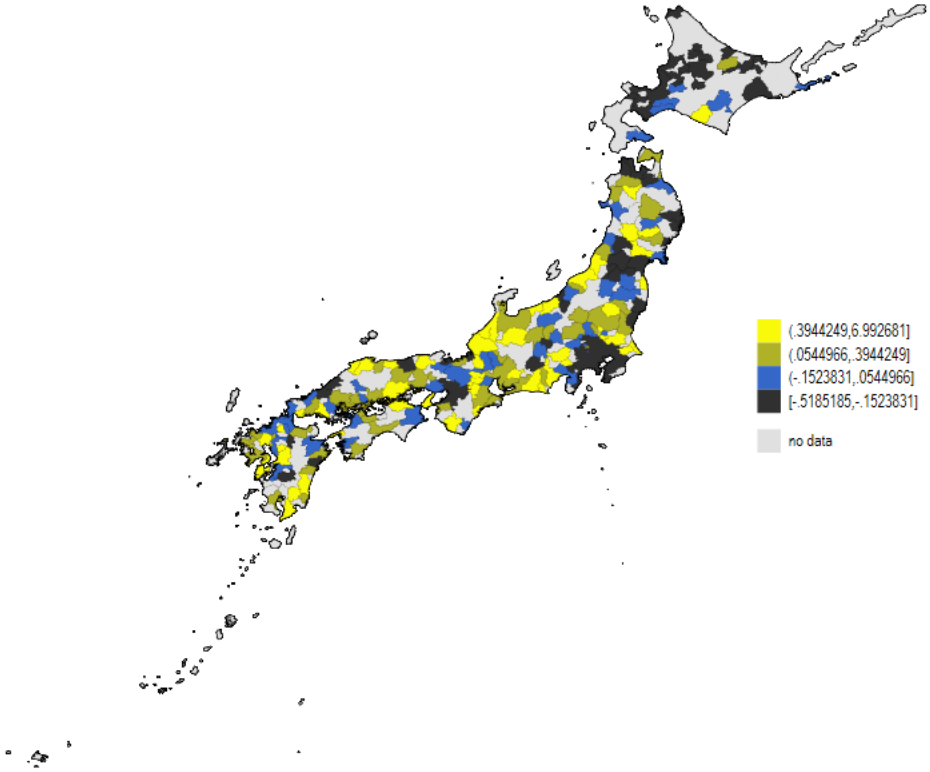
For imports from China, we use import data from the Japan Industrial Productivity (JIP) Database 2018 by the RIETI. Since these data use different industry classifications, we aggregate some industries. There are a total of 43 industries. In sum, our sample consists of 213 UEAs ($j = 1, ..., 213$) and 43 industries ($i = 1, ..., 43$) from 2001 to 2016.

Table 1 presents the summary statistics on changes in employment, FDI, and imports from China at the UEA level between 2001 and 2016. Table 1 indicates that the mean and median employment growth rates are 30.9 and 5.7 percent, respectively. Since these growth rates are simple averages and not weighted, the result implies that the negative growth of manufacturing employment in Japan is driven by a small number of UEAs with large negative growth.[23]

Figure 3 presents the changes in manufacturing employment from 2001 to 2016 by UEA, which is the Japanese equivalent of MSAs in the United States and is widely used in urban economics studies such as Fujita, Mori, Hender-

[22] Table A2 summarizes the definitions and sources of the variables.
[23] At the industry level, domestic employment declined in all manufacturing industries except for motor vehicles, motor vehicle parts and components, and other transportation equipment.

Figure 3: Changes in Manufacturing Employment between 2001 and 2016, by Urban Employment Area



Notes: The unit is percent. Some UEAs (e.g., Ogasawara islands area) are omitted to facilitate visualization.
Sources: Manufacturing employment is obtained from *the Census of Manufacture* (METI) and *the Economic Census for Business Activity* (MIC and METI); UEAs are from Kanemoto and Tokuoka (2002).

son, and Kanemoto (2004) and Hsu and Zhang (2014).[24] Yellow indicates a large positive change, and navy indicates a large negative change. The figure illustrates the uneven spatial distribution of declining manufacturing employment. While some UEAs show significant declines, others show increases.

Figure 4 presents the changes in FDI (Panel A) and the imports from China (Panel B) from 2001 to 2016, by UEA. As in Figure 3, yellow indicates a large positive change, and navy indicates a small positive change. These figures demonstrate that the effects of FDI exposure can differ within a country. Additionally, the impact of Chinese import competition may differ among local mar-

[24] A more detailed description of the data is provided in Section 2.

kets in Japan. Furthermore, Figures 3 and 4 exhibit similar patterns. However, the descriptive statistics cannot distinguish between the effects of FDI exposure and those of Chinese import competition. We will now turn to the regression analysis.

3 Main Results

Table 2 presents the estimation results of equation (1). As mentioned in Section 2, the local labor market is defined as UEAs, and manufacturing FDI is measured by the employment of manufacturing foreign affiliates. Columns (1) through (3) present the results of the ordinary least squares (OLS) estimations. Columns (4) through (6) show the results of the IV specification. For the first-stage results, we report Shea's adjusted partial R^2 because equation (1) includes multiple endogenous variables.[25] Column (6) is our main IV specification, in which both FDI and import exposures are endogenous variables.

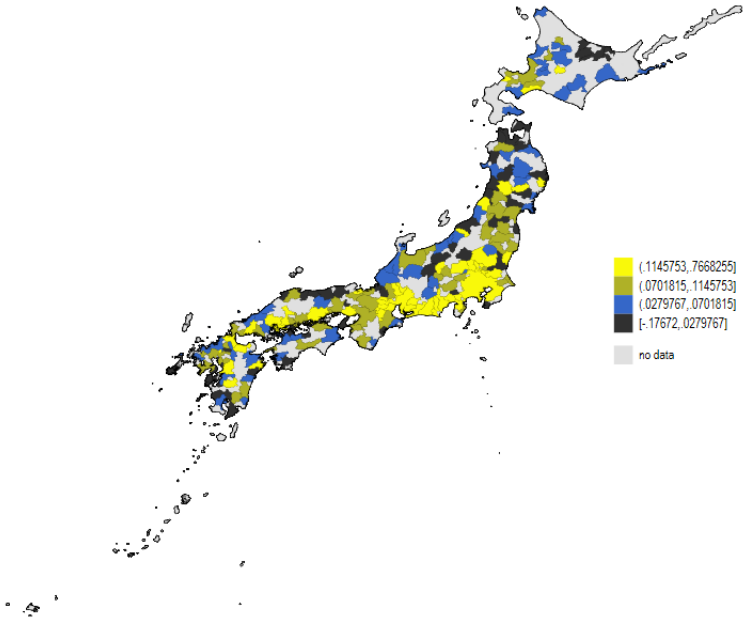
We highlight the following four findings. First, Shea's adjusted partial R^2 in column (6) indicates high values, suggesting that our instruments are strong. Thus, the problem of the weak instruments is not an issue. Second, the coefficient of the imports is insignificant when FDI and imports are included simultaneously (columns (3) and (6)). Finally, the coefficient of FDI is significantly positive (columns (3) and (6)). This result suggests that manufacturing FDI contributes to local employment growth. The estimated coefficient of FDI in our main specification (column (6)) is 0.8966. This implies that a 1 percent increase in FDI, as measured by foreign manufacturing employment, drives a 0.9 percent increase in local employment. This impact is quantitatively larger than that of the US multinationals (Kovak et al., 2021).

Thus far, our focus has been on the manufacturing activities of foreign affiliates, excluding non-manufacturing activities. Furthermore, we define the local

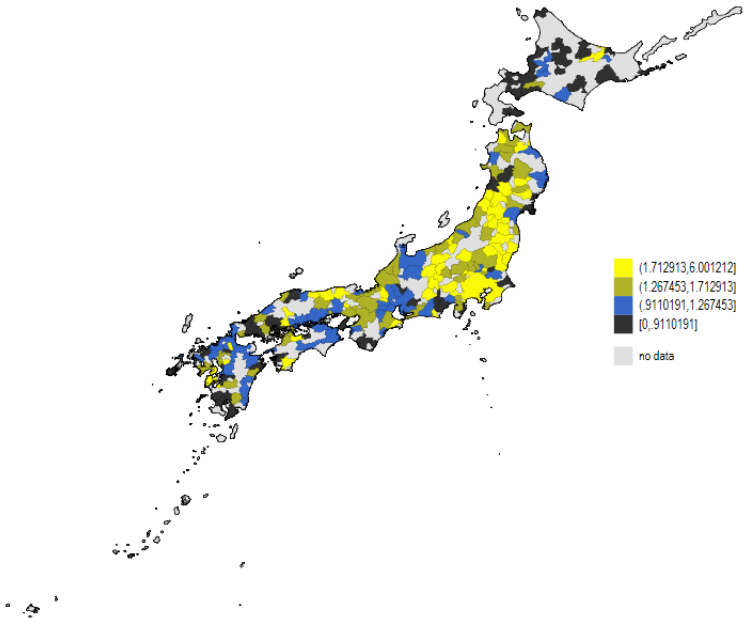
[25] Shea's adjusted partial R^2 is an indicator of a valid IV in a multivariate model (Shea, 1997). The first-stage results are presented in Table A3 in Appendix A3.

Figure 4: Changes in FDI and Imports from China between 2001 and 2016, by Urban Employment Area

Panel A. Changes in FDI



Panel B. Changes in Imports from China



Notes: The unit is percent. Some UEAs (e.g., Ogasawara islands area) are omitted to facilitate visualization.
Sources: FDI is from *the Basic Survey on Overseas Business Activities* (METI); Chinese imports are from the JIP 2018 database (RIETI); UEAs are from Kanemoto and Tokuoka (2002).

Table 2: Main Results

	(1) OLS	(2) OLS	(3) OLS	(4) IV	(5) IV	(6) IV
ΔFDI	0.9960***		0.8993***	1.0036***		0.8966***
	[0.2508]		[0.2807]	[0.2485]		[0.2731]
ΔImports		-0.1212**	-0.0482		-0.1250**	-0.0557
		[0.0509]	[0.0516]		[0.0511]	[0.0512]
N	213	213	213	213	213	213
Local market	UEA	UEA	UEA	UEA	UEA	UEA
Industry						
Parent	MFG	MFG	MFG	MFG	MFG	MFG
Foreign affiliates	MFG	MFG	MFG	MFG	MFG	MFG
FDI	EMPL	EMPL	EMPL	EMPL	EMPL	EMPL
Control variable	Yes	Yes	Yes	Yes	Yes	Yes
Kleibergen-Paap rk Wald F statistic						
				462.31	7907.98	453.34
First stage: Shea's adjusted partial R^2						
FDI	NA	NA	NA	0.977	NA	0.974
Imports	NA	NA	NA	NA	0.988	0.985

Notes: UEA, MFG, and EMPL stand for urban employment area, manufacturing, and employment, respectively. NA means not applicable. ***, **, and * indicate statistical significance at the 1 percent, 5 percent, and 10 percent levels, respectively. Figures in brackets indicate the heteroskedasticity robust standard errors. Regression models are weighted by the start of period UEA share of national manufacturing employment.
Source: For the data sources, see Section 2.2.

labor market by UEAs rather than jurisdictional areas. One might ask whether these definitions matter because if they don't, the analysis would be much simpler and easier to implement. To address this question, we conducted a supplementary analysis examining the validity of the definitions of foreign affiliates and the local labor market. The results, presented in Section A.3, indicate that if we include that including the activity of non-manufacturing foreign affiliates would overestimate the positive effects of FDI exposure. The results also show that the instruments become weak when jurisdictional areas are used instead of UEAs. In sum, focusing on the manufacturing activities of foreign affiliates and using UEAs matters.

4 Robustness Checks

4.1 Exclude the Tokyo Metropolitan Area

One might be concerned that our results are driven primarily by the Tokyo Metropolitan Area because economic activity in Japan is strongest there. In 2001, 23.5 percent of manufacturing employment was concentrated in the Tokyo Metropolitan Area. If this area is an outlier, our results may not be applicable to other areas. To address this concern, we verify whether our results are sensitive to the inclusion of the Tokyo Metropolitan Area.

Column (2) presents the estimation results excluding the Tokyo Metropolitan Area from the analysis, and column (1) presents our main results for reference. With the Tokyo Metropolitan Area excluded, the number of observations declined from 213 to 212. The results indicate that Shea's adjusted partial R^2 is 0.972 and 0.993 for FDI and imports, respectively, meaning the instruments are strong. The sign and significance levels are the same as those in column (1) for FDI and import exposure. The absolute value of the coefficients is slightly larger for both FDI and import exposure. These results suggest that the positive effect of FDI is more evident and that the negative effect of Chinese imports is

Table 3: Robustness Check

	(1) IV	(2) IV	(3) IV	(4) IV
ΔFDI	0.8966***	0.9540***	1.0634***	0.8894***
	[0.2731]	[0.2810]	[0.2619]	[0.2918]
ΔImports	-0.0557	-0.0585	0.0016	-0.0568
	[0.0512]	[0.0513]	[0.0017]	[0.0548]
ΔExports				0.0072
				[0.0884]
N	213	212	213	213
Local market	UEA	UEA	UEA	UEA
Industry				
Parent	MFG	MFG	MFG	MFG
Foreign affiliates	MFG	MFG	MFG	MFG
FDI	EMPL	EMPL	EMPL	EMPL
Imports	China	China	Low-wage	China
Exports				China
Kleibergen-Paap rk Wald F statistic				
	453.34	470.81	320.40	306.22
First stage: Shea's adjusted partial R^2				
FDI	0.974	0.972	0.975	0.976
Imports	0.985	0.993	0.997	0.988
Exports	NA	NA	NA	0.995
Area	All	Non-Tokyo	All	All
Period	2001–2016	2001–2016	2001–2016	2001–2016

Notes : UEA, MFG, and EMPL stand for urban employment area, manufacturing, and employment, respectively. *** and ** indicate statistical significance at the 1 percent and 5 percent levels, respectively. Figures in brackets indicate the heteroskedasticity robust standard errors. Regression models are weighted by the start of period UEA share of national manufacturing employment.
Source: For the data sources, see Section 2.2.

more severe outside the Tokyo Metropolitan Area. Overall, we can conclude that our results are robust to the exclusion of the Tokyo Metropolitan Area.

4.2 Imports from low-wage countries

Regarding import exposure, we focus on the imports from China. However, imports from other low-wage countries may also affect local employment. To address this concern, we measure import exposure focusing on imports from low-wage countries, including China. We define low-wage countries as those with a per capita GDP of less than 5 percent of the U.S. per capita GDP between 2001 and 2016 (Bernard, Jensen, and Schott, 2006).

Column (3) presents the estimation results. The results indicate that Shea's adjusted partial R^2 is 0.975 and 0.997 for FDI and import exposures, respectively. The coefficient of FDI exposure is slightly larger than that of the baseline results. In contrast, the coefficient of import exposure remains insignificant. These results suggest that import exposure from low-wage countries does not necessarily have a significant effect on local employment.

4.3 Effect of export exposure

Thus far, we have not controlled for the effects of exports. However, some studies such as Dauth, Findeisen, and Suedekum (2014) and Kiyota, Maruyama, and Taniguchi (2021) have examined the effects of import shocks by considering both import and export exposures. To address this issue, we include export exposure to China as an additional endogenous variable. The export exposure and its instrument are constructed in the same manner as the import exposure.[26]

The results are presented in column (4). Shea's adjusted partial R^2 is 0.976 and 0.988 for FDI and imports, respectively. The sign and significance levels are the same as in column (1) for FDI and import exposures. While Shea's adjusted partial R^2 for exports is 0.995, the coefficient of export exposure is insignificant.

[26]Like imports from China, we obtain data on exports to China from the JIP database.

In sum, our main findings continue to hold even when controlling for the export as well as import exposures.

5 Discussions

5.1 Difference between FDI firms and non-FDI firms

One might argue that the results are simply driven by the fact that the firms with good performance increase FDI while expanding domestic employment. In turn, this implies that the positive effects of FDI on local employment concentrate on FDI firms. Non-FDI firms in the same local labor market may not benefit from FDI. However, it is not necessarily clear whether FDI affects other non-FDI firms in the same local market positively or negatively. For instance, Greenstone, Hornbeck, and Moretti (2010) found that establishing a large plant positively affected the productivity of other existing plants in the same county. Since FDI firms are generally large, their plants are likely large as well. If a large domestic plant closes due to FDI, existing plants in the same local market could experience negative productivity effects. In contrast, Ito and Tanaka (2014) examined the effects of firms' FDI on the employment of their suppliers in the home country using firm-level transaction data. Their analysis revealed statistically positive effects. Note that transactions are more likely to occur between firms and/or plants in neighboring areas. Their results imply that the expanding FDI could positively affect the local labor market through spillovers from FDI firms to non-FDI firms.

To further address these issues, we examine the differential effects on FDI and non-FDI firms as follows:

$$\Delta L_{j,t}^{\text{FDI}} = \lambda_t + \beta \Delta \text{FDI}_{j,t} + \gamma \Delta \text{Imports}_{j,t} + \varepsilon_{j,t} \tag{10}$$

$$\Delta L_{j,t}^{\text{Non-FDI}} = \lambda_t + \beta \Delta \text{FDI}_{j,t} + \gamma \Delta \text{Imports}_{j,t} + \varepsilon_{j,t}, \tag{11}$$

Table 4: Difference between FDI and Non-FDI Firms

	(1) IV	(2) IV
ΔFDI	-0.6217	1.0355**
	[0.5253]	[0.4521]
ΔImports	-0.2976**	-0.0491
	[0.1298]	[0.0534]
N	181	213
Local market	UEA	UEA
Industry		
Parent	MFG	MFG
Foreign affiliates	MFG	MFG
FDI	EMPL	EMPL
Kleibergen-Paap rk Wald F statistic		
	432.42	453.34
First stage: Shea's adjusted partial R^2		
FDI	0.973	0.974
Imports	0.984	0.985
Firm	FDI	Non-FDI
Area	All	All
Period	2001–2016	2001–2016

Notes: UEA, MFG, and EMPL stand for urban employment area, manufacturing, and employment, respectively. ***, **, and * indicate statistical significance at the 1 percent, 5 percent, and 10 percent levels, respectively. Figures in brackets indicate the heteroskedasticity robust standard errors. Regression models are weighted by the start of period UEA share of national manufacturing employment.
Source: For the data sources, see Section 2.2.

where $L_{j,t}^{\text{FDI}}$ and $L_{j,t}^{\text{Non-FDI}}$ denote the employment of FDI and non-FDI firms, respectively. Their sum equals the total employment in UEA j: $L_{j,t}^{\text{FDI}} + L_{j,t}^{\text{Non-FDI}} = L_{j,t}$. The definitions of the other variables, including the instruments, remains the same.

Table 4 presents the estimation results for FDI and non-FDI firms in columns (1) and (2), respectively. The number of observations for FDI firms in column (1) is smaller than the number of observations for non-FDI firms in column (2) because some FDI firms do not have any plants in certain UEAs. Table 4 indicates that all of Shea's adjusted partial R^2 exceed 0.680, suggesting the strongness of the instruments.

We highlight two findings. First, the coefficient of FDI exposure is negative but insignificant for FDI firms, whereas it is significantly positive for non-FDI firms. This suggests that, on average, FDI exposure has a negative but insignificant impact on the employment of FDI firms. The positive effects of FDI exposure come from non-FDI firms rather than FDI firms. This result also indicates that labor reallocation from FDI firms to non-FDI firms. These findings reveal the potential mechanisms of cross-industry spillovers pointed out by Kovak et al. (2021). One might be concerned that the firms with good performance conduct FDI and expand employment. However, the results do not support this concern.

Second, the coefficient of import exposure is significantly negative for FDI firms, but not for non-FDI firms. This result means that, while FDI firms compete with Chinese imports, non-FDI firms do not. This may be due to differences between intermediate inputs and final goods. Non-FDI firms either produce intermediate inputs that do not compete with Chinese final goods or import intermediate inputs rather than final goods from China.

Why does outward manufacturing FDI exposure have a positive effect on the employment of non-FDI firms in the same local market? The next section will address this issue in more detail.

5.2 Possible mechanisms

Why does outward manufacturing FDI exposure have a positive effect on the employment of non-FDI firms in the same local market? In Section 3, we found that FDI exposure positively affects employment. In Section 5.1, we also found that these positive effects are confirmed in FDI firms rather than in non-FDI firms. This section examines potential mechanisms by substituting the dependent variable in equation (1) from the changes in local employment to the changes in gross output, value added, average wages, labor productivity, employment per plant, the number of plants, the exports of plants, and the imports

from Japan by foreign affiliates of FDI firms.

For gross output and value added, we aggregate plant-level gross output and value added at the UEA level. Labor productivity is measured by the per-capita value added (= value added divided by employment). The UEA-level exports (to the world) are calculated by aggregating the plant-level exports. Similar to the $FDI_{j,t}$ that is measured by the employment of foreign affiliates, we construct the imports from Japan by foreign affiliates of FDI firms at the UEA level.[27]

Tables 5 and 6 present the estimation results for FDI firms and non-FDI firms, respectively. We highlight four findings. First, for FDI firms (Table 5), the significantly positive coefficients of FDI exposure are confirmed for average wages and imports from Japan by foreign affiliates. This implies that FDI exposure does not have significant effects on the output, value added, and labor productivity, employment, or number of plants of FDI firms. FDI positively affects average wages, even though productivity does not increase.

Second, import as well as FDI exposure positively affects imports from Japan by foreign affiliates of FDI firms. Table 4 showed the significantly negative effects of import exposure for FDI firms. This result suggests that Chinese imports do not always negatively impact the employment of FDI firms. Chinese imports positively affect if FDI firms export some of their products to their foreign affiliates. These differential impacts may be due to differences between the imports of final goods and those of intermediate inputs.

Third, for non-FDI firms (Table 6), we find significant positive coefficients of FDI exposure for gross output, value added, average wages, employment per plant, and exports. Column (8) in Table 5 indicates that the imports from Japan by foreign affiliates of FDI firms increased significantly. Together, these results suggest an FDI spillover effect on local employment: FDI by FDI firms

[27] Gross output, value added, average wages, labor productivity, employment per plant, and the number of plants are measured as growth rates. Exports are divided by plant output (so that we can include the UEA with zero exports).

Table 5: Possible Mechanisms: FDI Firms

	(1) IV	(2) IV	(3) IV	(4) IV	(5) IV	(6) IV	(7) IV	(8) IV
Dependent variable	Gross output	Value added	Average wages	Labor productivity	Employment per plant	Number of plants	Exports from JPN	Imports from JPN
ΔFDI	-1.8273	-1.8396	0.1955**	0.1955	-0.1280	-0.1174	-0.7572	54.5836***
	[2.0493]	[2.0940]	[0.0779]	[0.3160]	[0.1714]	[0.4662]	[1.0448]	[8.7128]
ΔImports	-0.6311*	-0.5411	0.0002	0.0228	-0.0981**	-0.0798	-0.2943**	4.1445***
	[0.3730]	[0.3588]	[0.0185]	[0.0477]	[0.0418]	[0.1201]	[0.1403]	[0.6108]
N	181	181	181	181	181	181	150	181
Local market	UEA	UEA	UEA	UEA	UEA	UEA	UEA	UEA
Industry								
Parent	MFG	MFG	MFG	MFG	MFG	MFG	MFG	MFG
Affiliates	MFG	MFG	MFG	MFG	MFG	MFG	MFG	MFG
Kleibergen-Paap rk Wald F statistic								
	432.42	432.42	432.42	432.42	432.42	432.42	453.35	453.34
First stage: Shea's adjusted partial R^2								
FDI	0.973	0.973	0.973	0.973	0.973	0.973	0.973	0.973
Imports	0.984	0.984	0.984	0.984	0.984	0.984	0.984	0.984
Firm	FDI	FDI	FDI	FDI	FDI	FDI	FDI	FDI
Area	All	All	All	All	All	All	All	All
Period	2001–2016	2001–2016	2001–2016	2001–2016	2001–2016	2001–2016	2001–2016	2001–2016

Notes: UEA, MFG, and EMPL stand for urban employment area, manufacturing, and employment, respectively. ***, **, and * indicate statistical significance at the 1 percent, 5 percent, and 10 percent levels, respectively. Figures in brackets indicate the heteroskedasticity robust standard errors. Regression models are weighted by the start of period UEA share of national manufacturing employment. Source: For the data sources, see Section 2.2.

Table 6: Possible Mechanisms: Non-FDI Firms

	(1) IV	(2) IV	(3) IV	(4) IV	(5) IV	(6) IV	(7) IV
Dependent variable	Gross output	Value added	Average wages	Labor productivity	Employment per plant	Number of plants	Exports from JPN
ΔFDI	1.0413**	1.1739**	0.2408***	0.1491	0.2954**	0.7282	1.8703***
	[0.5012]	[0.4654]	[0.0710]	[0.1471]	[0.1283]	[0.4947]	[0.4813]
ΔImports	-0.1520**	-0.0572	0.0003	0.0109	-0.0332	-0.0432	-0.0680
	[0.0675]	[0.0688]	[0.0145]	[0.0359]	[0.0204]	[0.0475]	[0.1681]
N	213	213	213	213	213	213	174
Local market	UEA	UEA	UEA	UEA	UEA	UEA	UEA
Industry							
Parent	MFG	MFG	MFG	MFG	MFG	MFG	MFG
Affiliates	MFG	MFG	MFG	MFG	MFG	MFG	MFG
Kleibergen-Paap rk Wald F statistic							
	453.34 453.34 453.34	453.34	453.34	453.34	453.34	1367.91	
First stage: Shea's adjusted partial R^2							
FDI	0.974	0.974	0.974	0.974	0.974	0.974	0.978
Imports	0.985	0.985	0.985	0.985	0.985	0.985	0.984
Firm	Non-FDI	Non-FDI	Non-FDI	Non-FDI	FDI	FDI	FDI
Area	All	All	All	All	All	All	All
Period	2001–2016	2001–2016	2001–2016	2001–2016	2001–2016	2001–2016	2001–2016

Notes: UEA, MFG, and EMPL stand for urban employment area, manufacturing, and employment, respectively. ***, **, and * indicate statistical significance at the 1 percent, 5 percent, and 10 percent levels, respectively. Figures in brackets indicate the heteroskedasticity robust standard errors. Regression models are weighted by the start of period UEA share of national manufacturing employment.
Source: For the data sources, see Section 2.2.

increases the output and exports of non-FDI firms, raising their labor demand and average wages. Consequently, FDI firms in the same local labor market also need to raise wages. In contrast, we cannot confirm a significant effect on labor productivity. This suggests that productivity spillovers do not explain the positive effects of FDI exposure on local employment.

Finally, exports of FDI firms decrease slightly while those of non-FDI firms increase significantly. This finding is interesting because it provides new insight into the long-standing debate about the relationship between FDI and exports, whether they are complementary or substitutable. These concepts are usually discussed in terms of the difference between vertical and horizontal FDIs. However, our results suggest that such complementarity and substitutability may arise simultaneously due to the supply-chain relationship between FDI and non-FDI firms within the same local market.

6 Concluding Remarks

In this study, we examined the local labor market effect of FDI exposure. One of our contributions is investigating possible spillover effects from FDI firms to non-FDI firms. To do so, we developed unique matched data on foreign affiliates, domestic parents, and domestic plants in Japan from 2001 to 2016. During this period, FDI and Chinese imports increased while manufacturing employment decreased.

Our results suggest that outward FDI exposure positively affected local manufacturing employment. This result is robust even when controlling for the effects of the imports from (and exports to) China, when using an alternative measure of FDI, or excluding the Tokyo Metropolitan Area. Quantitatively, our baseline results showed that a 1 percent increase in foreign manufacturing employment drives a 0.9 percent increase in local employment. We also found that the employment increases were not observed for FDI firms, but rather for non-

FDI firms. While only indicative, our results suggest that the positive effects come from spillovers from FDI firms to non-FDI firms. Outward FDI by FDI firms increases the labor demand of non-FDI firms in the same local market by increasing their output and exports.

These results have important policy implications. Policies supporting FDI are sometimes controversial. These results have important policy implications. Policies that support outward FDI are sometimes controversial because they may negatively affect local employment. However, our results suggest that this is not the case, even at the local labor market level. In fact, manufacturing FDI can offset the decline in domestic manufacturing employment. Overall, our results indicate that FDI positively affects local employment.

One limitation of this study is that Japanese plant-level data report employment only at the aggregate level. The impact of Chinese import competition and FDI exposure may differ based on the skills of workers and/or the tasks performed. Another limitation is that data on technology-related variables, such as information and communication technology, are unavailable at the plant level. Thus, we could not consider the effects of technology shocks at the UEA level. It is also important to note that transaction data are usually available at the firm level. In order to investigate the mechanisms discussed in this paper further, we need to trace the transaction from domestic plants to foreign affiliates. Due to data limitations, these issues are beyond the scope of our study.

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A Appendix

A.1 Data Appendix

A.1.1 The employment of foreign affiliates

This appendix presents the employment of foreign affiliates in manufacturing and non-manufacturing industries between 2001 and 2016. The parent firms are limited to manufacturing firms.

Table A1: Share of Non-manufacturing Employment

	Total	Manufacturing	Non-manufacturing	Share
2001	2,645	2,403	242	9.1%
2002	2,863	2,585	278	9.7%
2003	3,128	2,854	274	8.8%
2004	3,420	3,136	284	8.3%
2005	3,592	3,318	274	7.6%
2006	3,727	3,445	282	7.6%
2007	3,821	3,536	285	7.5%
2008	3,630	3,244	387	10.6%
2009	3,770	3,356	414	11.0%
2010	4,031	3,593	438	10.9%
2011	4,154	3,705	448	10.8%
2012	4,277	3,793	484	11.3%
2013	4,299	3,839	460	10.7%
2014	4,574	4,068	505	11.0%
2015	4,483	3,955	529	11.8%
2016	4,344	3,834	510	11.7%
Average	3,381	3,038	342	10.1%

Notes: The unit is one thousand workers. "Manufacturing" and "Non-manufacturing" indicate the employment of foreign affiliates in manufacturing and non-manufacturing, respectively. "Share" indicates the share of non-manufacturing workers to total workers.
Source: For the data sources, see Section 2.2.

Table A2: Definition of Variables

Variable	Notation	Definition	Source
Dependent variable			
Employment	$L_{ij,t}$	Number of employees in industry i in UEA j in year t.	CM
	$L_{i,t}(=\sum_i L_{ij,t})$	Number of employees in industry i in year t.	BSOBA
	$L_{j,t}(=\sum_j L_{ij,t})$	Number of employees in UEA j in year t.	BSOBA
Endogenous variables			
FDI	$\text{FDI}_{a,t}$	Number of employees of manufacturing foreign affiliate a in year t.	BSOBA
	$\text{FDI}_{i,t} = (\sum_i \text{FDI}_{a,t})$	Number of employees of manufacturing foreign affiliate a. of firm i in year t.	BSOBA
Imports from China	$\text{Imports}_{i,t}$	Imports from China in industry i in year t.	JIP 2018 database
Exports to China	$\text{Exports}_{i,t}$	Exports to China in industry i in year t.	JIP 2018 database
Control variables			
Initial employment	$L_{j,0}(=\sum_j L_{ij,0})$	Number of employees in UEA j in 2001 (log value).	CM
Manufacturing employment	$s^L_{j,0}$	Ratio of manufacturing employment to total working population in UEA j in 2001.	CM
			CM
Initial imports from China	$s^{IM}_{j,0}$	Ratio of imports from China to total imports in UEA j in 2001.	JIP 2018 database
Dependent variables for possible mechanisms			
Gross output		Total sales of plants in UEA j in year t.	CM
Value added		Total value added of plants in UEA j in year t.	CM
Average wages		Average wages in UEA j in year t.	CM
Labor productivity		Value-added per worker in UEAj in year t.	CM
Employment per plant		Employment divided by the number of plants in UEA j in year t.	CM
Number of plants		Number of plants in UEA j in year t.	CM
Exports from JPN		Total plant-level exports from UEA j in year t.	CM
Imports from JPN		Imports of FDI firm's foreign affiliate from UEA j in year t.	BSOBA

Notes: Notation indicates the nation used in the main text, if applicable. CM stands for the Census of Manufacture; BSOBA stands for the Basic Survey on Overseas Business Activities.

A.1.2 Definition of variables

A.2 First-stage results

Table A3: First-stage results of Table 2

	(1)	(2)	(3)	(4)
Dependent variable	ΔFDI	ΔImports	ΔFDI	ΔImports
ΔFDI^{JP}	1.038***		1.025***	-0.047
	[0.041]		[0.034]	[0.048]
$\Delta Imports^{JP}$		1.037***	-0.007	1.034***
		[0.011]	[0.005]	[0.009]
Log of population	0.004*	0.039***	0.004*	0.039***
in 2001	[0.003]	[0.008]	[0.003]	[0.008]
Share of manufacturing	11.128	80.557**	13.607	83.882**
employment in 2001	[6.749]	[30.837]	[8.348]	[33.109]
Share of Chinese imports	0.132	-0.430**	0.130	-0.448**
in 2001	[0.0940]	[0.1851]	[0.089]	[0.185]
N	213	213	213	213

Notes: This table shows the first-stage results of IV estimation in Table 2. Columns (1) and (2) show the first-stage results of FDI and imports, respectively, in Column (2) in Table 2. Columns (3) and (4) correspond to the second stage in Columns (3) and (4) in Table 2, respectively.
Source: For the data sources, see Section 2.2.

A.3 Validation of the definitions of foreign affiliates and local labor markets

In the main analysis, we focused on the manufacturing activities of foreign affiliates, excluding non-manufacturing activities. Additionally, we defined the local labor market using UEAs instead of jurisdictional areas. To determine whether these definitions are relevant or complicate the analysis unnecessarily, we examined their validity in a supplementary analysis.

First, we measured the FDI variable, incorporating the employment of manufacturing and non-manufacturing foreign affiliates. The results are presented in column (2) of Table A4, whereas column (1) presents our main results (i.e., column (2) in Table 2). This table shows that the sign and significance levels are the same for FDI and import exposure.

However, the magnitude differs, particularly for FDI exposure. Its coefficient is 0.6511, which is nearly 0.3 percentage points smaller than that of the coefficient 0.9 of our main result. This suggests that the positive effects of FDI exposure will be underestimated when including the activity of non-manufacturing foreign affiliates.

Next, we redefine the local labor market for Japan's 47 prefectures rather than the 213 UEA level. Column (3) presents the estimation results. We highlight two findings. First, Shea's adjusted partial R^2 is small: 0.077 for FDI expo-

Table A4: Validation of the Definitions of Foreign Affiliates and Local Labor Markets

	(1) IV	(2) IV	(3) IV
ΔFDI	0.8975***	0.6415***	0.3529**
	[0.2920]	[0.2271]	[0.1421]
ΔImports	-0.06250	-0.0877*	-0.1124***
	[0.0519]	[0.0505]	[0.0301]
N	213	213	47
Local market	UEA	UEA	Prefecture
Industry			
Parent	MFG	MFG	MFG
Foreign affiliates	MFG	All	MFG
FDI	EMPL	EMPL	EMPL
Imports	China	China	China
Kleibergen-Paap rk Wald F statistic			
	520.80	2009.32	128.53
First stage: Shea's adjusted partial R^2			
FDI	0.972	0.984	0.892
Imports	0.986	0.988	0.960
Area	All	All	All
Period	2001–2016	2001–2016	2001–2016

Notes : UEA, MFG, and EMPL stand for urban employment area, manufacturing, and employment, respectively. ***, **, and * indicate statistical significance at the 1 percent, 5 percent, and 10 percent levels, respectively. Figures in brackets indicate the heteroskedasticity robust standard errors. Regression models are weighted by the start of period UEA share of national manufacturing employment.
Source: For the data sources, see Section 2.2.

sure and 0.992 for import exposure. This indicates that the instrument for FDI exposure is weak. This may be because the jurisdictional areas are so aggregated that they cannot capture the differential effects within each area. Second, the coefficients of FDI and import exposures turned out to be insignificant. Our results imply that the definition of the local labor market is important when analyzing the effects of FDI exposure.