

# Inter-provincial Resource Allocation Efficiency in Chinese Manufacturing Industry

Zheng-xuan QIN

Business school, Tianjin University of Finance and Economics, Tianjin, China, 300222

**Keywords:** Misallocation, Provinces, Resources.

**Abstract.** The article examines how to measure the progress of resource allocation efficiency among provinces under the assumption of changes in firms' scale of returns, and uses the LP semi-parametric method to estimate the output elasticity of each subdivided industry in the manufacturing sector to reflect provincial and provincial and national The overall measure of the degree of misallocation of resources. The study finds that compared to the overall mismatch in the country, the mismatches between provinces in China are relatively small, the capital mismatch between provinces is gradually declining across provinces, and the trend of labor mismatch among provinces is gradually strengthening, although interregional resources the efficiency of configuration has been greatly improved, but it still needs improvement.

## Introduction

How to achieve effective resource allocation is not only the fundamental issue of economics, but also the core issue of China's reform and opening up in the past 40 years [1]. Whether it is a developed region along the coast of China or a developed region in the west, the government should take the improvement of resource allocation efficiency as its fundamental goal and achieve a rational allocation of resources among regions. Therefore, it is not easy to affirm or deny the economic phenomenon that resources are concentrated in some developed regions [2]. Instead, it should be based on an objective evaluation of the resource allocation results behind the phenomenon, and on the possible existence of policies that lead to resource mismatches. The analysis and exploration of the causes can only scientifically and objectively determine the scientific value of the polarization of resources between regions.

The first part of the article derives the method of measuring the efficiency of resource allocation among provinces under the assumption of a change in the scale of firms' compensation, and the second part uses the micro-enterprise data of manufacturing industries to calculate the overall resources mismatch of the country on the basis of the first part of the theoretical basis and resources mismatch among 27 provinces from 1999 to 2007. The third part is the research conclusion and policy inspiration.

In this paper, LP semi-parametric methods are used to estimate the elasticity of the output of each sub-industry in the measurement of resource mismatch, and use the marginal output value of capital and the marginal output value of labor to measure the overall disposition of resource allocation [3]; The distorted allocation of resources is decomposed into intra-regional distortions and distortions between regions. On this basis, we can obtain the resource errors that reflect provincial and provincial and intra-provincial resources. With degree of measurement indicators, These research methods and the conclusions obtained from the research may also be of reference value for how to better play the role of the government in the process of resource allocation among regions.

## Theoretical Analysis and Measurement Methods

Almost all existing studies on the measurement of resource allocation efficiency are based on the measurement of the discreteness of the marginal output value of production factors. The theoretical basis is that if the resource allocation efficiency is optimal, then the marginal output value of production factors between enterprises should be equal [4]. Otherwise, enterprises with high marginal

output value should transfer a part of their production factors to enterprises with lower value of marginal output, and then make the whole industry achieve a higher level of output under the condition of unchanged technological level. If the intra-industry firms' marginal output value between the firms is always unequal, then there must be institutional factors that hinder the transfer of the factors among the firms, and thus create distortions in the allocation of resources.

Following the existing research, it is assumed that there is a heterogeneous industry in the society, and their output together constitute the only production factor that a representative manufacturer invests in production in a completely competitive market. For the first company in the industry, there is a C-D production function:  $Y_{si} = A_{si} K_{si}^{\alpha_s} L_{si}^{\beta_s}$

Combining the basic assumptions of the production function of the enterprise and the price of the output product, there is a profit maximization function:

$$\max \{ P_{si} Y_{si} - (1 + \tau_{L,si}) \omega L_{si} - (1 + \tau_{K,si}) r K_{si} \} \quad (1)$$

At the same time find the marginal product value of labor and capital:

$$MRPL_{si} = \omega(1 + \tau_{L,si}), MRPK_{si} = r(1 + \tau_{K,si}) \quad (2)$$

Drawing on Gong Guan' s thinking, China' s overall resource mismatch can be expressed by the variance of labor and capital [5]:

$$Mis\_K = Var(\ln MRPK_{si}), Mis\_L = Var(\ln MRPL_{si}) \quad (3)$$

The meaning of the above formula is that if there are no resource mismatches among manufacturing companies nationwide, their marginal product values should be equal. Therefore, the variance of the marginal product value of an enterprise can be used to indicate the level of resource mismatch.

For the above formula, the overall mismatch of the above factors of production can be decomposed into provincial-to-provincial mismatches and intra-provincial mismatches based on statistically significant variance identities:

$$\begin{aligned} Mis\_K &= Var(\ln MRPK_{si}) = Mis\_Ks + Mis\_Ki \\ &= \sum_{j=1}^m \frac{N_j}{N} Var(\ln MRPK_{sji}) + \sum_{j=1}^m \frac{N_j}{N} (\overline{\ln MRPK_{sj}} - \overline{\ln MRPK_s})^2 \end{aligned} \quad (4)$$

$$\begin{aligned} Mis\_L &= Var(\ln MRPL_{si}) = Mis\_Ls + Mis\_Li \\ &= \sum_{j=1}^m \frac{N_j}{N} Var(\ln MRPL_{sji}) + \sum_{j=1}^m \frac{N_j}{N} (\overline{\ln MRPL_{sj}} - \overline{\ln MRPL_s})^2 \end{aligned} \quad (5)$$

Suppose there are  $j$  provinces,  $N_j$  indicates the number of firms in the  $j$  th region, and  $N$  indicates the number of firms in the nationwide manufacturing industry.  $Mis\_L$  and  $Mis\_K$  are the overall labor mismatches and overall capital mismatches in the country.  $Mis\_Ks$  and  $Mis\_Ls$  represent capital mismatches and labor mismatches in each province in the country.  $Mis\_Li$  and  $Mis\_Ki$  represent labor mismatches and capital mismatches between provinces across the country.

The meaning of the above two formulas is that the country's overall resource mismatch is the sum of resource mismatches between provinces and resource mismatches within each province. The level of resource mismatches between provinces can actually be understood as if there is no resource mismatch between provinces, then the value of the edited products of each province should be equal, and vice versa, and therefore, between provinces. The extent of resource misalignment is essentially the sum of the extent to which the marginal product value of each province deviates from the average.

## Data Processing and Results

The data in this article was derived from the 1999-2007 《China Industrial Enterprise Database》. First of all, according to the *National Economic Industry Classification (GB/T4754-2002)* to adjust the industry, screening the manufacturing industry of the two-digit code industry. Secondly, according to the practices of most of the literature, companies that have no corporate codes, industry codes, regional codes, total payroll payable for the current year, industrial added value, total industrial inputs, total fixed assets, total assets, etc., are deleted and excluded those enterprises with an average number of employees less than eight, enterprises with total profits greater than product sales income, enterprises with total assets greater than the annual average balance of fixed assets, and companies with business years later than the year in which the corresponding data are located. Data for missing values in individual years are filled with the arithmetic average of the adjacent years. After the above-mentioned processing, a total of 436,291 manufacturing enterprises in 27 provinces in the Chinese mainland were selected.

Table 1 shows the overall mismatch of resources in the country as measured by the industrial enterprise database. It can be seen that the general trend of resource misallocation in China is small, flat, and generally shows a downward trend, indicating China's policy of optimizing resource allocation. To some extent, good progress has been made. Secondly, compared with labor mismatch, China's resource mismatches are mainly based on capital mismatches. That is, in the cost function of enterprises, the mismatch caused by rising cost of capital occupies a major position, which is a typical “capital-led” error. Labor mismatches fluctuate slightly in 2005. The author believes that this is mainly related to economic fluctuations.

Table 1. 1999-2007 National resource mismatches change

	National Capital Mismatch	National Labor Mismatch
1999	1.2222862	1.0494208
2000	1.216047	1.0435851
2001	1.2169951	1.0285362
2002	1.2181128	1.0314532
2003	1.211184	1.0256011
2004	1.1781402	0.97427068
2005	1.1886915	1.1001792
2006	1.1867734	1.0086923
2007	1.1809144	1.0129712

From Figure 1, we can infer that compared with the overall mismatch in the country, the mismatches between provinces in China are relatively small, and the capital mismatch between provinces has gradually declined. The market segmentation in China is weakening, and the market gradually moves towards the conclusion of integration. The professional division of labor of the Chinese Ministry of Industry has been increasing since the reform, and the market segmentation has been weakening. Although local court members compete for growth, it will bring local protectionism, Problems such as repeated construction, but the 'trade' links between regions are continuously strengthened. Obviously, the weakening of the market segmentation between regions and the strengthening of “trade” will help eliminate market barriers, promote the efficiency of resource allocation among regions, and reduce resource mismatches among regions [6]. Before 2005, the misallocation of resources among provinces had been dominated by capital mismatches. Since 2005, labor mismatches between provinces have gradually increased to exceed capital mismatches, which is mainly related to the regional labor concentration effect. Such agglomeration has aggravated the misallocation of resources between regions, and as a whole it reflects the gradual increase in the mismatch of labor force between provinces.

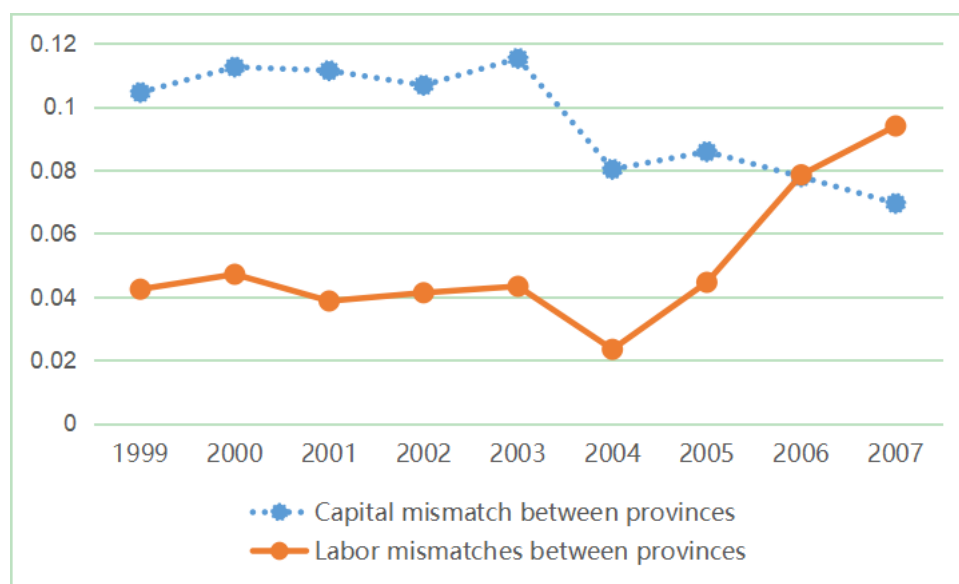


Figure 1. Measurement of resource mismatches between provinces in China

## Conclusions and Policy Suggestions

Based on theoretical analysis, this paper deduces the measurement of resource allocation efficiency among provinces under the assumption of a change in the scale of firms' compensation. Uses manufacturing micro-enterprise data to calculate the overall level of resource mismatches in China and 27 provinces from 1999 to 2007. In the degree of mismatch between provinces, LP semi-parametric methods are used to estimate the elasticity of factor output in various sub-sectors of the manufacturing industry, and then the overall level of resource mismatches in China and the level of resource mismatches among provinces are calculated. The study finds that compared to the overall national mismatch, the mismatches between provinces in China are relatively small, the capital mismatch between provinces is gradually declining across provinces, and the trend of labor mismatch among provinces is gradually strengthening, although interregional resources the efficiency of disposition has been greatly improved, but it still needs to be improved. In this regard, this paper puts forward the following recommendations: First, credit intervention should be appropriately reduced in the financial sector, especially in relation to cross-provincial credit; secondly, the reform of the local administrative system should be appropriately promoted, Continuously improve the local administrative system; Finally, further promote the cooperation between different provinces and local governments to reduce the imbalance between capital and labor ratio.

## References

- [1] R. Diego, R. Richard, Misallocation and Productivity[J]. Review of Economic Dynamics, 1(2013).
- [2] C.T. Hsieh, P.J. Klenow, Misallocation and Manufacturing TFP in China and India [J]. Quarterly Journal of Economics, 124(2009),1403—1448.
- [3] Li Tixin, Zhang Q, Research on China's Labor Force Transfer under the Condition of “Dual Economy”—A Theoretical Discussion Based on the Rural Land System in our Country to the “Shortage of Rural Workers” Phenomenon[J]. Economic Problems Exploration, 12(2010), 106 -111.
- [4] Liu Dongdong, Research on the Effect of Financial Misfits for the Third Industry on Technological Progress[D]. Harbin University of Commerce, 2017.
- [5] Gong Guan, Hu GuanLiang. China's Manufacturing Resource Allocation Efficiency and Total Factor Productivity[J].Economic Research, 48(2013), 4-15.

- [6] Li Xuchao, Market Distortion, Misallocation of Resources and China's Total Factor Productivity [D]. Zhejiang University, 2017.