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Local Labor Market Effects of Chinese Imports and Offshoring: Evidence from Matched-Foreign Affiliate-Domestic Parent-Domestic Plant Data in Japan*

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Abstract

This study examines the local labor market effects of offshoring on manufacturing activities. One of the contributions of this study is that it develops matched foreign affiliate-domestic parent-domestic plant data on Japan from 1995 to 2016 to measure the manufacturing employment and offshoring of manufacturing activities at the local level. Our results indicate that while exposure to Chinese import competition negatively affects local manufacturing employment, offshoring exposure contributes to mitigating such negative effects. We find that a 10 percent increase in foreign manufacturing employment drives a 1 percent increase in local employment. We also find that offshoring exposure has a significantly positive effect on the employment of non-offshoring firms in the same local labor market. Our results indicate that offshoring has a negative impact on local employment.

Keywords: Offshoring, Foreign Direct Investment, Local labor market, Import competition, Firm heterogeneity
JEL classification: F16, F23, F66, R23, J23, L60

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1 Introduction

One of the most controversial aspects of globalization is offshoring, that is, when manufacturing operations and business functions move abroad. However, the public tends to dislike offshoring. In the United States, for example, less than two percent of respondents consistently support it (Mansfield and Mutz, 2013, Figure 1), because of its possible negative economic consequences. For instance, when firms relocate their production abroad, workers may lose their jobs; such negative impacts go beyond workers and affect the local economy (Frieden, 2019) by their negative effects on workers in auxiliary companies and local suppliers, local income, and property values decreases, young people leaving the area, and social services decline (Rickard, 2021). Nonetheless, "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). As we will see below, the studies on the local labor market effects of offshoring exposure are still limited.

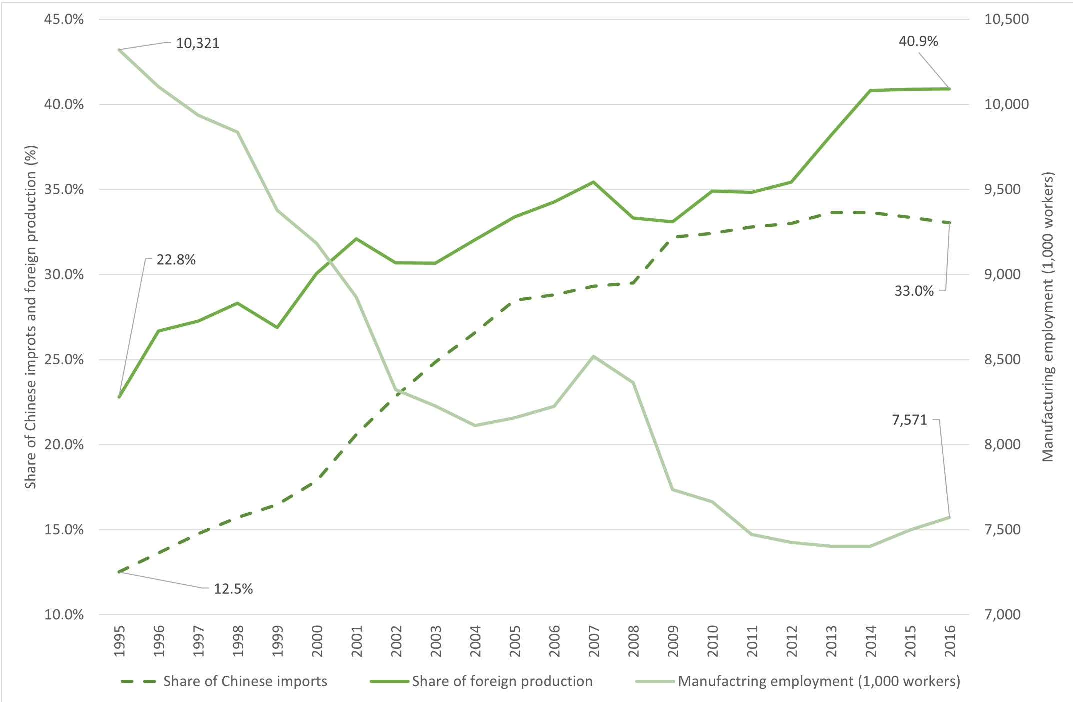
Based on this background, this study investigates the local labor market effects of offshoring exposure on the manufacturing activity.[1] A key challenge for this type of research is that one needs to measure manufacturing employment and the offshoring exposure of manufacturing activities at the local level. To address this issue, we focus on Japan, where detailed confidential firm-, foreign-affiliate- and plant-level data are available and, similar to many other high-income countries, experiences declining manufacturing employment and increasing offshoring of manufacturing activity.

Figure 1 presents the changes in manufacturing employment and the share of foreign production to total production from 1995 to 2016 for Japan.[2] The figure indicates that, while manufacturing employment declined from 10.3 million to 7.6 million workers over the analyzed period, the share of Chinese imports to total manufacturing imports increased from 12.5 percent to 33.0 percent. Simultaneously , the share of foreign production increased from 22.8 percent to 40.9 percent during the period. These obser-

[1]Following Kovak, Oldenski, and Sly (2021), we describe the potential threats of offshoring for the local labor market due to offshoring exposure, which differs from the actual offshoring. As discussed in Section 2, the offshoring exposure 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.

[2]The share of foreign production is defined as the foreign sales to 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*.

Figure 1: Changes in Manufacturing Employment, Share of Foreign Production, and Share of Chinese Imports, 1995–2016



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); 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).

vations imply that offshoring, as well as import competition, might lead to a decline in manufacturing employment.

One of the contributions of this study is that to estimate the local labor market effects of offshoring exposure, we develop matched-foreign affiliate-domestic parent-domestic plant data. This rich dataset enables us to measure both local-level employment and offshoring in a precise manner. Note that the foreign affiliates of manufacturing firms engage in both manufacturing activities (i.e., production) and non-manufacturing activities (e.g., sales, financing). To estimate the relationship between domestic and foreign production activities, we must exclude non-production activities from foreign activities. This study thus focuses only on the manufacturing activities of foreign affiliates owned by Japanese manufacturing firms, which we refer to as offshoring. In other words, this study excludes the effects of foreign affiliates' non-manufacturing activities from the analysis.

Our motivation comes from two research strands. One of them investigated the effects of offshoring on domestic employment, presenting mixed results. For example, Harrison and McMillan (2011) argued that the effects of US offshoring depend on both the type and location of investment. Wright (2014) estimated that the aggregate effect of offshoring leads to a 2.6 percent cumulative increase in aggregate employment. Kiyota and Maruyama (2017) found that offshoring is associated with increasing demand for high-skilled workers but has insignificant effects on the demand for unskilled workers in Japan.[3]

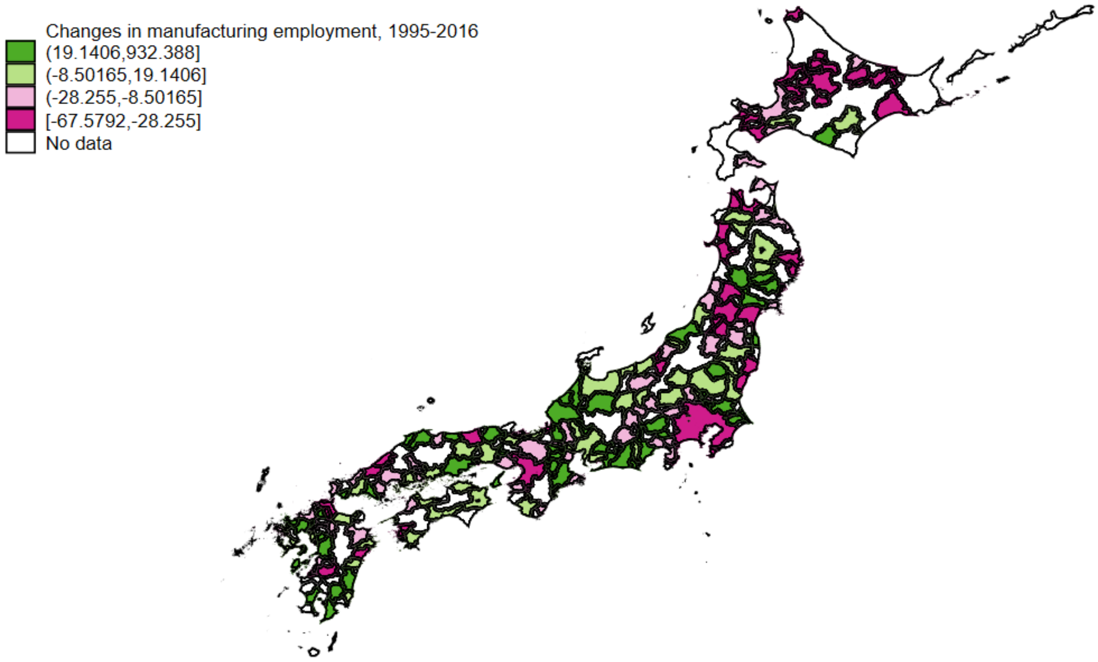
The other strand is composed of studies on local labor markets with rising import competition. After the pioneering study of Topalova (2007), who examined the effects of a national trade shock on the local labor market in India, several studies, such as Topalova (2010), Autor, Dorn, and Hanson (2013), Kovak (2013), and Hakobyan and McLaren (2016), examined the local labor market effects of increasing import competition. An important finding of these studies is that the effects are heterogeneous across regions or metropolitan areas; some regions benefit from increasing imports, while others do not. That is partly because some workers are immobile across regions and metropolitan areas. This, in turn, implies that labor markets are local rather than national. Moreover, Autor, Dorn, Hanson, and Majlesi (2020) found that increasing import competition contributed to the polarization of US politics. Therefore, it is essential to focus on local labor market effects in analyzing the impacts of globalization.

Both these research strands make significant contributions to the literature. However, the first one ignores the fact that the effect of offshoring exposure could differ between the regions within a home country. Figure 2 presents the changes in manufacturing employment from 1995 to 2016 by urban employment area (UEA), which is the Japanese version of the metropolitan statistical areas (MSAs) in the United States and is widely used in urban economics studies such as Fujita, Mori, Henderson, and Kanemoto (2004) and Hsu and Zhang (2014).[4] This figure indicates the spatially uneven pace of the declining employment in manufacturing. While some UEAs indicate significant declines, others indicate increases. Similar to the local labor market effect of

[3] Additionally, several studies have examined the effects of foreign direct investment (FDI) on domestic employment in Japan. Generally, they found either positive or insignificant effects. For more details, see Yamashita and Fukao (2010), Hayakawa, Matsuura, Motohashi, and Obashi (2013), and Kambayashi and Kiyota (2015).

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

Figure 2: Changes in Manufacturing Employment between 1995 and 2016, by Urban Employment Area



Notes: Some UEAs are omitted to facilitate visualization.
Sources: Manufacturing employment is obtained from *the Census of Manufacture* (METI); UEAs are from Kanemoto and Tokuoka (2002).

import competition, the effect of offshoring exposure could be heterogeneous within a country.

By contrast, the second research stream ignored another important channel of globalization: offshoring. As confirmed by Figure 1, both import competition and offshoring have been on the rise during this period. Therefore, the effects of offshoring should be considered when analyzing the impact of globalization on domestic employment. In this context, our study is also related to Ebenstein, Harrison, McMillan, and Phillips (2014), who examined the effects of trade and offshoring on wages and occupations in the United States at the country level, finding substantial wage effects of offshoring to low-wage countries. This study contributes to the literature by also considering Chinese imports and offshoring.

We focus on offshoring by Japanese multinational firms. An advantage of using Japanese data is that we can match confidential foreign affiliate, domestic parent, and domestic plant data, which enables us to construct employment and offshoring datasets at the local level. Our sample period is 1995–2016, when the Japanese economy experienced a decline in manufacturing employment and an increase in offshoring. As explained in Section 2, we define the local labor market as the level of the UEA. UEAs are a more plausible definition than jurisdictional areas, such as cities, because the labor market sometimes extends beyond jurisdictional boundaries, especially in urban areas with good public transportation.

To the best of our knowledge, only a few studies have examined the effects of offshoring exposure and outward FDI on local employment.[5] Federico and Minerva (2008) examined the effects of Italy's outward FDI on local employment growth between 1996 and 2001 for 12 manufacturing industries and 103 administrative provinces.[6] Their main finding was that FDI leads to faster local employment growth than the national industry average. Kovak, Oldenski, and Sly (2021) studied the effects of offshoring exposure by US multinationals on local employment from 1987 to 2007. In their study, the local labor market is defined as a metropolitan area, while local offshoring is measured by the weighted average of industry-level foreign affiliate employment in all industries. They found that a metro area whose industries experienced, on average, a 10 percent increase in affiliate employment exhibited a 0.17 percent increase in metro-area employment.

Our study is closely related to, but also different from these studies in several respects . First, we focus on the relationship between domestic and foreign manufacturing activities to investigate the impacts on the offshoring of manufacturing activities. Second, our study considers the effects of Chinese import competition because it has a significant effect on local employment in various countries, including Japan (Taniguchi, 2018; Kiyota , Maruyama, and Taniguchi, 2021). In other words, we examine the local labor market for offshoring exposure, explicitly controlling for the effects of Chinese import competition. Third, we focus on Japan, and because our study is the first to examine the local labor market effect of offshoring in Japan, it adds another national perspective to the available evidence.

Our results indicate that while Chinese import competition negatively affects local manufacturing employment, offshoring exposure contributes to mitigating such nega-

[5]For *inward* FDI, some studies investigated local market effects, such as Axarloglou and Pournarakis (2007) and Figlio and Blonigen (2000). Jofre-Monseny, Sánchez-Vidal, and Viladecans-Marsal (2017) investigated the effects of big plant closures, which relocated abroad, on local employment in Spain. However, offshoring does not necessarily lead to plant closure.

[6]However, there is no explanation of how local-level FDI is measured in their paper.

tive effects. This result is robust even when we employ an alternative measure of offshoring exposure; we exclude the Tokyo Metropolitan Area and conduct a sub-sample analysis. We also find that offshoring exposure has a significantly positive effect on the employment of non-offshoring firms in the same UEA. In sum, our results indicate that offshoring positively impacts local employment.

A limitation of this study is that plant-level data in Japan report employment only at the aggregate level. The impact of Chinese import competition and offshoring exposure could differ between the skills of workers and/or between tasks. 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. Owing to data limitations, these issues are beyond the scope of our study.

The remainder of this paper is organized as follows. The following section presents the analytical framework. Section 3 presents our estimation results. Section 4 presents the results of the robustness check, and section 5, the extensions of our research. A summary of our findings and their implications are presented in the final section.

2 Methodology and Data

2.1 Methodology

Our approach builds upon the analysis of Autor, Dorn, and Hanson (2013), who examined the effects of Chinese import competition on the local labor market in the United States. We extend this framework to consider the offshoring effects. In this study, we define the local labor market for each UEA.

Let $L_{j,t}$ be manufacturing employment in UEA j in year t. Let $\text{Offshoring}_{j,t}$ and $\text{Imports}_{j,t}$ be offshoring from UEA j in Japan to low-wage countries in year t and imports from China to UEA j, respectively. We refer to firms that engage in offshoring as offshoring firms and those that do not as non-offshoring firms. The regression equation is as follows:

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

where $\Delta L_{j,t}$ is the change in manufacturing employment between the initial year (i.e., $t = 0$) and year t, meaning $\Delta\text{Offshoring}_{j,t}$ and $\Delta\text{Imports}_{j,t}$ are the exposures to the offshoring of manufacturing activity and Chinese import competition between the initial year (i.e., $t = 0$) and year t, respectively. $\varepsilon_{j,t}$ is the error term. This specification allows us to examine the effects of offshoring exposure while also controlling for the effects of Chinese import competition. Note that time-invariant UEA-specific effects, such as the initial level of offshoring, are eliminated in equation 1 because we take the differences for both the left- and right-hand-side variables.

There are two remarks regarding this equation. First, manufacturing employment $L_{j,t}$ includes both, the employment of offshoring and non-offshoring firms. Therefore, we examine the impact of offshoring on the overall local labor market. We expect a significantly negative β if offshoring negatively affects employment in UEA j.

Second, our main focus is offshoring. In this study, the Chinese import competition is a control variable. While the imports of final goods may negatively affect employment, those of intermediate goods could have positive effects, as pointed out by Taniguchi (2018), Wang, Wei, Yu, and Zhu (2018), and Kiyota, Taniguchi, and Maruyama (2021). However, to distinguish between the imports of final goods and those of intermediate inputs, we need input–output table data from 1995 to 2016, which are not available. In this study, we thus use total imports, although we acknowledge the difference between the imports of final goods and those of intermediate inputs.

Similarly , we can expand the analysis by using imports from China for low-wage countries, including China. This is an interesting topic as, since 2001, China has recorded the largest share of Japanese manufacturing imports. The share of Chinese imports increased from 12.5 percent in 1995 to 33.0 percent in 2016. Additionally, the main focus of this study is offshoring. Therefore, we follow Autor, Dorn, and Hanson (2013) and do not pursue this issue here.

There are several issues in estimating equation (1). The first is the availability of data on offshoring and import exposure. In Japan, neither offshoring nor import exposure is available at the UEA level. Following Autor, Dorn, and Hanson (2013), we construct the UEA-level offshoring exposure as follows:

$$\Delta\text{Offshoring}_{j,t} = \sum_i \frac{L_{ij,0}}{L_{i,0}} \frac{\Delta\text{Offshoring}_{i,t}}{L_{j,0}}, \tag{2}$$

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

In our main analysis, we measure offshoring by employing manufacturing foreign affiliates. Note that even if a parent firm is a manufacturing one, the main activity of its foreign affiliates may not be manufacturing. For example, if a manufacturing firm establishes a sales branch in a foreign country, the foreign affiliate's main activity is classified as services, rather than manufacturing. This implies that if we aggregate all foreign affiliates, we overestimate their manufacturing activity . Indeed, in our sample period, more than 10 percent of the labor in foreign affiliates works for non-manufacturing industries, although their parent firms are manufacturing companies.[7] Accordingly , we measure the offshoring industry by the industry of foreign affiliates rather than that of domestic parent firms.[8] A detailed description of the data is provided in Section 2.2.

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

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

where i indicates the industry, $L_{ij,0}/L_{i,0}$ is the share of industry i's employment in UEA j in industry i's total employment in Japan 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, obtained from the JIP 2018 database (RIETI).

The second issue concerns possible endogeneity. In general, the local labor market conditions can affect the offshoring decisions of a firm that operates in that local market. For example, if the local labor market becomes too tight for a manufacturing firm to secure regional employment, the firm may decide to go abroad to continue its production activity. Another example is that if productive firms agglomerate in a particular region, they become productive through productivity spillovers, which leads to the decision to offshore.[9] It is also possible that some unobservable local factors af-

[7] For more details, see Table A1.

[8] One may ask whether we can classify foreign affiliates by horizontal or vertical FDI. However, there is no consensus on how horizontal and vertical FDI can be measured. For details, see Braconier, Norbäck, and Urban (2005).

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

fect local labor market conditions and firms' decisions to conduct offshoring. A similar argument can be applied to import variables.

To address this issue, we employ an instrumental variable method, in which we use a Bartik-type shift-share variable (Bartik, 1991) as an instrument. One of the key ideas of the Bartik-type instrument is that it reflects overall offshoring from Japan or imports from China while excluding the UEA. This is because, if we consider the UEA, it could directly affect its employment, which in turn would violate the exclusion restriction.[10] For this reason, we refer to offshoring and import exposures rather than offshoring and imports.

In the first stage, we estimate the following equations:[11]

$$\Delta\text{Offshoring}_{j,t} = \zeta_t + \phi_1 \Delta\text{Offshoring}^{\text{JP}}_{j,t} + \phi_2 \Delta\text{Imports}^{\text{JP}}_{j,t} + u_{j,t} \tag{4}$$

and

$$\Delta\text{Imports}_{j,t} = \xi_t + \psi_1 \Delta\text{Offshoring}^{\text{JP}}_{j,t} + \psi_2 \Delta\text{Imports}^{\text{JP}}_{j,t} + v_{j,t}, \tag{5}$$

where $\Delta\text{Offshoring}^{\text{JP}}_{j,t}$ and $\Delta\text{Imports}^{\text{JP}}_{j,t}$ are the Bartik instruments and are respectively defined as follows:

$$\Delta\text{Offshoring}^{\text{JP}}_{j,t} = \sum_i \frac{L_{ij,0}}{L_{i,0}} \Delta\text{Offshoring}_{i,-j,t} \tag{6}$$

and

$$\Delta\text{Imports}^{\text{JP}}_{j,t} = \sum_i \frac{L_{ij,0}}{L_{i,0}} \Delta\text{Imports}_{i,-j,t}, \tag{7}$$

where $L_{ij,0}/L_{i,0}$ is the share of industry i's employment in UEA j in industry i's total employment in Japan in the initial year (i.e., $t = 0$); $\Delta\text{Offshoring}_{i,-j,t}$ is the change in industry i's offshoring from the initial year (i.e., $t = 0$) to year t, excluding offshoring 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 $v_{j,t}$.[12] The next section explains the data used to estimate these equations.

[10] For details about the Bartik instrument, see Goldsmith-Pinkham, Sorkin, and Swift (2020).

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

[12] Several studies utilize the Bartik instrument to address endogeneity. See Glaeser, Gyourko, and Saks (2006), Saiz (2010), and Diamond (2016).

2.2 Data

2.2.1 Definition of the local labor market

In this study, we define the local labor market as an UEA. UEAs comprise a set of municipalities and an intermediate spatial scale between prefectures and municipalities in Japan. There are 47 prefectures and approximately 1,700 municipalities in Japan. While some studies, such as Taniguchi (2018), defined the local labor market as the prefecture level, it is common to commute from one prefecture to another in an urban area in Japan. For example, many people working in central Tokyo commute from neighboring prefectures of Chiba, Kanagawa, and Saitama. By contrast, 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. The municipalities are too small to cover the local labor market, as many workers can easily commute from one municipality to another in rural and urban areas.

This study considers the 224 urban UEAs proposed by Kanemoto and Tokuoka (2002). UEAs are regional units comparable to the MSAs in the United States. The UEAs consist of core and surrounding suburban municipalities, from which more than 10 percent of the workers commute to core cities. The UEAs can be classified by the size of the core city and are divided into two areas. The first are the metropolitan employment areas, whose central cities have densely inhabited district (DID) populations exceeding 50,000. The other are micropolitan employment areas, with a DID population between 10,000 and 50,000. Data were obtained from the UEA website maintained by the Center for Spatial Information Science, University of Tokyo (https://www.csis.u-tokyo.ac.jp/UEA/index_e.htm). Among the 224 UEAs, 213 had manufacturing employment over the study period.[13]

2.2.2 Data sources

To measure employment and offshoring at the local level, we need information on the parent firm, domestic plants, and foreign affiliates. For the parent firm-level information, we utilize the confidential firm-level database of *Kigyou Katsudou Kihon Chousa*

[13] One may be concerned that the UEAs do not cover some of the rural areas. For the period between 1995 and 2016, our dataset covers 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.

Houkokusyo (*the Basic Survey of Japanese Business Structure and Activities: BSJBSA*), prepared annually by the Research and Statistics Department, METI (1995–2016). The survey is compulsory for firms in the manufacturing, wholesale trade, and retail trade industries having 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*). This survey is conducted annually by the Research and Statistics Department of the METI. The BSOBA covers all firms with foreign affiliates, except for the insurance/finance and real estate industries. The definition of a foreign affiliate in the survey is a company abroad where the Japanese parent firm has more than a 10 percent share of investment or is a subsidiary in which other foreign affiliates have above 50 percent equity share.

For plant-level data, we use the confidential plant-level database of *Kogyo Toukei Hyo* (*the Census of Manufacture: CM*) prepared by the Research and Statistics Department, METI. CM is conducted annually, covering all Japanese manufacturing plants with more than four workers.

We construct matched foreign affiliate-domestic parent-domestic plant data from 1995 to 2016 using the concordance developed by the Research Institute of Economy, Trade and Industry (RIETI).[14] That allowed us to capture employment and offshoring at the local level. Without our dataset, manufacturing employment and offshoring cannot be measured at the local level. Moreover, the use of our dataset enables us to distinguish the employment of plants that belong to offshoring firms from those belonging to non-offshoring firms, which is essential in analyzing the spillover effects of offshoring (Section 5).

Because we utilize matched foreign-affiliate-domestic parent-domestic plant data, we limit our sample to domestic plants and foreign affiliates 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 13, our dataset covers 81.7 percent of domestic manufacturing

[14] Because of the availability of concordances, the data cannot be extended before or after this period, as of the day of writing this paper.

Table 1: Summary Statistics

	ΔL	ΔOffshoring	ΔImports
Mean	14.398	8.934	40.700
SD	97.521	31.754	98.476
p5	-46.838	0.251	2.973
p50	-8.459	2.414	18.393
p95	167.530	21.950	118.772
N	213	213	213

Notes: ΔL indicates manufacturing employment growth from 1995 to 2016. ΔImports and ΔOffshoring are based on equations (2) and (3), respectively. SD, p5, p50, and p95 indicate standard deviation, the 5 percentile, median, and 95 percentile, respectively. N means the number of observations.
Source: For the data sources, see Section 2.2.

employment, even when we focus on firms with at least 50 employees and capital exceeding 30 million yen.

For imports from China, we utilize import data from the Japan Industrial Productivity (JIP) Database 2018 by the RIETI. Because the industry classifications used in these data are different, we aggregate some industries. The total number of industries is 44. In sum, our sample consists of 213 UEAs ($j = 1, ..., 213$) and 44 industries ($i = 1, ..., 44$) over 22 years ($t = 1995, ..., 2016$).

2.3 Measurement of local level employment, offshoring, and imports

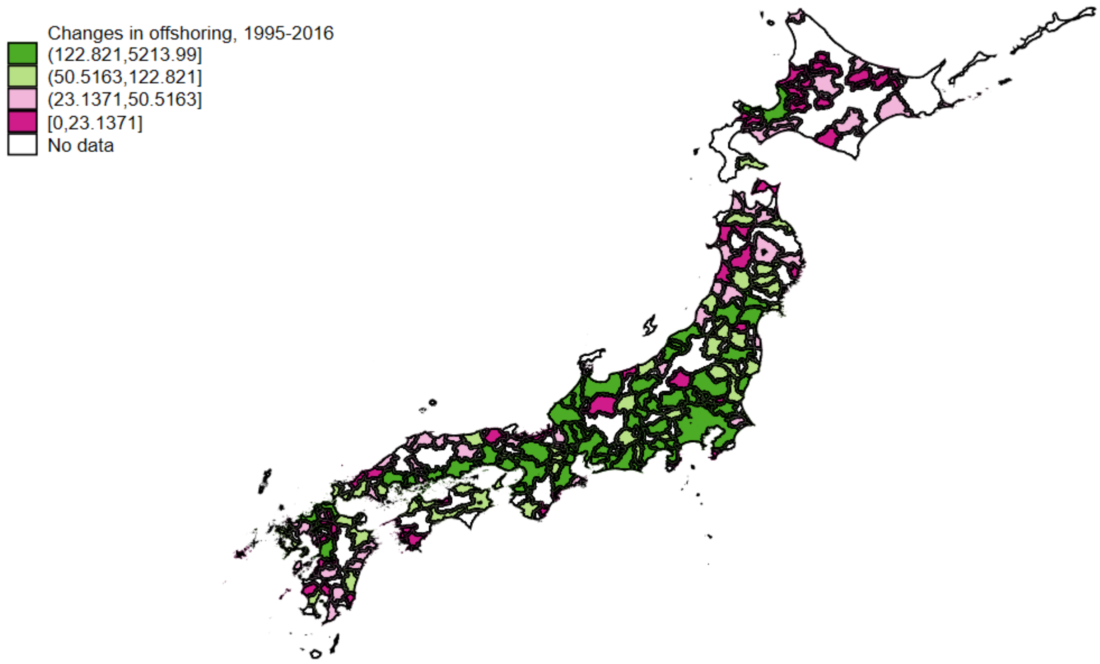
Industry i's employment in the UEA j in year t, $L_{ij,t}$, is computed by aggregating the employment of plants at the UEA and industry levels. Then, local employment is obtained by aggregating employment at the UEA level, $L_{j,t} = \sum_i L_{ij,t}$. As mentioned in Section 2.1, offshoring and imports are not available at the UEA level. We construct UEA-level offshoring and imports based on equations (2) and (3), respectively.

Table 1 presents the summary statistics for the changes in employment, offshoring, and imports from China at the UEA-level between 1995 and 2016. Table 1 indicates that, although the median employment growth is -8.5 percent, its mean is 14.4 percent, implying that a few UEAs had large manufacturing employment growth.[15] As per Figure 2, both offshoring and imports from China show an increasing trend.

Figures 3 and 4 present the changes in the imports from China and offshoring from

[15] At the industry level, domestic employment declined in all manufacturing industries except for motor vehicles, motor vehicle parts and components, and other transportation equipment (See Figure 5).

Figure 3: Changes in Offshoring between 1995 and 2016, by Urban Employment Area



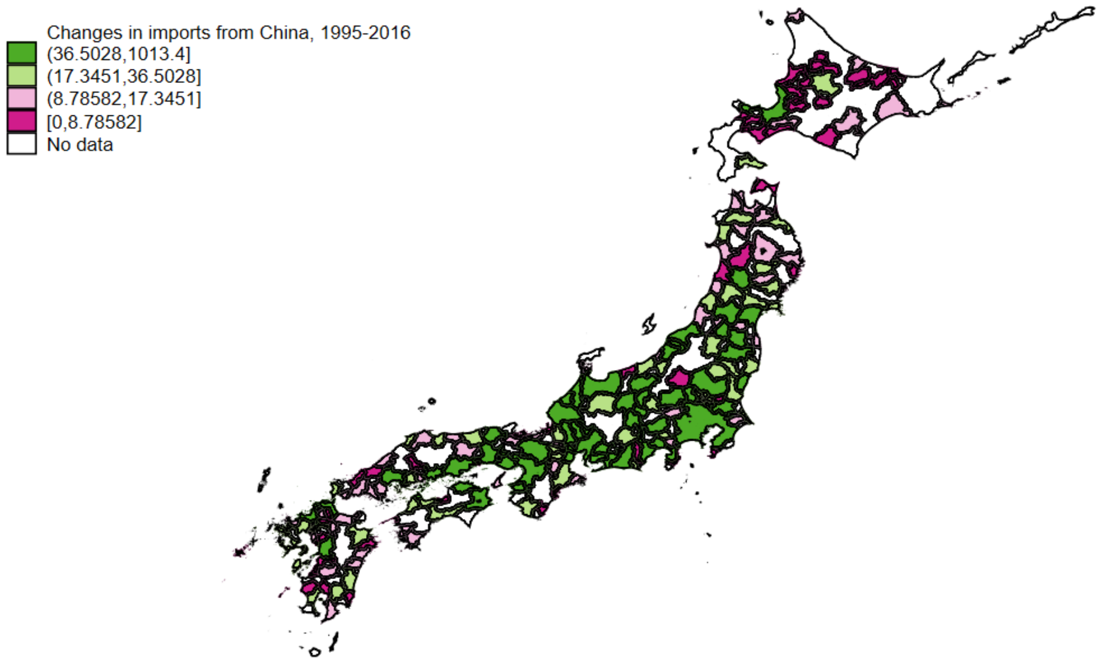
Notes: Some UEAs are omitted to facilitate visualization.
Sources: Offshoring is from *the Basic Survey on Overseas Business Activities* (METI); Manufacturing employment is obtained from *the Census of Manufacture* (METI); UEAs are from Kanemoto and Tokuoka (2002).

1995 to 2016 by UEA. These figures show similar patterns. This, in turn, implies that the descriptive statistics cannot distinguish between the effects of offshoring exposure and those of the Chinese import competition. We 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, while offshoring is measured by the employment of manufacturing foreign affiliates. Column (1) presents the results of the ordinary least squares (OLS) estimations. Column (2) is our main specification, where both offshoring and import exposures are endogenous variables. Column (3) presents the estimation results when offshoring exposure is treated as an exogenous variable, while column (4) presents the results when import exposure is treated as an exogenous variable for reference. For the first-stage results, we report Shea's adjusted partial R^2 because equation (1) includes multiple endogenous variables.

Figure 4: Changes in Imports from China between 1995 and 2016, by Urban Employment Area



Notes: Some UEAs are omitted to facilitate visualization.
Sources: Chinese imports are from the JIP 2018 database (RIETI); Manufacturing employment is obtained from *the Census of Manufacture* (METI); UEAs are from Kanemoto and Tokuoka (2002).

Table 2: Main Results

	(1) OLS	(2) IV	(3) IV	(4) IV
ΔOffshoring	0.25109	0.09851***	0.11572**	0.06943
	[0.28109]	[0.02950]	[0.05271]	[0.12927]
ΔImports	-0.07952	-0.06828***	-0.07192***	-0.06132**
	[0.07087]	[0.00782]	[0.01303]	[0.03093]
N	213	213	213	213
Local market	UEA	UEA	UEA	UEA
Industry				
Parent	MFG	MFG	MFG	MFG
Foreign affiliates	MFG	MFG	MFG	MFG
Offshoring	EMPL	EMPL	EMPL	EMPL
First stage: Shea's adjusted partial R^2				
Offshoring	NA	0.920	NA	0.059
Imports	NA	0.894	0.821	NA

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 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.

We highlight the following four findings. First, in column (2), Shea's adjusted partial R^2 indicates high values, which suggests that our instruments are strong, meaning the problem of the weak instruments is not an issue. Second, column (1) indicates that neither offshoring nor imports present significant coefficients. By contrast, column (2) indicates that offshoring exposure has significantly positive effects on employment, while import exposure has significantly negative effects. This implies that OLS underestimates the impact of offshoring and imports from China.

Third, column (3) shows a larger coefficient for offshoring exposure than column (2). By contrast, column (4) presents an insignificant coefficient for offshoring exposure. These results suggest that, without addressing the endogeneity of offshoring and imports simultaneously, the coefficients on offshoring are either overestimated or underestimated. Furthermore, the standard error of the coefficient on import exposure is smaller in column (2) than in columns (3) and (4), implying that the estimated coefficients are more precise when we control for the endogeneity of offshoring and import exposure simultaneously, than when we consider the endogeneity of only one of these variables.

Finally, our main specification (column (2)) indicates that Chinese import competition has significantly negative effects on local employment. This result is consistent with the findings of Autor, Dorn, and Hanson (2013), who found a negative Chinese shock in the United States. By contrast, the effect of offshoring is significantly positive, suggesting that offshoring exposure contributes to local employment growth.

Why does offshoring exposure have positive effects on employment? There are several possible mechanisms underlying this phenomenon. First, offshoring in the last stage of production leads to an increase in the production of intermediate stages in Japan, raising the labor demand in the country. Second, because of offshoring, plants may reallocate workers from offshored activities to other activities. Third, as a result of offshoring unskilled-intensive activities, the demand for skill-intensive activities increases. If the unskilled-intensive activities effect exceeds the skill-intensive, overall employment increases, although the composition of workers changes in this case.[16]

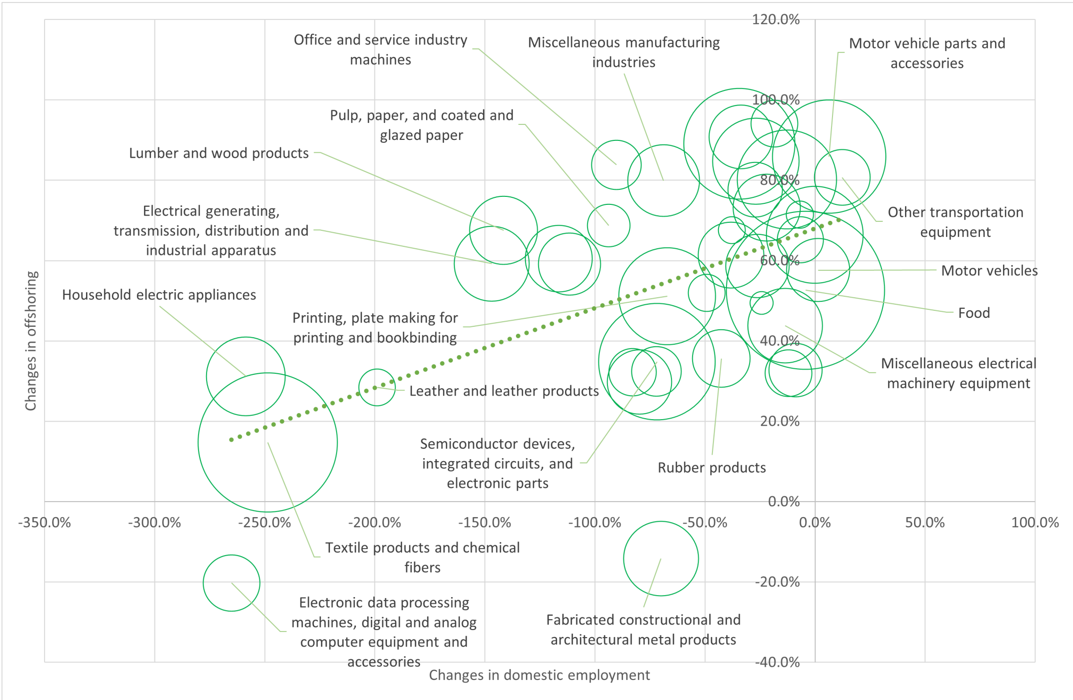
One may argue that the results are trivial because they reflect the industry composition of the local labor market. For instance, if an industry is productive, it will actively engage in offshoring while increasing domestic employment and sales. Therefore, our results reflect that such a productive industry is located in the local labor market. Because the variables used in our analysis are similar to other local labor market studies, measured at the local labor market level, it is difficult to consider industry productivity changes explicitly. Nonetheless, this argument suggests a positive correlation between the changes in domestic sectoral employment and offshoring. As a shortcut, we verify whether such a correlation is observed.

Figure 5 presents this correlation for 1995–2016. The horizontal axis indicates the changes in domestic employment, and the vertical axis, the changes in offshoring. The size of the circle represents the employment size in 1995. Industries with offshoring changes greater than 300 percent are regarded as outliers and dropped from the figure. The share of domestic employment of these dropped industries combined accounts for only 1.1 percent of total domestic manufacturing employment.[17] The dotted line indicates the predicted value from the linear regression.

[16] Head and Ries (2003) also found that additional affiliate employment in low-income countries increases the skill intensity of Japanese multinationals.

[17] These industries are: chemical fertilizers, electronic equipment and electric measuring instruments, and prepared animal foods and organic fertilizers.

Figure 5: Changes in Offshoring and Domestic Employment between 1995 and 2016, by Industry



Notes: Industries with greater than 300 percent change in offshoring are regarded as outliers and are dropped from this figure. The dotted line indicates the predicted value from the linear regression.
Source: For the data sources, see Section 2.2.

There are two notable findings. First, we confirm a positive correlation between changes in domestic sectoral employment and offshoring. This finding suggests that the industry characteristics are important. Second, offshoring increased in almost all industries. Because the changes in offshoring are clustered between 20 and 100 percent, it is difficult to determine which industries actively engage in offshoring. A similar argument was made by Bernard, Eaton, Jensen, and Kortum (2003). Focusing on exports by plants, they pointed out that "while previous work has sought to link trade orientation with industry, exporting producers are in fact quite spread out across industries" (p. 1271). This result implies that, although industry characteristics matter in explaining the relationship between offshoring and domestic employment, they cannot explain all aspects. Given the firm heterogeneity within an industry, our results are thus not necessarily trivial.

We should also note that although offshoring exposure contributes to local employment, its magnitude is limited. The estimated coefficient on offshoring exposure indicates that a 10 percent increase in foreign manufacturing employment drives a 1.3 percent increase in local employment. As per Figure 1, overall manufacturing employment declined at the national level, suggesting that offshoring mitigated the negative effects of imports from China.

Thus far, we have focused on the manufacturing activity of foreign affiliates, excluding non-manufacturing activities. Moreover, we define the local labor market by UEAs rather than jurisdictional areas. One may ask whether these points matter because, if not, the analysis will be much simpler and easier to implement. To answer this question, we examine the validity of the definitions of foreign affiliates and the local labor market as a supplementary analysis. The results, presented in Section A.2, indicate that if we include the activity of non-manufacturing foreign affiliates, the positive effects of offshoring exposure will be overestimated. The results also show that the instruments become weak when jurisdictional areas are utilized rather than UEAs. In sum, the focus on the manufacturing activities of foreign affiliates and the use of UEAs matter.

4 Robustness Checks

4.1 Alternative measure of offshoring

One concern is that our results are sensitive to the measurement of offshoring. In the main analysis, we measured offshoring by the employment of foreign affiliates. However, the results may change if an alternative measure of offshoring is employed. Hence, we measure offshoring by investment in manufacturing foreign affiliates as follows:

$$\Delta \text{Offshoring}_{j,t} = \sum_i \frac{K_{ij,0}}{K_{i,0}} \frac{\Delta \text{Offshoring}_{i,t}}{L_{j,0}}, \tag{8}$$

where i indicates the industry of the foreign affiliate, $K_{ij,0}/K_{i,0}$ is the share of industry i's capital stock in UEA j in industry i's total capital stock in Japan in the initial year (i.e., $t = 0$), and $\Delta\text{Offshoring}_{i,t}$ is the change in industry i's offshoring from the initial year (i.e., $t = 0$) to year t. We use the capital stock rather than employment for weights because we measure offshoring by the value of investments rather than employment.

Table 3: Robustness Check

	(1) IV	(2) IV	(3) IV	(4) IV	(5) IV
ΔOffshoring	0.09851***	0.00814**	0.11541***	0.10832***	0.06270***
	[0.02950]	[0.00337]	[0.02504]	[0.02294]	[0.02322]
ΔImports	-0.06828***	-0.07743***	-0.08482***	-0.05983***	-0.05363***
	[0.00782]	[0.01386]	[0.01126]	[0.00621]	[0.01178]
N	213	213	212	213	222
Local market	UEA	UEA	UEA	UEA	UEA
Industry					
Parent	MFG	MFG	MFG	MFG	MFG
Foreign affiliates	MFG	MFG	MFG	MFG	MFG
Offshoring	EMPL	Investment	EMPL	EMPL	EMPL
First stage: Shea's adjusted partial R^2					
Offshoring	0.920	0.668	0.929	0.684	0.952
Imports	0.894	0.738	0.949	0.747	0.971
Area	All	All	Non-Tokyo	All	All
Period	1995–2016	1995–2016	1995–2016	1995–2005	2006–2016

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.

The value of investments by foreign affiliates was obtained from BSOBA.[18] For capital stock, we aggregate the tangible assets of the plants from the CM.

Column (2) in Table 3 presents the estimation results of the alternative measure of offshoring, whereas column (1) indicates our main results (i.e., column (2) in Table 2). Column (2) indicates that Shea's adjusted partial R^2 is 0.67 and 0.74 for offshoring and imports, respectively. Although these are smaller than those in column (1), they are still relatively high. The sign is the same as in column (1) for offshoring and imports. Although the significance level slightly declines for offshoring, it remains significant at the 5 percent level. Note that the magnitudes of the coefficients are not directly comparable because employment and investment use different units. These results imply that our main result holds even when we employ an alternative measure of offshoring.

[18]For the investment value in 1995, the investment value in 1995 is used directly. For the investment value in 2016, we use the cumulative value of the investment from 1995 to 2016.

4.2 The Tokyo Metropolitan Area

Another concern may be that our results are mainly driven by the Tokyo Metropolitan Area because, in Japan, the economic activity is strongest in this area. In 1995, 23.5 percent of manufacturing employment was concentrated in the Tokyo Metropolitan Area. If this area is an outlier, our results may not hold for other areas. To address this concern, we verify whether our results are sensitive to the inclusion of the Tokyo Metropolitan Area.

Column (3) presents the estimation results.[19] Since the Tokyo Metropolitan Area was excluded, the number of observations declined from 213 to 212. The results indicate that Shea's adjusted partial R^2 is 0.93 and 0.95 for offshoring and imports, respectively, meaning the instruments are strong. The sign and significance levels are the same as those in column (1) for offshoring and import exposure. The magnitude of the coefficients is slightly larger in absolute terms for both offshoring and import exposure. These results suggest that the positive effect of offshoring is more evident, whereas the negative effect of imports from China is more severe in areas other than the Tokyo Metropolitan Area. Overall, we can conclude that our results are robust to excluding the Tokyo Metropolitan Area.

4.3 Sub-sample analysis

One may be further concerned that our results are sensitive to the choice of sample period because our main analysis covers more than two decades. If the positive effects of offshoring are limited to a particular period, our results do not have external validity. Hence , we split the sample period in half (i.e., 1995–2005 and 2006–2016) and estimate equation (1) for each period.

Columns (4) and (5) present the estimation results for 1995–2005 and 2006–2016, respectively.[20] The instruments are weaker for 1995–2005 than for 2006–2016 as Shea's adjusted partial R^2 is 0.68 and 0.75 for offshoring and import exposures, respectively. Nonetheless, the values are reasonably high. The sign and significance levels are the same as those in column (1) for offshoring and import exposure.

[19] The weight of instruments $L_{ij,0}/L_{i,0}$ is also recalculated when dropping the Tokyo Metropolitan Area.

[20] For the weight of instruments $L_{ij,0}/L_{i,0}$, the initial year is set to 2006 if the analysis focuses on the period between 2006 and 2016.

An important difference may be the magnitude of the coefficients. The coefficient on offshoring exposure declines from 0.11 to 0.06 from 1995–2006 to 2006–2016. This result implies that, although the effect of offshoring exposure is significantly positive, its effect has declined in recent years. Whereas this is beyond the scope of our study, clarifying it is essential for future research.

5 Extensions

5.1 Difference between offshoring firms and non-offshoring firms

As discussed in Section 3, within the same industry, some firms engage in offshoring, whereas others do not. While we did not consider this issue, firm heterogeneity becomes essential when we discuss the relationship between offshoring and non-offshoring firms.

Offshoring may result in a decline in employment at the firm-level. However, it is unclear whether this issue affects other non-offshoring firms in the same local market. For example, Greenstone, Hornbeck, and Moretti (2010) found that the establishment of a large plant had positive effects on the productivity of other existing plants in the same country. Because offshoring firms are generally large, their plants are also possibly large. If a large domestic plant shuts down because of offshoring, existing plants in the same region could have negative productivity effects. By contrast, Ito and Tanaka (2014) examined the effects of firms' offshoring on the employment of their suppliers in the home country using firm-level transaction data. The analysis revealed statistically positive effects. Noting that transactions are more likely to occur between firms in neighboring areas, their results imply that the expansion of offshoring could positively affect the local labor market.

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

$$\Delta L_{j,t}^{\text{Offshoring}} = \gamma_t + \beta \Delta \text{Offshoring}_{j,t} + \varepsilon_{j,t} \tag{9}$$

$$\Delta L_{j,t}^{\text{Non-offshoring}} = \gamma_t + \beta \Delta \text{Offshoring}_{j,t} + \varepsilon_{j,t}, \tag{10}$$

where $L_{j,t}^{\text{offshoring}}$ and $L_{j,t}^{\text{Non-offshoring}}$ denote the employment of offshoring and non-offshoring

Table 4: Difference between Offshoring and Non-offshoring Firms

	(1) IV	(2) IV
ΔOffshoring	0.03960	0.08560***
	[0.03200]	[0.02197]
ΔImports	-0.04635***	-0.06527***
	[0.00903]	[0.00630]
N	177	213
Local market	UEA	UEA
Industry		
Parent	MFG	MFG
Foreign affiliates	MFG	MFG
Offshoring	EMPL	EMPL
First stage: Shea's adjusted partial R^2		
Offshoring	0.858	0.936
Imports	0.879	0.900
Firm	Offshoring	Non-offshoring
Area	All	All
Period	1995–2016	1995–2016

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.

firms, respectively. Their sum is equal to the total employment in UEA j: $L_{j,t}^{\text{offshoring}} + L_{j,t}^{\text{Non-offshoring}} = L_{j,t}$. The definitions of the other variables are the same as before.

Table 4 presents the estimation results. The number of observations for offshoring firms in column (1) is smaller than that for non-offshoring firms in column (2) because the offshoring firms do not have any plants in some UEAs. Table 4 indicates that all Shea's adjusted partial R^2 exceed 0.86, which indicates strong instruments.

The sign and significance levels of import exposure are the same as those of column (1). However, the coefficient on offshoring exposure becomes insignificant for offshoring firms, whereas that on non-offshoring firms continues to be significantly positive. These results suggest a positive spillover effect from offshoring to non-offshoring firms. In other words, offshoring has a significant positive effect on the employment of non-offshoring firms in the same UEA. As Greenstone, Hornbeck, and Moretti (2010) have shown, this may be due to the productivity spillovers from offshoring firms. Alternatively, as pointed out by Ito and Tanaka (2014), offshoring exposure may contribute to the growth of local employment through supply chain linkages. It should be noted that offshoring exposure does not have an insignificant effect on offshoring firms' employment, implying a limited threat of employment, although manufacturing firms increase the offshoring of their manufacturing activities.

5.2 Possible mechanisms

In Section 3, we find that offshoring exposure has a positive effect on employment. As a possible mechanism, it is possible that the domestic production and/or productivity of plants increases as a consequence of offshoring. To further investigate these possibilities, we replace the dependent variable in equation (1) from the changes in local employment with the changes in gross output, value added, average wages, and labor productivity.

Table 5 presents the estimation results. Columns (1)–(4) show the results when we utilize the changes in gross output, value added, average wages, and labor productivity, respectively. Labor productivity is measured by the per-capita value added. Table 5 shows that Shea's adjusted partial R^2 is 0.920 for offshoring exposure and 0.894 for import exposure, which implies the strongness of the instrumental variables.[21] The coefficient on import exposure is significantly negative in all the columns. These results suggest that the import exposure results in a decline in gross output, value added, average wages, and labor productivity.

By contrast, the coefficient on offshoring exposure is significantly positive for gross output, value added, and average wages. This implies that, as expected, offshoring contributes to increases in output production, which leads to increases in value added and average wages. However, the coefficient on offshoring exposure is insignificant for labor productivity. While only indicative, these results suggest that supply chain relationships do not explain the positive effects of offshoring exposure on local employment.

[21] Shea's adjusted partial R^2 are the same between columns (1) and (4) because the first stage regression is the same.

Table 5: Possible Mechanisms

	(1)	(2)	(3)	(4)
	IV	IV	IV	IV
ΔOffshoring	0.16629***	0.14239*	0.06275***	0.02548
	[0.04174]	[0.07715]	[0.00773]	[0.03503]
ΔImports	-0.10930***	-0.09949***	-0.02667***	-0.02084**
	[0.00993]	[0.01873]	[0.00228]	[0.00881]
N	213	213	213	213
Local market	UEA	UEA	UEA	UEA
Industry				
Parent	MFG	MFG	MFG	MFG
Foreign affiliates	MFG	MFG	MFG	MFG
Dependent variable	Gross output	Value added	Average wages	Labor productivity
First stage: Shea's adjusted partial R^2				
Offshoring	0.920	0.920	0.920	0.920
Imports	0.894	0.894	0.894	0.894
Firm	All	All	All	All
Area	All	All	All	All
Period	1995—2016	1995—2016	1995—2016	1995—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.

6 Concluding Remarks

In this study, we examined the local labor market effects of offshoring exposure on manufacturing activities. One of the main contributions of this study is that we developed matched foreign affiliate-domestic parent-domestic plant data in Japan to measure manufacturing employment and offshoring of manufacturing activities at the local level. The data cover the period between 1995 and 2016, when offshoring rose and manufacturing employment declined.

Our results indicate that, while imports from China negatively affect local manufacturing employment, offshoring exposure contributes to mitigating such negative effects. We find that a 10 percent increase in foreign manufacturing employment drives a 1 percent increase in local employment. This result is majorly robust even if we employ an alternative measure of offshoring, such as excluding the Tokyo Metropolitan Area or performing a sub-sample analysis. We also found that offshoring exposure has a significantly positive effect on the employment of non-offshoring firms in the same local labor market.

These results have important policy implications. Policies supporting firms' offshoring are sometimes controversial because they may negatively affect domestic employment. Our results suggest that this is not the case, even at the local labor market level. Indeed, offshoring manufacturing activities can mitigate the decrease in domestic manufacturing employment. Overall, our results indicate that offshoring negatively affects local employment.

A limitation of this study is that plant-level data in Japan report employment only at the aggregate level. The impact of Chinese import competition and offshoring exposure could differ between the skills of workers and/or between tasks. 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. Owing to data limitations, these issues are beyond the scope of our study.

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A Appendix

A.1 Data Appendix

This appendix presents the employment of foreign affiliates in manufacturing and non-manufacturing industries between 1995 and 2016. The parent firms are limited to manufacturing firms.

Table A1: Share of Non-manufacturing Employment

	Total	Manufacturing	Non-manufacturing	Share
1995	1,632	1,480	152	9.3%
1996	2,098	1,888	210	10.0%
1997	2,281	2,049	232	10.2%
1998	2,169	1,928	241	11.1%
1999	2,594	2,308	286	11.0%
2000	2,840	2,522	318	11.2%
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 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.

A.2 Validation of the definitions of foreign affiliates and local labor markets

In the main analysis, we focused on the manufacturing activities of foreign affiliates and excluded non-manufacturing activities. Moreover, we defined the local labor market using UEAs rather than jurisdictional areas. To determine whether these points matter or complicate the analysis unnecessarily, we examine the validity of the definitions of foreign affiliates and the local labor market as a supplementary analysis.

We first measure the offshoring variable, incorporating the employment of manufacturing and non-manufacturing foreign affiliates. The results are presented in column (2) of Table A2, whereas column (1) presents our main results (i.e., column (2) in Table 2). This table indicates that the sign and significance levels are the same for offshoring and import exposure.

Table A2: Validation of the Definitions of Foreign Affiliates and Local Labor Markets

	(1) IV	(2) IV	(3) IV
ΔOffshoring	0.09851***	0.14142***	0.18278***
	[0.02950]	[0.04859]	[0.06240]
ΔImports	-0.06828***	-0.07870***	-0.13096**
	[0.00782]	[0.01206]	[0.05251]
N	213	213	47
Local market	UEA	UEA	Prefecture
Industry			
Parent	MFG	MFG	MFG
Foreign affiliates	MFG	All	MFG
Offshoring	EMPL	EMPL	EMPL
First stage: Shea's adjusted partial R^2			
Offshoring	0.920	0.866	0.554
Imports	0.894	0.884	0.383

Notes : UEA, MFG, and EMPL stand for urban employment area, manufacturing, and employment, respectively. *** and ** indicate statistical significance levels at 1 percent and 5 percent, 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.

However, the magnitude is different, particularly for the offshoring exposure. Its coefficient is 0.14, which is more than 40 percentage points greater than that of our main result (0.10). That implies that if we include the activity of non-manufacturing foreign affiliates, the positive effects of offshoring exposure will be overestimated. This is not surprising if non-manufacturing activities include export-platform activities such as sales branches. If the activity of sales branches in foreign countries expands, exports from domestic plants to sales branches also increase, which is expected to have positive effects on the domestic activity in general. In other words, even if we focus only on manufacturing activities, we find significant positive effects on the local labor market, similar to our main results.

Next, we redefine the local labor market for the 47 prefectures in Japan rather than the 213 UEA level. Column (3) presents the estimation results. First, Shea's adjusted partial R^2 is small: 0.554 for offshoring exposure and 0.383 for import exposure, suggesting these instruments are not strong. That may be because jurisdictional areas are so aggregated that they cannot capture differential effects within each jurisdictional area. Our results imply that the definition of the local labor market matters when analyzing the offshoring effects.