

The Influence Effect of Foreign Direct Investment on the Resource Mismatch in The Beijing-Tianjin-Hebei Region

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Abstract: In order to explore whether the continuous influx of foreign direct investment helps to improve the resource mismatch in the Beijing-Tianjin-Hebei region, this paper makes an empirical analysis of the data of the Beijing-Tianjin-Hebei region from 2003 to 2019, and finds that the inflow of FDI has a significant positive impact on the regional resource mismatch, especially the resource mismatch of capital factors. On this basis, a dynamic panel model was added to further verify the positive effect of FDI on improved capital mismatch. The study also found that the impact of foreign direct investment on resource mismatch in Beijing-Tianjin-Hebei region has very obvious regional heterogeneity, which shows the improvement effect of foreign direct investment on capital mismatch in Hebei region, but no obvious improvement effect on Beijing and Tianjin. Therefore, in order to further improve the Beijing-Tianjin-Hebei region resources mismatch, accelerate Hebei economic development to narrow the gap with the Beijing and Tianjin, increase and effective use of foreign direct investment is a favorable for economic high quality development, suggested that the government in the FDI inflow at the same time, strengthen the regional coordinated development, promote resource balanced allocation, improve the regional resource coordination and allocation, in order to realize the sustainable development of the Beijing-Tianjin-Hebei region as a whole.

Keywords: FDI, Resource mismatch, Beijing-Tianjin-Hebei, High-quality development.

1. Introduction

1.1. Background Introduction

With the rapid development of China's economy and the advancement of the opening-up policy, foreign direct investment (FDI) is playing an increasingly important role in China's regional development. In recent years, protectionism has risen in international trade and investment. Some countries have introduced new restrictions on foreign investment and tightened the scrutiny of foreign investment, which has had a serious impact on the free flow of capital across borders. However, with the position of welcoming and protecting foreign investment, in recent years, China has significantly streamlined the negative list for foreign investment access, providing legal and institutional guarantee for the continuous improvement of the business environment [1]. As an important engine of China's economic development and a key region of national strategic positioning, the Beijing-Tianjin-Hebei region has attracted wide attention. However, with the influx of foreign capital, whether there is a mismatch in resource allocation in the Beijing-Tianjin-Hebei region and the impact of FDI on this mismatch phenomenon have become a subject of much concern.

The Beijing-Tianjin-Hebei region is located in the north of China, including Beijing, Tianjin and parts of Hebei, and it is one of the important economic sectors in China. In recent years, the coordinated development of Beijing, Tianjin and Hebei has become a national strategy, focusing on solving the problem of big city diseases in Beijing, adjusting and optimizing the urban layout and spatial structure, building a modern transportation network system, expanding the ecological space of environmental capacity, and promoting industrial upgrading and transfer.

Beijing-Tianjin-Hebei urban agglomeration is the "capital economic circle" of China. The Beijing-Tianjin-Hebei urban agglomeration includes Beijing and Tianjin, and also includes

Baoding, Tangshan, Langfang, Shijiazhuang, Qinhuangdao, Zhangjiakou, Chengde, Cangzhou, Hengshui, Xingtai and Handan in Hebei Province. Among them, Beijing, Tianjin, Baoding and Langfang are the central core functional areas, and the Beijing-Tianjin-Baoding area takes the lead in linkage development. The birth of xiong'an new area, Hebei Province, has made Xiongxian County, Rongcheng County and Anxin County under the jurisdiction of Baoding City and some surrounding areas attract much attention.

In recent years, the government has issued a series of development plans around the Beijing-Tianjin-Hebei region, which are embodied in the following aspects:

Tianjin, focusing on the new coastal area, took the initiative to undertake the transfer of heavy chemical industry in Beijing. Support the construction of Beiqi Huanghua Automobile Industrial Park, strive for the fourth factory of Beijing Hyundai Motor to settle in Cangzhou, start the implementation of major projects such as Shougang Phase II and Bohai Iron and Steel Base, and promote the layout of heavy chemical industry to the coast.

Shijiazhuang will focus on building the southern sub-central city of Beijing-Tianjin-Hebei urban agglomeration, strengthen the functional division of labor and supporting cooperation with Beijing and Tianjin, and promote the development of the south-central and east wings of Hebei.

Langfang is expected to become a demonstration area for the coordinated development of Beijing, Tianjin and Hebei, seize the favorable opportunity of the new airport and the airport economic zone, take ecology, intelligence, leisure and business as the development direction, vigorously develop modern service industries and strategic emerging industries, and attract the transfer of high-end industries and corporate headquarters in Beijing.

Chengde and Beijing and Tianjin jointly worked out the tourism economic circle planning, jointly carried out tourism promotion, expanded the scope of the Beijing-Tianjin-Hebei tourist card, and strived to expand the scope of Beijing transit

visa-free tourists to Hebei.

Handan, as the joint development point of Henan, Shandong and other places.

Baoding, as a node city in the capital, makes use of its geographical advantages to plan and build a service area that centrally undertakes the administrative work of the capital and other functions. Develop high-end equipment manufacturing, new energy, energy conservation and environmental protection, airport economy, modern logistics and other industries. Undertake the functions of some administrative institutions, universities, research institutes and medical care for the elderly in the capital.

In terms of economic development, the Beijing-Tianjin-Hebei region, as the core layer of the Bohai Economic Circle, has just started its economic integration. Compared with the Yangtze River Delta and the Pearl River Delta, there is still a big gap in the level of regional economic development in Beijing, Tianjin and Hebei. However, the promotion of the national strategy of Beijing-Tianjin-Hebei integration will help accelerate the process of market integration, promote the co-construction and sharing of public services and promote regional economic development.

In this context, this paper aims to explore the influence of foreign direct investment on the Beijing-Tianjin-Hebei region resource mismatch effect, in-depth analysis of foreign investment on the regional industrial structure, technical level, the labor market, in order to optimize the allocation of resources in the Beijing-Tianjin-Hebei region, promote the economic sustainable development to provide theoretical reference and policy advice. Through the study of the impact of FDI in the Beijing-Tianjin-Hebei region, it can provide reference and inspiration for the resource mismatch in other regions of China, and promote the optimization and transformation and upgrading of China's economic structure.

1.2. Study Significance

How to correct the distortion of factor market and optimize the allocation of resources is an important issue for China's supply-side structural reform and promote high-quality economic development. As an important force driving China's economic growth, it is worth paying attention to whether foreign direct investment has an impact on the distortion of the factor market. As one of the important economic sectors in China, the Beijing-Tianjin-Hebei region has important research significance.

On the one hand, FDI can introduce advanced technology and management experience to improve the production efficiency and competitiveness of the Beijing-Tianjin-Hebei region, so as to promote economic development. On the other hand, the FDI may also exacerbate the economic inequality in the Beijing-Tianjin-Hebei region. Since foreign enterprises often only focus on market size and production efficiency, they may ignore local social and environmental problems, leading to uneven resource distribution and social instability. Therefore, in-depth studies and analysis are needed to draw accurate conclusions.

2. literature Review

2.1. Impact of FDI on Economic Growth

The impact of FDI (foreign direct investment) on regional economic growth has always been an important topic in economic research. Many studies have shown that the introduction of FDI can bring positive effects on regional

economic growth. However, this effect may vary under different circumstances.

On the one hand, foreign direct investment (FDI) has had many positive effects on economic growth. First, FDI can bring about the introduction of production factors such as capital, technology and management experience, and promote the improvement of productivity and efficiency, thus driving economic growth. Secondly, the entry of foreign enterprises can promote local industrial upgrading and technological innovation, improve the overall industrial level, and promote the optimization of economic structure. In addition, FDI can also promote the development of international trade, expand the export market, increase employment opportunities, improve people's living standards, and then stimulate domestic demand and promote economic growth. In general, FDI, as an important external resource, plays a positive role in promoting economic growth and promoting economic development.

On the other hand, the impact of FDI may also be restricted by the regional investment environment, policy environment and other factors. For example, the study found that differences in investment efficiency among regions are an important factor affecting the economic growth effect of FDI. In addition, the introduction of FDI may also cause problems such as market competition and cultural differences, which will have a negative impact on the local economy.

In conclusion, the impact of FDI on regional economic growth has a dual nature, which may bring both positive effects and adverse effects. In practical application, each region should reasonably guide and use FDI according to its own situation to achieve the goal of economic growth.

2.2. Concept and Measurement Method of Resource Mismatch

1) The concept of resource mismatch

Misallocation is an economic concept, which mainly discusses the distribution of production factors (such as capital and labor) among industries under the condition of complete market and no friction. When the marginal output value is not equal, there is resource mismatch. This situation may lead to low production efficiency, and then affect economic growth and economic development. In some cases, resource mismatch may be one of the reasons leading to the economic crisis.

In economics, resource mismatch may occur at multiple levels, including labor market and capital market.

In the labor market, the mismatch of resources may be manifested in the mismatch between the skills of human resources and the job requirements, that is, there is a situation of skill surplus or skill shortage. This mismatch will cause some talents to fail to give full play to their abilities and affect production efficiency and enterprise competitiveness.

In the capital market, resource mismatch may be manifested as improper capital flow and other problems. For example, some industries or regions may have overcapacity due to excessive financial support, while others cannot fully develop due to lack of financial support, resulting in waste of resources and uneven economic growth.

There are two ways to define resource mismatch: one is to discuss the value of marginal output itself, that is, the first derivative of production function; The second is to discuss the value of marginal output, which is the first derivative of production function. The degree of resource mismatch can be measured by calculating the difference of marginal output

value of each industry. Reducing the mismatch of resources is helpful to optimize the distribution of production factors, improve production efficiency and promote economic development.

At the micro level, the so-called resource mismatch refers to the inequality of marginal output value between different industries or enterprises in the economy. Obviously, this phenomenon violates the basic dogma of economic principles, that is, in the optimal resource allocation pattern realized by market economy, the marginal output value of different units should be the same.

In practice, resource mismatch is widespread. At the macro level, there is a big gap in total factor productivity between different countries. Under the background of globalization, this gap can hardly be completely attributed to technical barriers, on the contrary, it may be caused by different allocation modes of resources. China's low output during the planned economy period shows that resource allocation has an important impact on productivity.

If resources can flow freely enough to achieve Pareto optimality, it is "effective allocation", while "Misallocation" deviates from this ideal state. Some scholars in China, such as Yang Zhen, Chen Yongjun (2013) and Nie Huihua (2011), translated the word "Misallocation" by mistake. This paper follows the translation methods of Yuan Zhigang and Xie Dongdong (2011), Chen Yongwei and Hu Weimin (2011) and Shi Jinchuan (2012) and translates it into "Misallocation". The imperfect market-oriented mechanism intensifies the distortion of factor allocation, and the mismatch of resources has become an important factor restricting the improvement of enterprise production efficiency.

From a technical point of view, "mismatch" can be divided into two types. Chen Yongwei (2013) made a more accurate definition: connotative mismatch and extensional mismatch. Intrinsic mismatch means that according to the basic principles of economics, assuming that the production technology level of all enterprises is convex in a perfectly competitive market, the optimal allocation should be that the marginal output of production factors in each enterprise is equal, otherwise there is room for correcting "mismatch" and improving output. Epitaxial mismatch refers to the situation that under the condition that the marginal output of production factors of all enterprises in an economy is equal, the output can still be improved through factor reconfiguration.

2) Calculation method of resource mismatch index [2]

This article refers to Chen Yongwei and Hu Weiming (2011) [2] The capital mismatch index τ_{K_i} and the labor mismatch index τ_{L_i} can represent the degree of regional resource mismatch.

The theoretical deduction of the resource mismatch index is as follows:

Suppose that the production function is a production function with constant scale return, the specific form is as follows: $Y_{it} = A_k \beta_{K_{it}} L_{i,t}^{1-\beta_{K_{it}}}$

Both sides simultaneously take the logarithm, sorting can get: $\ln(Y_{it}/L_{it}) = \ln A + \beta_{K_{it}} \ln(K_{it}/L_{it}) + \varepsilon_{it}$, among, Y_{it} Represents the output variable, namely the actual GDP of each province; L_{it} Represents the amount of labor input, indicating the average annual employment number of each province; K_{it} represents the amount of capital input, expressed by the fixed capital stock of each province, and calculated by using the perpetual inventory method.

The calculation formula of the capital input amount is:

$K_t = I_t/P_t + (1-\delta_t)K_{t-1}$, among, K_t represents the current fixed capital stock, I_t represents the fixed asset investment in year t , P_t represents the corresponding fixed asset investment price index, and δ is the depreciation rate. According to the usual practice of domestic literature, it is generally taken as 9.6%.

After obtaining the elasticity of capital output β_{K_i} , the elasticity of labor output is $\beta_{L_i} = 1 - \beta_{K_i}$ because the scale return is unchanged. The absolute distortion coefficient of factor price is calculated by the following formula: $\gamma_{K_i} = (K_i/K) / (s_i \beta_{K_i} / \beta_{K_i})$; $\gamma_{L_i} = (L_i/L) / (s_i \beta_{L_i} / \beta_{L_i})$, among $s_i = y_i / Y$ means that the output of region i is a share of the output of the entire economy, $\beta_{K_i} = \sum_i S_i \beta_{K_i}$ represents the weighted capital contribution value.

Finally, the capital mismatch index τ is calculated by the following formula: $\tau_{K_i} = 1/\gamma_{K_i} - 1$; And the labor force mismatch index, τ_{L_i} : $\tau_{L_i} = 1/\gamma_{L_i} - 1$

2.3. Domestic and Foreign Related Studies

In the past few decades, domestic and foreign scholars have achieved fruitful results in studying the relationship between FDI and resource mismatch.

Some foreign scholars attributed the causes of resource misallocation to the market behaviors such as the friction in the financial market, the excessive leverage ratio of enterprises and the imperfect development of the insurance market [3, 4, 5]. In order to further study how to alleviate resource mismatch, some foreign scholars discussed the impact of FDI on resource redistribution in China, and the results showed that FDI is helpful to improve the efficiency of production resource allocation [6]. Gopinath et al. (2017) [7] A study of southern European countries found that in the context of financial liberalization, large capital inflows aggravate the degree of resource mismatch in these countries, thus hindering economic development. However, Varela (2017) [8] step back Found that capital account opening and financial liberalization can improve a country's total factor productivity.

In recent years, Chinese scholars have also conducted thorough studies on the relationship between FDI and resource mismatch. As an important part of China's opening-up, foreign direct investment and foreign direct investment are the key to implementing the "bringing in" and "going global" strategies [9]. Bai Junhong and Liu Yuying (2018) [10] It is found that OFDI can significantly improve the resource allocation of capital factors and labor factors in China, and improve the efficiency of resource allocation. Yang Xiaomei and Xiao Hongye (2020) [11] After studying the impact of two-way FDI on resource mismatch in China, the study found that the co-development of two-way FDI will significantly alleviate the overall capital mismatch and labor mismatch in China, but there are regional differences in this impact. Liu Huizheng et al. (2022) [12] A quasi-natural experiment was designed to study the influence of foreign capital deregulation on resource mismatch, and found that the deregulation of foreign capital significantly aggravated the resource misallocation. It was suggested that foreign capital should be rationally utilized to give play to its role in alleviating financing constraints and improve the efficiency of resource allocation.

In short, there are still some differences in research methods, research objects and conclusions on the mismatch relationship between FDI and resources. There are few related studies on the prefecture-level level in China, so the research subjects of this paper are innovative, which can provide

specific policy suggestions for the coordinated development of Beijing-Tianjin-Hebei region through heterogeneous analysis.

Although the existing research has achieved important results, there are also some shortcomings:

First, the existing research on improving resource mismatch mainly focuses on the overall factors of the country. the possible important role of FDI in improving resource misallocation is not fully recognized; second, theoretical explanation and rigorous empirical test on the issue of how FDI affects resource mismatch in the Beijing-Tianjin-Hebei region.

Based on this reason, the contribution of this paper is incorporated in a unified analysis framework. The contribution of the same method is discussed.

3. Research Hypothesis

Since the implementation of the reform and opening up policy, the financial market has opened up and foreign capital has begun to flow into the domestic market. Especially after the 21st century, China's investment environment has been significantly optimized, attracting a large amount of foreign investment. At this stage, foreign investment has been an important driving force for China's economic development.

The inflow of foreign direct investment not only provides financial support for the economic development of Beijing-Tianjin-Hebei region, but also injects new vitality into the economic development of Beijing, Tianjin and Hebei in terms of production technology, management concept and marketing methods. Therefore, it can be inferred that FDI directly or indirectly played the effect of optimizing the industrial structure of Beijing, Tianjin and Hebei.

Hypothesis 1: FDI will help optimize the resource allocation in the Beijing-Tianjin-Hebei region.

According to the data of China Statistical Yearbook, Beijing is the region with the most rapid growth of foreign investment in the Beijing-Tianjin-Hebei region at the present stage. Tianjin is in the middle and Hebei is the most backward. On the whole, FDI is not only quite different in the Beijing-Tianjin-Hebei region, but also has the problem of uneven distribution of the stock. Therefore, the following assumptions are extended:

Hypothesis 2: The effect of FDI on the resource mismatch varies in regional areas.

4. Empirical Analysis

4.1. Model Construction

In order to quantify the effect of foreign direct investment on resource mismatch in the Beijing-Tianjin-Hebei region, this paper establishes a dual fixed effect model, as follows:

$$\tau_{Kit} = c + \beta \ln FDI_{it} + \sum \gamma_j x_{ijt} + \mu_i + \lambda_t + \varepsilon_{it} \quad (1)$$

$$\tau_{Lit} = c + \beta \ln FDI_{it} + \sum \gamma_j x_{ijt} + \mu_i + \lambda_t + \varepsilon_{it} \quad (2)$$

τ_{Kit} represents the capital mismatch index, τ_{Lit} represents the labor mismatch index, $\ln FDI_{it}$ as the core explanatory variables of this paper, said the i region in t years of foreign direct investment, the logarithm, β said the foreign direct investment of resource mismatch, if β is significantly greater than 0, reflect the foreign direct investment will worsen the resource mismatch, β , significantly less than 0, reflects the foreign direct investment can improve the resource mismatch. x_{ijt} is the information set of control variables, these variables

are explained and explained below. μ_i represents the region-fixed effect, λ_t represents the time-fixed effect, and the ε_{it} is the random interference term.

4.2. Variable Setting and Data Description

Interpreted variable: the resource mismatch index, including the capital mismatch index and the labor force mismatch index, the specific measurement method has been explained in detail in the previous article, do not repeat here.

Core explanatory variable: foreign direct investment. Based on the consideration of data availability and integrity, this paper expresses the total industrial output value of foreign-invested enterprises.

In addition to the core explanatory variables, this paper also adds control variables that may affect the resource mismatch in the Beijing-Tianjin-Hebei region:

1) Industrial structure (structure). Different industries have different demands for resources and different types of resources. If the industrial structure of a region is biased to a certain type of resource-intensive industries, and the supply of resources in the region is not sufficient, it will lead to resource mismatch. This paper uses the proportion of the added value of the tertiary industry in the regional GDP to measure the industrial structure.

2) Trade dependence (trade): Some scholars point out that import trade can be an important way for enterprises to obtain production factors, which will have an impact on the efficiency of resource allocation in a region. Melitz (2003) pointed out that in the open economic environment, export trade can optimize the allocation of resources within the industry. However, some domestic scholars Zhang Jie et al. (2011) pointed out that the productivity of China's export enterprises is not necessarily higher than that of non-export enterprises, and the government subsidies to export enterprises may aggravate the mismatch of regional resources. This paper uses the proportion of total import and export trade in regional GDP to measure the trade dependence.

3) Government intervention (government). Government intervention can prompt resource relocation within the region to address the problem of resource misallocation. The government can guide resources to specific industries or fields by formulating industrial policies and providing subsidies or incentives, so as to optimize the allocation of resources. This paper uses the proportion of local government fiscal expenditure in regional GDP to measure the degree of government intervention.

The summary of the main variables used and the definitions in this paper are shown in Table 1, and the descriptive statistics for these variables are shown in Table 2. The data used in this paper are derived from the statistical yearbooks of each region.

Table 1. Primary variable definitions

variable	symbol	definition
Capital mismatch index	τK	Capital misallocation in various cities
Labour mismatch index	τL	Labor force mismatch in various cities
Loggarithm of FDI	$\ln f di$	Loggarithm of total industrial output value of foreign-invested enterprises in each city
industrial structure	structure	The added value of the tertiary industry in regional GDP
dependence on foreign trade	t trade	The proportion of the total import and export trade of each city in the regional GDP
government intervention	$\ln g$ overnme nt	The proportion of city government fiscal expenditure in GDP is then logarithmic

Table 2. Descriptive statistics of the main variables

variab le	observ ed value	mean	standard deviatio n	least value	crest value
τK	221	-0,0180	0,2306	-0,4188	0,6244
τL	221	0,4999	0,4820	-0,6744	2,0131
$\ln f di$	221	14,5296	1,7864	10,5130	18,1753
\ln stru cture	221	3,6992	0,2645	3,1962	4,4251
trade	221	0,2579	0,3720	0,0051	18,292
gover nment	221	0,1464	0,0622	0,0557	0,3940

4.3. Analysis of the Empirical Test Results

4.3.1. Degree of resource mismatch and its analysis

Table 3 reports the capital mismatch index and labor force mismatch index of all cities in Beijing, Tianjin and Hebei in 2019, with the measurement method being adopted as described above. An index greater than 0 indicates that the actual allocation of production factors in the city is lower than the theoretical effective allocation ratio, and the resource allocation is insufficient; the index less than 0 indicates excessive resource allocation. The larger the absolute value of the index is, the more serious the resource mismatch is.

Table 3. Capital mismatch index and labor force mismatch index of all cities in Beijing, Tianjin and Hebei in 2019

Area	Capital mismatch index	Labour mismatch index
Beijing	0.1184072	0.2358292
Tianjin	-0.1423477	2.013143
Shijiazhuang City	0.0667514	0.2848272
Tangshan City	-0.1181298	0.5572132
Handan City	0.0982069	-0.6072004
Zhangjiakou City	0.1843375	0.3151214
Baoding City	0.2242754	-0.6199945
Cangzhou City	-0.2023254	0.7675614
Qinhuangdao City	-0.1187246	0.7822887
Xingtai City	-0.1710139	0.4231558
Langfang City	0.4944395	-0.6744187
Chengde City	-0.2758457	1.155178
Hengshui City	-0.2848321	1.073138

As can be seen from the above table, there is a certain degree of resource mismatch in the capital and labor factor markets in Beijing, Tianjin and Hebei, and there are obvious

differences in different regions. In 2019, the capital mismatch index of Tianjin, Tangshan, Cangzhou, Qinhuangdao, Xingtai, Chengde and Hengshui showed excessive resource allocation, while the rest of the cities showed insufficient resource allocation.

4.3.2. Benchmark regression results

Since the resource mismatch index symbols calculated above are positive and negative, in order to ensure the operability of the regression model, this paper draws on Ji Shuhan et al. (2016) [13] The absolute value of the resource mismatch index, the larger the value, the more serious the mismatch. When the resource mismatch index and the foreign direct investment change in the opposite direction, that is, the coefficient of explanatory variables is negative, the resource mismatch situation is considered to improve.

Table 4. Test of the influence of the FDI on the resource mismatch index

	(1)	(2)	(3)	(4)
VARIABLES	a bstauk	abstauk	abstaul	abstaul
$\ln f di$	-0.0402** (0.0178)	-0.0303* (0.0168)	-0.00329 (0.0291)	-0.00602 (0.0273)
\ln structure		-0.286*** (0.0820)		-0.592*** (0.133)
trade		-0.179*** (0.0511)		-0.122 (0.0832)
government		1.245*** (0.303)		-0.834* (0.494)
Constant	0.698*** (0.234)	1.546*** (0.366)	0.731* (0.382)	3.010*** (0.596)
Observations	221	221	221	221
R-squared	0.257	0.368	0.456	0.539
Number of city control time control area	13 yes yes	13 yes yes	13 yes yes	13 yes yes

Standard errors in parentheses

*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

Table 4 reports the estimates based on model (1) (2). The first two columns reflect the situation of the capital factor market. The first column is the impact of FDI on the mismatch of capital factors and resources without adding other control variables. The regression coefficient reported in the table is significantly negative, indicating that foreign direct investment significantly reduces the degree of resource mismatch in the capital factors market in Beijing, Tianjin and Hebei. The second column reports the results of the regression adding other control variables to the first column, where the regression coefficients remained significantly negative and the marginal effect decreased slightly, but still passing the significance level test. The third and fourth columns report the impact of FDI on resource mismatch in the labour markets. The regression coefficient of FDI was negative, but it did not pass the significance level test, indicating that foreign direct investment improved the resource mismatch in the labor market, but the effect was not significant.

The reasons may be as follows: 1. There may be a mismatch between the demand of foreign enterprises for labor and the supply of the local labor market, resulting in the

insignificant improvement effect of resource mismatch. In addition, the information asymmetry in the labor market and the employment concept of FDI on the resource mismatch in the labor market.² There is a certain gap in the economic development level of the Beijing-Tianjin-Hebei region, and the distribution of FDI among regions may be uneven. This means that the improvement effect of FDI on labor market resource mismatch may be restricted by the imbalance of regional economic development.

Overall, FDI corrects about 10 times more of resource mismatch in capital markets than in the labor market. Therefore, it can be inferred that the impact of FDI on resource mismatch in the Beijing-Tianjin-Hebei region is mainly achieved by reducing the distortion of the capital market.

To sum up, FDI plays a leading and significant role in capital mismatch in the Beijing-Tianjin-Hebei region, and its role in the labor market is relatively small and not significant. Therefore, the following will focus on the mismatch of FDI to capital market resources.

4.4. Robustness Test

Considering the impact of FDI on resource mismatch, there may be a time lag [14], The robustness test in this section joins the first-order lag term of the explained variable to build a dynamic panel model for further estimation.

The generalized moment estimation method is more effective in dealing with complex situations such as heteroscedasticity and sequence correlation, and in order to solve the endogeneity problem, the generalized moment estimation method is selected in this section. The estimated results are shown in Table 5. The estimated coefficient of foreign direct investment (lnfdi) remains significantly negative, which is consistent with the benchmark regression results.

In conclusion, the main empirical results of this paper remain robust after considering the path dependence problem of resource mismatch.

Table 5. The regression results of the dynamic panel model

	(1)
VARIABLES	abstauk
lagk	0.865*** (0.0172)
lnfdi	-0.00800* (0.00425)
lnstructure	-0.0981*** (0.0200)
trade	-0.0155 (0.0115)
government	-0.460*** (0.0757)
Observations	195
Number of city	13
control time	yes
control area	yes

Standard errors in parentheses
 *** p<0.01, ** p<0.05, * p<0.1

4.5. Heterogeneity Test

Based on the analysis of the existing literature, the authors found that the role of FDI in the factor market largely depends

on the external environment. The unbalanced economic development of cities in Beijing, Tianjin and Hebei is obvious. Then, are there regional differences in the impact of foreign direct investment on resource mismatch in the Beijing-Tianjin-Hebei region? This is the next step we will focus on. The total sample was divided into three subsamples: Beijing, Tianjin and Hebei, and subsample regression was conducted to test the regional differences in the impact of FDI on resource mismatch in the Beijing-Tianjin-Hebei region.

The results are shown in Table 6 (1) - (3), (1) indicates Beijing area, (2) Tianjin area, and (3) Hebei area. The results show that the improvement effect of foreign direct investment on the capital factor market and resource mismatch is very significant in Hebei, but not significant in Beijing and Tianjin. There may be several reasons for this result as follows:

1) Differences in industrial structure: Hebei mainly focuses on manufacturing industry, while Beijing and Tianjin pay more attention to service industry and high-tech industry. In the manufacturing sector, FDI may be easier to promote the adjustment and optimization of industrial structure, thus improving the mismatch of capital factor market resources. However, in the service industry and high-tech industry, the market competition is fierce, and the improvement effect of FDI on resource mismatch may be restricted to a certain extent.

2) Policy environment and infrastructure: In the process of attracting FDI, the government needs to provide a good policy environment and infrastructure support for foreign enterprises. In the Hebei region, the government may pay more attention to improving the investment environment, so that FDI can play a better role in improving the resource mismatch in the capital factor market. However, in the Beijing and Tianjin region, the policy environment and infrastructure are relatively good, and the entry of FDI may fail to significantly improve the resource mismatch of the capital factor market.

3) Enterprise scale and competitiveness: When FDI enterprises enter the market, they may exert certain competitive pressure on local enterprises, so as to improve their own capital allocation efficiency. In Hebei region, due to the relatively small scale of enterprises, the entry of FDI may be easier to improve the competitiveness of enterprises and improve the resource mismatch of capital factor market resources. However, in Beijing and Tianjin, the scale of enterprises is large and the market competition is fierce, so the improvement effect of FDI on the mismatch of capital factor market resources may be offset to a certain extent.

Table 6. Analysis of regional heterogeneity

	(1)	(2)	(3)
VARIABLES	abstauk	abstauk	abstauk
lnfdi	0.156	0.204	-0.0552***
	(0)	(0)	(0.0157)
lnstructure	1.772	0.468	-0.254***
	(0)	(0)	(0.0809)
trade	0.430	0.514	0.465***
	(0)	(0)	(0.139)
government	-1.356	-0.655	1.788***
	(0)	(0)	(0.300)
			(0.0592)
Constant	-10.08	-5.598	1.571***
	(0)	(0)	(0.338)
Observations	17	17	187
R-squared	1.000	1.000	0.423
Number of state	1	1	11
control time	yes	yes	yes
control area	yes	yes	yes

Standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

5. Conclusion and Policy Recommendations

5.1. Conclusion

Based on the existing literature analysis of foreign direct investment on resource mismatch, using the 2003-2019 Beijing-Tianjin-Hebei region, a total of 13 cities panel data, measured the regional capital and labor mismatch, and on the basis of building the static and dynamic panel model, empirical test the foreign direct investment on the influence of resource mismatch in Beijing-Tianjin-Hebei region. The main research findings are:

1) During the inspection period, there were different degrees of capital mismatch and labor force mismatch in the Beijing-Tianjin-Hebei region, and there were obvious differences in each region. Overall, the labor mismatch index in Beijing is lower than that in other cities, while Tianjin has the most serious labor mismatch. Baoding, Cangzhou, Chengde, Hengshui and other prefecture-level cities in Hebei Province, capital mismatch and labor mismatch are relatively serious. The reason may lie in that:

Economic development level: As the capital of China, Beijing has a high level of economic development, a relatively complete industrial structure, and the demand and supply of labor are relatively balanced, so the labor mismatch index is low. Tianjin, as an important port city in northern China, has a high level of economic development, but it still has a certain gap in its industrial structure and industrial layout compared with Beijing, leading to the imbalance between supply and demand in the labor market and the serious problem of labor mismatch. The economic development level of prefecture-level cities in Hebei province is more weak than the former two.

Population and labor mobility: As the capital, Beijing has attracted a large number of talents and labor force influx, making the labor market achieve a balance between supply and demand to a certain extent. However, Tianjin and other small prefecture-level cities in Hebei Province have relatively little labor mobility due to their geographical location and economic development level, leading to the mismatch

between supply and demand in the labor market and the serious problem of labor mismatch.

2) The empirical study in this paper found that ofDI contributed to the improvement of capital mismatch in the Beijing-Tianjin-Hebei region, and the result remained stable after adopting the dynamic model. The heterogeneity analysis found that there are regional differences in the improvement of resource mismatch in the Beijing-Tianjin-Hebei region, especially the improvement effect on Hebei.

5.2. Policy Recommendations

The enlightenment of this paper is that, under the background of economic globalization, the open economy is conducive to the improvement of the regional resource mismatch, and then promote the high-quality development of China's economy. Based on the empirical research in this paper, the following suggestions are made:

1) Continue to expand opening to the outside world, attract foreign investment and optimize FDI investment

For economically underdeveloped areas such as Hebei Province, more attention should be paid to the introduction of foreign capital, which is conducive to optimizing the allocation of local resources, and narrowing the gap between them and developed areas; guiding foreign investment in industries and regions with comparative advantages, and improving the efficiency of resource allocation.

2) Improve interregional cooperation mechanisms

Strengthen regional resource complementarity and cooperation to improve the overall efficiency of resource allocation. Different regions have different resource endowments. In the Beijing-Tianjin-Hebei region, Beijing and Tianjin have strong competitiveness in high-tech industries and service industries, while the prefecture-level cities in Hebei province have advantages in manufacturing and agriculture. By strengthening regional cooperation, the complementarity and development of the industrial chain can be realized and the overall economic benefits can be improved. Through the establishment of inter-regional cooperation mechanism to promote the coordinated development of transportation, environmental protection and industry, it is conducive to alleviating the non-capital functions of Beijing and improving the competitiveness of the whole region. Specifically, relevant policies can be formulated to encourage regional cooperation, reduce cooperation costs and improve cooperation benefits.

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