Dataset of the Influence of the Local Labour Market on the Scale of Japanese Direct Investment Enterprises in the Bohai Sea Rim Region (1990–2016)

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Abstract: Authors analysed the information from Overview of Inbound and Outbound Enterprises (County Edition) published in 2016 to obtain data on foreign direct investment (FDI) enterprises from Japan in the Bohai Sea Rim region from 1990 to 2016. Moreover, the authors used statistical data from Chinese Population Census by County (2010) and The Third Economic Census Yearbook of five provinces (Beijing, Tianjin, Hebei, Liaoning and Shandong) to obtain the influence dataset of the local labour market on the scale of Japanese direct investment enterprises in the Bohai Sea Rim region (1990–2016). The dataset includes the result data and attached data. The result data include (1) amounts of FDI from Japan used in China and proportions to total flows from Asian countries, 2002–2021; (2) number of Japanese enterprises in the Bohai Sea Rim region and its proportion to the total number in China; (3) geographical concentration degree of different industries in the Bohai Sea Rim region in 2013; and (4) number of development zones and universities and colleges offering a Japanese major on the county scale in the Bohai Sea Rim region in 2016. The attached data include (1) the attribute of Japanese enterprises in the Bohai Sea Rim region; (2) the number of labour force and shared labour force in the Bohai Sea Rim region in 2010; and (3) the dedicated labour force in specific industries in the Bohai Sea Rim region in 2013. The dataset is archived in .xls format and consists of one data file with a size of 234 KB.

Keywords: labour force scale; dedicated labour force; shared labour force; Japanese transnational enterprises scale; Bohai Sea Rim region

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[2] Wang, M. J., Ma, H.W., Shao, J., *et al*. Influence dataset of the local labor market on the scale of Japanese direct investment enterprises in Bohai Sea Rim region (1990–2016) [J/DB/OL]. *Digital Journal of Global Change Data Repository*, 2023. https://doi.org/10.3974/geodb.2023.10.01.V1. https://cstr.escience.org.cn/CSTR:20146.11.2023.10.01.V1.

Dataset Availability Statement:

The dataset supporting this paper was published and is accessible through the *Digital Journal of Global Change Data Repository* at: 3https://doi.org/10.3974/geodb.2023.10.01.V1 or https://cstr.escience.org.cn/CSTR:20146.11.2023.10.01.V1.

1 Introduction

Since 1985, the focus of Japanese investment in Asia has been shifting to China. A total of 52 Japanese multinational enterprises (JMEs) were operating in mainland China in 1985, accounting for 1.7% of the total number of JMEs in Asia. The number of JME in China increased to 6,091 in 2012 with the corresponding proportion of 39.10%, surpassing the 'Four Asian Tigers' with 4,135 and 26.50% and four ASEAN countries (Philippines, Indonesia, Malaysia and Thailand) with 4,007 and 25.70%, thus becoming Japan's largest investment destination country in Asia. In 2016, the number and proportion of JMEs in China were 6,363 and 38.5%, respectively. While the number of JMEs in China has increased rapidly, the size of enterprises has declined significantly. From 1990 to 2015, the average employment size of JMEs at the national level in China dropped from 1,018 to 80, and that in the Bohai Sea Rim region dropped from 757 to 155[1]. Why is there such a significant change in JMEs size? What are the dominant factors behind it? In other words, what factors decide the size of local foreign direct investment (FDI) subsidiaries? These problems need to be investigated in depth.

The investment of JMEs in China is determined by the comprehensive balance of production supply factors and product demand market factors. The former includes industrial tax policies, labour force, human capital, raw materials, land cost, social capital and agglomeration factors required by enterprise production, while the latter refers to market demand factors for product sales, including the local market, the Japanese market and the third-country market. While the role of the market increases, like the vertical FDI facing Japan and the platform FDI facing the third-country market, labour supply factors remain important and have undergone significant changes. Firstly, the importance of a cheap labour force has declined. Secondly, the proportion of human capital has remained steady at 3% to 4%, showing a significant rise compared with the change in cheap labour.

Labour supply is still an important factor for JMEs in China, which is why local labour supply factors must have a key impact on the size of JMEs. What is the specific manifestation of this impact? Existing research has not yet provided answers to this question. Therefore, this study integrates the attribute information of JMEs in the Bohai Sea Rim region with the labour force scale dataset of cities. This dataset can be used to analyse the attribute characteristics of JMEs in the Bohai Rim region and also provide explanations for the shrinking size of JMEs in China.

2 Metadata of the Dataset

The metadata of the Dataset of the influence of the local labour market on the scale of Japanese direct investment enterprises in the Bohai Sea Rim region (1990–2016)[2] are summarised in Table 1. It includes the dataset's full name, short name, authors, year, data format, data size, data files, data publisher and data sharing policy, etc.
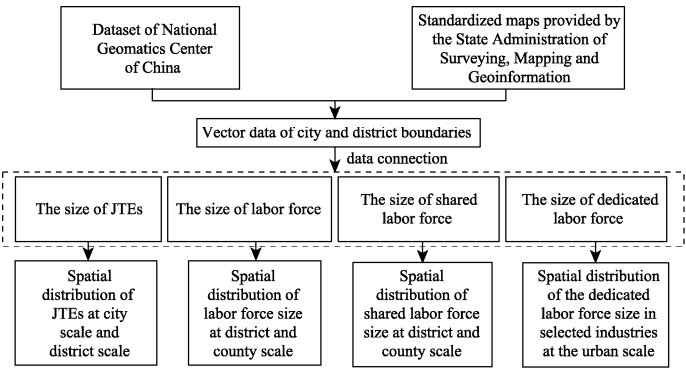
3 Data Sources and Methods

3.1 Data Sources and Processing

The enterprise data are derived from the Overview of Japanese Export and Import Enterprises

(2016), including the location of the enterprise, employee size, subordinate sectors, date of establishment, business content and Japanese investment proportion of JMEs in the

Table 1   Metadata summary of the Dataset of the influence of the local labour market on the scale of Japanese direct investment enterprises in the Bohai Sea Rim region (1990–2016)

Items	Description
Dataset full name	Dataset of the influence of the local labour market on the scale of Japanese direct investment enterprises in the Bohai Sea Rim Region (1990–2016)
Dataset short name	BohaiFDI_1990-2016
Authors	Wang, M. J. JDV-5082-2023, School of Resources Environment & Tourism, Capatial Normal University, maojunw@yeah.net Ma, H.W. JDU-8149-2023, School of Resources Environment & Tourism, Capatial Normal University, mahuiwenchn@163.com Shao, J. PLA Strategic Support Force Information Engineering University, wjingshao@yeah.net Gao, Y. F. JDV-6003-2023, Shanxi Urban & Rural Planning and Design Institute CO., LTD., 421739507@qq.com
Geographical region	Bohai Sea Rim region
Year	1990–2016
Data format	.xlsx
Data size	234 KB
Data files	The result data include (1) amounts of FDI from Japan used in China and its proportions to total flows from Asian countries, 2002–2021; (2) number of Japanese enterprises in the Bohai Sea Rim region and its proportion to the total number in China; (3) geographical concentration of different industries in the Bohai Sea Rim region in 2013; and (4) number of development zones and universities and colleges offering a Japanese major on the county scale in the Bohai Sea Rim region in 2016. The attached data include (1) the attribute of Japanese enterprises in the Bohai Sea Rim region; (2) the number of labour force and shared labour force in the Bohai Sea Rim region in 2010; and (3) the dedicated labour force in specific industries in the Bohai Sea Rim region in 2013
Foundation	National Natural Science Foundation of China (41771183)
Data publisher	Global Change Research Data Publishing & Repository, http://www.geodoi.ac.cn
Address	No. 11A, Datun Road, Chaoyang District, Beijing 100101, China
Data sharing policy	(1) *Data* are openly available and can be free downloaded via the Internet; (2) End users are encouraged to use *Data* subject to citation; (3) Users, who are by definition also value-added service providers, are welcome to redistribute *Data* subject to written permission from the GCdataPR Editorial Office and the issuance of a *Data* redistribution license; and (4) If *Data* are used to compile new datasets, the 'ten per cent principal' should be followed such that *Data* records utilized should not surpass 10% of the new dataset contents, while sources should be clearly noted in suitable places in the new dataset[3]
Communication and searchable system	DOI, CSTR, Crossref, DCI, CSCD, CNKI, SciEngine, WDS/ISC, GEOSS

Figure 1   Technical route of the dataset development

Bohai Sea Rim region. On the basis of the data validity, we select a total of 681 Japanese subsidiaries in 28 prefecture-level cities of the Bohai Sea Rim region. The labour force scale data and other influencing factor data sources are shown in Table 2.

Table 2   Sources of data on factors influencing the local labour market on the scale of JMEs

Variable		Definition of index	Year	Source
Dependent variable	Employee size	Enterprise employees (logarithm)	2016	Overview of Japanese Export & Import Enterprises (2016) [1]
Independent variables	Labor supply size	Population with labour capacity of county (logarithm)	2010	County Data in Population Census of China (2010) [4]
	Shared labour size	Migrant population of county (logarithm)	2010	County Data in Population Census of China (2010) [4]
	Dedicated labour size	Number of employees in the subordinate industry of urban enterprises (logarithm)	2013	The Third China Economic Census Yearbook [5–9]
Control variables	Parent enterprise attributes	Listed enterprise or not	Listed =1, unlisted =0	2016	Overview of Japanese Export & Import Enterprises (2016) [1]
		Local initial investment or not	Initial investment=1, Non-initial investment=0	2016	Overview of Japanese Export and Import Enterprises (2016) [1]
	Subsidiary attributes	Age of enterprise	Survival age as of 2016	2016	Overview of Japanese Export & Import Enterprises (2016) [1]
		Mode of joint venture and sole proprietorship	Joint venture=0, Sole proprietorship=1	2016	Overview of Japanese Export & Import Enterprises (2016) [1]
		Industry category	Services=1, manufacturing=0	2016	Overview of Japanese Export & Import Enterprises (2016) [1]
	Market structure	Local market orientation	Urban social consumption retail sales (logarithm)	2016	Statistical yearbooks of Chinese cities
		Foreign market orientation	County export volume (logarithm)	2016	Statistical yearbooks of Chinese cities
	Spatial agglomeration	Total size of local agglomeration	Number of enterprises at district or county scale (logarithm)	2016	Statistical yearbooks of Chinese cities
		Size of JMEs	Cumulative number of JMEs at district or county scale	2016	Overview of Japanese Export & Import Enterprises (2016) [1]
	Cultural factors	Supply of Japanese-speaking labour force	Number of universities and colleges offering a Japanese major in cities	2016	Collected by the authors
	Location factors	Development zone	Number of development zones at provincial, district or county scale	2016	China Development Zone Audit and Announcement Catalog (2018 Edition)
		Urban type	Central urban area=1, non-central urban area=0	2016	Determined according to the planning horizon of each city

3.2 Technical Route

The technical route for producing data on the size of JMEs in the Bohai Sea Rim region, local labour market data and their spatial distribution is shown in Figure 1.

(1) The boundary vector data of cities, counties and districts in the Bohai Sea Rim Region are collected, mapped and integrated to form basic geographic boundary data.

(2) The attribute data of the scale of JMEs and the scale of labour force in the Bohai Sea Rim region are collected and organised. Then, the attribute data are connected with the boundary vector data of counties and districts in ArcGIS based on the same fields to complete the spatial distribution map of the scale of JMEs and the scale of the local labour market.

4 Data Results and Validation

4.1 Data Composition

The dataset of the influence of the local labour market on the scale of Japanese direct investment enterprises in the Bohai Sea Rim region contains three main sections: information on the attributes of JMEs in the Bohai Sea Rim region, the size of the labour force in each city in the Bohai Sea Rim region and statistics on other control variables.

4.2 Data Results

4.2.1 Spatial Distribution of the Size of JMEs in the Bohai Sea Rim Region
As shown in Figure 2, at the county and city scale, the size of JMEs in the central city is relatively smaller than those in distant suburbs. At the city scale, Qinhuangdao, Jining, Langfang, Weihai and Hengshui have the largest JME employment size with more than 400 people. The JMEs employment sizes of Tai'an, Handan, Dongying, Linyi and other cities are the smallest. The common characteristics of the latter cities is that they have few JMEs (less than four). The enterprise size of JMEs is related to their subordinate industries. The required minimum economic scale varies according to subordinate industries.
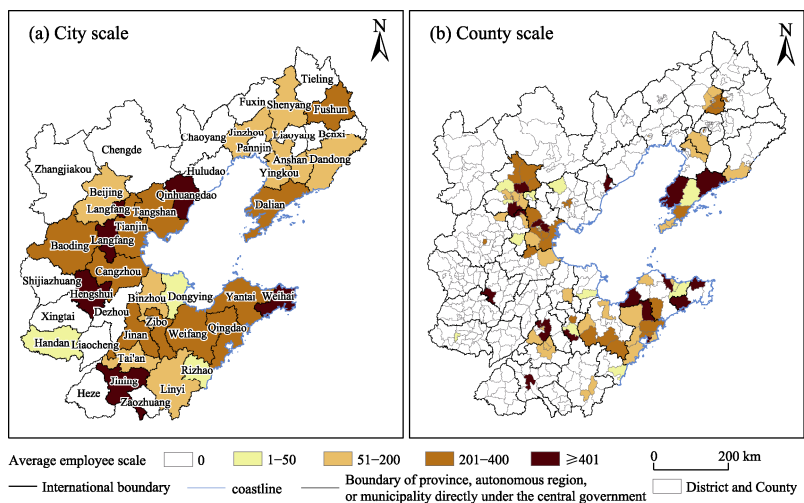
Figure 2   Map of spatial distribution of the average employee size of JMEs in the Bohai Sea Rim region

Despite significant differences in the average size of JMEs among cities, the average employment sizes in Beijing–Tianjin–Hebei, Liaoning and Shandong are 256, 249 and 280, respectively. Variance analysis shows that F (2.305) and SIG (0.101) indicate failure to pass the test at 0.1 level. Judging from this point of view, the attributes influencing the size of JMEs are more urban attributes than regional attributes. A few differences will certainly exist within each region. For instance, the coefficients of variation in Beijing–Tianjin–Hebei and Shandong province are 2.111 and 2.018, respectively. In Liaoning province, however, the average size and coefficient of variation of JMEs are 249 and 1.739, respectively, while the average JMEs size in other Liaoning cities is 100–200, except for Dalian with more than 200 people.

4.2.2 Spatial Distribution of the Size of the Labour Force in the Bohai Sea Rim Region

(1) Distribution characteristics of labour force size and shared labour force size

The labour force scale and the shared labour force scale show similar spatial distribution characteristics (Figure 3), with Beijing, Tianjin, Shenyang, Dalian, Qingdao and Jinan being

the main labour supply places in the Bohai Sea Rim region. In terms of the median size of local labour force, at the city scale, the Beijing–Tianjin–Hebei region is the largest, followed by Shandong province. At the county scale, Shandong province is the largest, followed by the Beijing–Tianjin–Hebei region. The median shared labour force size is the opposite of the local labour force. The dispersion degree of the labour force size in Beijing–Tianjin–Hebei at the urban scale is obviously lower than at district or county scale, but little difference exists between Shandong and Liaoning. The dispersion of the shared labour size at the urban scale is less than that at district or county scale.
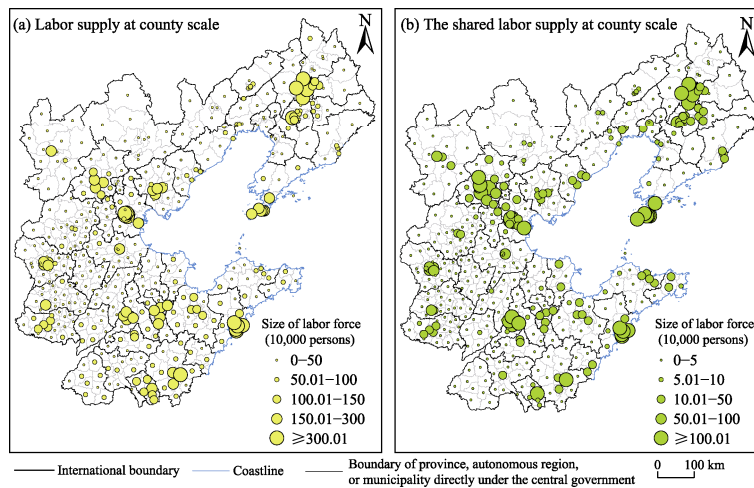
Figure 3 Map of spatial differentiation of labour force size and shared labour force size in the Bohai Sea Rim region

(2) Distribution characteristics of the dedicated labour force size

Transnational enterprises adopt spatial synergetic distribution of employment demand and supply with reference to the advantageous sectors of the local city and their own subordinate sectors. Enterprises can share the spillover benefit of the dedicated labour market when they match the supply and demand of the dedicated labour force. The matching degree between enterprises and labour force is measured by the size of employees in the subordinate sectors of specific JMEs in local cities. The geographical concentration index can be calculated by using Equation (1).

$$C_i = \sqrt{\frac{1}{m}\sum_j \left[C_{ij}(t) - \overline{C_{lj}}(t)\right]} \tag{1}$$

$$C_{ij}(t) = \frac{x_{ij}(t)}{\sum_j x_{ij}(t)} \tag{2}$$

$$\overline{C_{lj}}(t) = \sum_i \frac{x_{ij}(t)}{\sum_i \sum_i x_{ij}(t)} \tag{3}$$

where, C_i represents the geographical concentration degree of industry i, $x_{ij}(t)$ represents the employees of industry i in city j, $C_{ij}(t)$ represents the share of employees of industry i in city j, $\overline{C_{lj}}(t)$ represents the share of total employees in city j and m is the number of cities.

Real estate, information service and public service have a high GCD, while wholesale and retail and the petroleum industry have a low GCD (Figure 4). The percentages of JMEs in

chemical industry (7.34%), machinery and equipment manufacturing (10.43%), electrical machinery manufacturing (12.04%), conveying machinery manufacturing (10.87%), wholesale and retail (19.82%) and transportation (5.73%) all exceed 5% in the Bohai Sea Rim region. The chemical industry agglomerates in Tianjin and Shijiazhuang. The conveying machinery manufacturing industry agglomerates in Beijing and Tianjin, while the electrical machinery manufacturing industry agglomerates in Beijing, Tianjin and Shenyang. Machinery and equipment manufacturing is widely dispersed in Shandong Peninsula, Shenyang, Dalian, Beijing and Tianjin. Wholesale and retail and transportation highly agglomerate in Beijing and Tianjin (Figure 5). Obviously, each city has different advantageous sectors. The matching degree between supply and demand of the dedicated labour force directly affects JMEs' location selection and size.
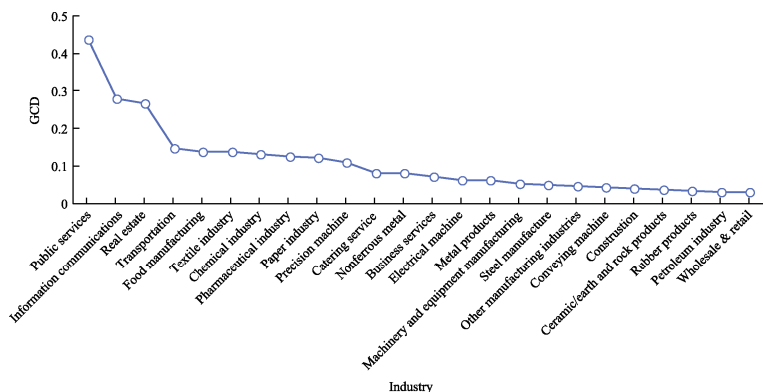

Figure 4   Geographical concentration degree of different industries in the Bohai Sea Rim region

4.2.3 Determinants of the Size of JMEs in the Bohai Sea Rim Region

This paper constructs a model of factors that influence the size of JMEs from the perspective of the local labour force. This model consists of the size of the labour force supply, the size of the shared labour force, the size of the dedicated labour force, enterprise attributes and city attributes. The variable indicators are detailed in Table 2.

The following findings were derived: (1) Whether the labour force size and shared labour force size are introduced separately or enterprise attributes and urban attributes are introduced successively, the high wage cost caused by the increase in the labour pool size restrains the expansion of enterprise size. (2) The specialised sectors in local cities have a significant promoting effect on the average JMEs employment size in the same industry. The effective matching between the employment demand of enterprises and the size of specialised urban talents benefits the expansion of enterprise size. (3) The scale of the local labour force has a significant and robust inhibiting effect on the scale of JMEs in the two phases before and after 2001. However, the inhibiting effect of the scale of the shared labour force and the expansion effect of the scale of the dedicated labour force are not robust in the two phases. (4) The size of JMEs is jointly influenced by the attributes of the parent and subsidiary enterprises, and the direction of impact and the strength ranks of the variables generating significant impact on enterprise size remain stable and consistent. Specifically, the listed parent enterprise tends to encourage the local subsidiaries to expand their size, but not significantly. If the investments of JMEs in the Bohai Sea Rim region are the first ones, most of them are tentative small-scale investments. The size of joint venture is larger than that of sole proprietorship. The longer the local subsidiary exists, the larger the size of the enterprise is. The size of the service industry is significantly smaller than that of manu-
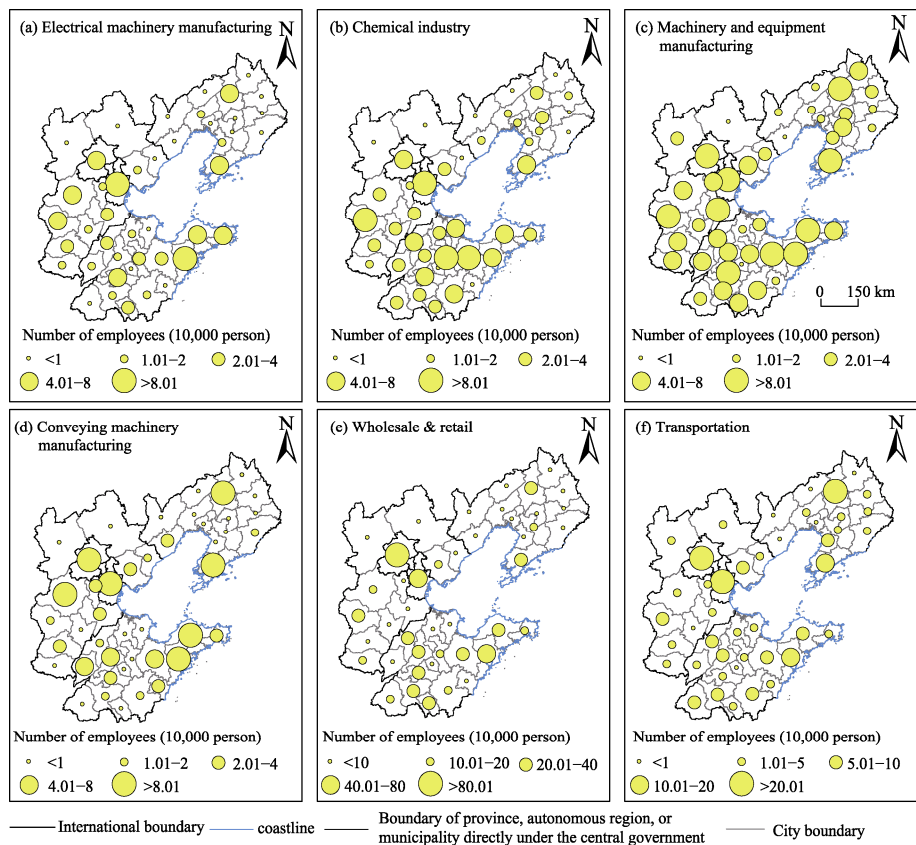
Figure 5 Map of spatial distribution of dedicated labour force in specific industries in the Bohai Sea Rim region

facturing industry. (5) Third, the attributes of the local city have a significant impact on the size of JMEs. While the size of JTE is essentially the result of the joint effect of the enterprise and the local city, the position of the local city is indispensable. However, the enterprise agglomeration in local cities and the succeeding agglomeration effect of JMEs have opposite influencing directions; the former is a positive incentive effect, and the latter is a negative inhibiting effect. The preferential policies of the development zone promote not only local agglomeration of JMEs but also the expansion of JMEs size. The smaller the enterprise, the more sensitive it is to the Japanese-speaking labour supply provided by the local city.

5 Discussion and Conclusion

Taking the Bohai Rim region as an example, this paper analyses the combined effects of labour pool factors, city attribute factors and enterprise attribute factors that affect the size of Japanese enterprises. The following conclusions were derived:

(1) The local labour force and the shared labour force have the same inhibiting effect on the size of enterprise due to the labour cost increase brought by its expansion. However, the size of the dedicated labour force has a significant incentive effect on the size of the enterprise.

(2) Over time, the strengthening of the inhibiting effect of the size of the shared labour force and the weakening of the expansion effect of the size of the dedicated labour force

together led to the shrinking of the size of JMEs in the Bohai Sea Rim region.

(3) The size of JMEs is simultaneously affected by the attributes of the parent and subsidiary enterprises. Among these attributes, age has the strongest positive promoting effect on the size of an enterprise, while the subordinate industries of the enterprise, mode of sole proprietorship and initial investment of the parent enterprise have an inhibiting effect.

(4) Among the attributes of the city, the development zone and local agglomeration have a significant and steady promoting effect on enterprise size. The smaller the enterprise is, the more sensitive it is to the supply of Japanese-speaking labour provided by cities. Thus, the latter's supply can promote local agglomeration of small Japanese enterprises.

This dataset can provide data support for relevant scholars to study the scale of JMEs in the Bohai Sea Rim region. In addition, as the trend of anti-globalisation becomes increasingly prominent, various countries are adopting subtle attitudes towards globalisation and international cooperation. As for FDI, as the carrier of globalisation, is it better to increase investment or to initiate divestment? Is expanding or shrinking better? Is spatial agglomeration or diffusion preferable? Which one between integration or decentralisation of the industrial chain links should be adopted? All these questions will to a certain extent affect the development of the local FDI enterprise. The dataset can contribute to the change tracking study described above.

Author Contributions
Shao, J. And Gao, Y. F. collected and processed the data; Wang, M. J. and Ma, H. W. wrote the data paper.

Conflicts of Interest
The authors declare no conflicts of interest.

References

[1]   Harushi shibaita. Overview of Inbound and Outbound Enterprises (Country Edition) [M]. Tokyo: Toyo Keizai, 2019.

[2]   Wang, M. J., Ma, H.W., Shao, J., *et al*. Influence dataset of the local labor market on the scale of Japanese Direct investment enterprises in Bohai Sea Rim region (1990–2016) [J/DB/OL]. *Digital Journal of Global Change Data Repository*, 2023. https://doi.org/10.3974/geodb.2023.10.01.V1. https://cstr.escience.org.cn/CSTR:20146.11.2023.10.01.V1.

[3]   GCdataPR Editorial Office. GCdataPR data sharing policy [OL]. https://doi.org/10.3974/dp.policy.2014.05 (Updated 2017).

[4]   Population Census Office under the State Council, Department of Population and Employment Statistics National Bureau of Statistics. Tabulation on the 2010 Population Census of the People's Republic of China by County [M]. Beijing: China Statistic Press, 2012.

[5]   Leading Group Office of the Third National Economic Census of Beijing, Beijing Municipal Bureau of Statistics, Survey Office of the National Bureau of Statistics in Beijing. Beijing Economic Census Yearbook 2013 [M]. Beijing: China Statistic Press, 2015.

[6]   Leading Group Office of the Third National Economic Census of Tianjin, Tianjin Municipal Bureau of Statistics. Tianjin Economic Census Yearbook 2013 [M]. Beijing: China Statistic Press, 2015.

[7]   Leading Group Office of the Third National Economic Census of Hebei Province, Hebei Provincial Bureau of Statistics. Hebei Economic Census Yearbook 2013 [M]. Beijing: China Statistic Press, 2015.

[8]   Leading Group Office of the Third National Economic Census of Liaoning Province, Liaoning Provincial Bureau of Statistics. Liaoning Economic Census Yearbook 2013 [M]. Beijing: China Statistic Press, 2015.

[9]   Leading Group Office of the Third National Economic Census of Shandong Province, Shandong Provincial Bureau of Statistics. Shandong Economic Census Yearbook 2013 [M]. Beijing: China Statistic Press, 2015.