

# The Impact of International Service Outsourcing on Employment in China

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**Abstract:** This article first analyzes the current situation of service outsourcing in China and the current employment situation. Secondly, it analyzes the transmission mechanism of the impact of international service outsourcing on employment through wage change effects, technological progress effects, and talent structure adjustment effects. The empirical analysis concludes: at the industry level, international service outsourcing has a suppressive effect on employment in different types of industries, but the degree of impact varies across industries. International service outsourcing increases the labor demand elasticity of capital-intensive and technology-intensive industries, but has a less significant impact on the labor demand elasticity of labor-intensive industries. At the labor structure level, international service outsourcing has a suppressive effect on employment of both types of labor, but increases the employment elasticity of high-skilled labor and decreases the employment elasticity of low-skilled labor. At the outsourcing type level, compared to high-end international service outsourcing, middle-end and low-end service outsourcing has a stronger suppressive effect on employment in China.

**Keywords:** international service outsourcing, outsourcing country, employment effects, labor demand elasticity

## 1. Introduction

The essence of service outsourcing is that companies transfer non-core business functions to enterprises based on cost factors and strategic development, allowing them to focus on developing their core industries, thereby enhancing their competitiveness and climbing the value chain. When activities develop between nations, it forms international service outsourcing. The development of international service outsourcing can not only promote industrial structural transformation and but also improve a country's trade structure and enhance its international competitiveness.

The impact of international service outsourcing on a country's development is mainly reflected in aspects: economic growth and employment. As a developing country, both of these indicators are key concerns in the national development agenda. Faced with increasingly challenging employment situations, it is of significant economic and social significance to study the employment effects by participating in international service outsourcing.

## 2. Development Status of Service Outsourcing in China

Since the implementation of the "Thousand, Hundred, Ten Projects" for the development of the service outsourcing industry in 2006, China has experienced continuous and rapid growth in the service outsourcing industry. With the support and guidance of favorable policies, the industry has expanded business scope, strengthened its core competitiveness, and rapidly improved its industrial capabilities. Previously, China mainly served as a recipient of service outsourcing contracts. However, with the continuous growth of the Chinese economy and the transformation of its development model, China's service outsourcing has shifted from being primarily a recipient to a provider and recipient of services. The development of international service outsourcing plays a crucial role in optimizing industrial structure, promoting integrated development of industries, upgrading economic and fostering the development of the sharing economy, thus contributing significantly to the development of China's economy and society.

### 3. Current Status of the Employment Market in China

Employment is crucial for the national economy and people's livelihoods, and a stable employment situation and low unemployment rate play a significant role in a country's economic development. As a populous country, China places great emphasis on the issue of employment. Since the reform and opening-up policy, China has experienced rapid economic development and high growth rates. However, in recent years, the employment situation has become increasingly challenging. On one hand, the number of employed individuals has been increasing year by year. On the other hand, due to adjustments in industrial structure, there is an oversupply of labor in some industries, while others face labor shortages. The lag in the labor market has led to short-term imbalances in employment. Factors contributing to the increasing employment pressure include labor supply exceeding demand, structural unemployment caused by industrial transformation, changes in people's mindset due to scientific and technological advancements, and reasons related to the workers themselves.

### 4. Analysis of the Impact Mechanism of International Service Outsourcing on Employment

With the increasing specialization of international division of labor and closer cooperation and communication among countries, international service outsourcing has become an important means to improve productivity under the trend of economic integration. The development of international service outsourcing brings positive impacts to both the outsourcing country and the recipient country. On one hand, outsourcing enables the outsourcing country to focus more on its core business, facilitating economies of scale and enhancing core competitiveness. On the other hand, it directly or indirectly affects the labor demand in a country's employment market.

The impact mechanism of outsourcing on employment can be summarized in three aspects. Firstly, there is the wage change effect, which can affect employment through substitution effects and scale effects. Secondly, outsourcing affects employment through its impact on technological progress, mainly through efficiency effects, restructuring effects, learning effects, and diversified input effects. Thirdly, outsourcing influences employment by changing the structure of human capital.

### 5. Empirical Research on the Impact of International Service Outsourcing on Employment

#### 5.1. Model Construction

The model in this study adheres to the basic structure of an economic system and can be described through the interdependence of variables such as output and inputs using a production function. Based on the Cobb-Douglas production function, this study establishes a model for the employment effect of international service outsourcing. The traditional Cobb-Douglas production function is represented as follows:

$$Y_i = A_i F(L_i, K_i)$$

where  $Y_i$  represents output as a function of technological factors  $A_i$ , labor input  $L_i$ , and capital input  $K_i$ , basic form:

$$Y = AK^\alpha L^\beta \quad (1)$$

$\alpha$ ,  $\beta$  and represents the elasticity coefficients of production factors.

Since service outsourcing has a technological progress effect, A is a function of service outsourcing (OS). In addition, research and development (RD) investment is an important factor affecting technological progress. Therefore, when examining the technological progress effect of international service outsourcing, we incorporate the RD investment factor. The simplified model for the technological factor A is as follows:

$$A = \lambda(RD, OS)^\eta \quad (2)$$

where FH represents the level of service outsourcing, RD represents research and development investment, with  $\lambda > 0$  and  $\eta > 0$ .

Furthermore, L represents the quantity of labor input, while other variables are in value form. Therefore, we convert the quantity of labor input into its value form

$$l = WL \quad (W \text{ is the average wage of labor}) \quad (3)$$

Substituting equations (2) and (3) into equation (1), and then taking the logarithm of both sides, we obtain:

$$\text{Ln}Y = \lambda + \eta\text{OS} + \eta\text{LnRD} + \alpha\text{Ln}k + \beta\text{Ln}L + \beta\text{Ln}W \quad (4)$$

From equation (4), we can derive the labor demand model:

$$\text{Ln}L = \alpha_0 + \alpha_1\text{Ln}Y + \alpha_2\text{Ln}K + \alpha_3\text{Ln}W + \alpha_4\text{OS} + \alpha_5\text{LnRD} \quad (5)$$

Since service outsourcing can affect the quantity and structure of employment through changes in worker wages, we add an interaction term between the level of international service outsourcing and wages to further understand the impact mechanism of international service outsourcing on employment in the Chinese manufacturing industry. This leads to the following equation:

$$\text{Ln}L = \alpha_0 + \alpha_1\text{Ln}Y + \alpha_2\text{Ln}K + \alpha_3\text{Ln}W + \alpha_4\text{OS} + \alpha_5\text{LnRD} + \alpha_6\text{Ln}W \times \text{OS} \quad (6)$$

## 5.2. Variable Selection and Description

### 5.2.1. Dependent Variable

The focus of this study is the impact of international service outsourcing on employment in China. In terms of measuring employment (L), this study uses the number of urban employed persons at the end of each year as the indicator. When examining the impact of international service outsourcing on employment of labor with different technological levels, research and development (R&D) personnel in each industry are considered as technical workers ( $L_s$ ), while other workers are considered non-technical workers  $L_u$ .

### 5.2.2. Core Explanatory Variable

The level of international service outsourcing (OS). The measurement of OS is calculated using input-output tables from different years. The main method used by domestic and foreign scholars to measure OS is the FH index method<sup>[1]</sup>. In this study, international service outsourcing is divided into high-end international service outsourcing ( $OS_h$ ) and mid-to-low-end service outsourcing  $OS_L$ .

### 5.2.3. Control Variables

(1) Industry output (Y). This study collected the total output of 30 sub-sectors of manufacturing. Based on data availability, the total industry output after 2012 is represented by industry sales output.

(2) Capital stock (K). The calculation method for capital stock is the perpetual inventory method, which is commonly used in most literature to estimate the capital stock of each industry. The estimation formula is:

$$K_{it} = I_{it} + (1 - \delta_i)K_{it-1}$$

where  $K_{it}$  represents the capital stock of the industry i at the end of the period t,  $K_{it-1}$  represents the capital stock of the industry i in the period t-1, and  $I_{it}$  represents the new fixed asset investment in the industry i during the period t. This indicator is adjusted to constant prices using the fixed asset price index to represent the depreciation rate of the industry. The processing of the required indicators follows the calculation method of Yu Yongze et al. (2017)<sup>[2]</sup>.

(3) Average industry wage W. This study focuses on the employment situation in the manufacturing industry. Since the total number of employees and total wage amounts for all industries cannot be directly obtained, the average wage of urban employees is used to represent the average wage of the industry. Data is sourced from the "China Employment Statistics Yearbook."

(4) High-skilled worker wage  $W_s$ . There is no unified standard for determining the skill level of individuals. In this study, R&D personnel in each industry are used to represent high-skilled workers.

Therefore, the average wage of high-skilled workers can be calculated by dividing R&D labor expenses by the number of R&D personnel. Data is sourced from the "Industrial Enterprise Science and Technology Activities Statistical Yearbook."

(5) Low-skilled worker wage  $W_v$ . The wage of low-skilled workers is calculated by subtracting the total wage of high-skilled workers (R&D labor expenses) from the total wage of the industry. The number of low-skilled workers is obtained by subtracting the number of high-skilled workers from the total number of employed persons, and then dividing the total wage by the total number of employed persons to obtain the average wage of low-skilled workers. Data is sourced from the "Industrial Enterprise Science and Technology Activities Statistical Yearbook."

Research and development investment (RD). This study uses R&D investment in each industry to represent research and development investment. Data is sourced from the "Industrial Enterprise Science and Technology Activities Statistical Yearbook."

### 5.3. Overall Baseline Regression

In the analysis of the impact mechanism, this study discusses the wage change mechanism of service outsourcing on employment, which includes scale effect and substitution effect. Therefore, in the estimation process of the model, following Slaughter (2001), the distinction between scale effect and fixed effect is made. The difference between the two lies in the constraint on output. The substitution effect refers to the elasticity of labor demand in the employment market, which is influenced by changing the substitution of labor and other production factors under the constraint of output. Therefore, the substitution elasticity includes the regression results of output, while the regression equation without output estimates the overall labor demand elasticity, and the difference between the two is the scale elasticity.

Using panel data from the manufacturing industry from 2002 to 2017, this study employs a fixed-effects model for regression analysis. The estimation results are shown in Table 1. Model (2) reflects the scale effect, which represents the elasticity of labor demand, while Model (1) reflects the substitution effect of labor demand.

Table 1 The estimation results of the model

Dependent Variable(L)	Model(1)	Model(2)
lnw	-0.516*** (-3.99)	-0.691*** (-5.57)
lnk	0.904*** (9.88)	0.813*** (8.96)
OS	-2.904*** (-4.36)	-2.549*** (-5.57)
Lnw*OS	0.327*** (4.54)	0.295*** (4.01)
LnRD	0.152** (2.33)	0.131* (1.96)
lny	0.254*** (3.77)	
Annual effect	Yes	Yes
Industry effect	Yes	Yes
R-squared	0.65	0.63
Observations	256	256

Note: The values in square brackets represent the t-statistics; \*\*\*, \*\*, and \* represent the significance levels of 1%, 5%, and 10% respectively. The same applies to the following table.

From the regression results, it can be observed that international service outsourcing has a significant negative effect on employment, indicating that it reduces the level of employment in China. Possible reasons for this are as follows: On one hand, through international service outsourcing, we transfer business that we do not have advantages in and obtain high-quality intermediate inputs through outsourcing, effectively reducing costs. This allows companies to streamline non-core business departments, improve specialization, and consequently reduce employment positions. On the other hand, outsourcing allows companies to focus more on their core business, improving labor productivity and creating scale effects, which result in a decrease in labor demand. In summary, service outsourcing reduces employment levels.

From the regression results, the coefficient of "w" is significantly negative, indicating that the overall elasticity of labor demand is negative. For every 1% increase in wages, the total labor demand decreases by 0.69%, with a 0.52% decrease due to other factors substitution. It can be seen that the scale effect is minimal. The coefficients of the interaction term between wages and service outsourcing represent the impact of service outsourcing on the elasticity of labor demand through substitution and scale effects. The positive values of the interaction term indicate that outsourcing can reduce the elasticity of labor demand. From the table, it can be seen that through the substitution effect, for every 1% increase in service outsourcing, the elasticity of labor demand decreases by 0.33%. Through the scale effect, for every 1% increase in service outsourcing, the elasticity of labor demand decreases by 0.30%. Overall, international service outsourcing reduces the elasticity of labor demand.

#### 5.4. Regression on the Employment Impact of Outsourcing in Different Factor-Intensive Industries

Due to variations in resource endowments, different factor intensities in industries result in varying degrees of outsourcing. Therefore, we need to further consider factor intensity. Additionally, despite controlling for industry characteristics in the previous regression, we need to conduct further analysis due to the varying effects of globalization on industries with different factor intensities. This study draws on Xie Jianguo's (2003)<sup>[3]</sup> classification method to divide industries into labor-intensive, capital-intensive, and technology-intensive categories. The model is constructed as follows:

$$\ln L_i = \alpha_0 + \alpha_1 \ln Y_i + \alpha_2 \ln K_i + \alpha_3 \ln W_i + \alpha_4 OS_i + \alpha_5 \ln RD_i + \alpha_6 \ln W_i \times OS_i$$

The analysis of the impact of international outsourcing on employment in these three types of industries is shown in Table 2. Models (1) and (2) represent the impact on labor-intensive industries, models (3) and (4) represent capital-intensive industries, and models (5) and (6) represent technology-intensive industries. From the results, we can observe that the relationship between international outsourcing and employment is negatively correlated in all three types of industries, indicating that outsourcing reduces the demand for labor in these industries. However, it is noteworthy that the impact of international outsourcing on employment in labor-intensive industries is not significant, while it is significant in both capital-intensive and technology-intensive industries. Furthermore, the impact is greatest in technology-intensive industries. This can be explained by the fact that the technological level of many industries in China's manufacturing sector is relatively backward compared to other countries. Therefore, these industries outsource their unfamiliar or unsolvable tasks to other countries through service outsourcing, gradually improving their own technological capabilities through learning by doing. Thus, the "workload" outsourced does not squeeze out the labor force in labor-intensive industries, but it does substitute for employment in capital-intensive and technology-intensive industries.

Table 2 The estimation results of the model

Dependent Variable(L)	Model(1)	Model(2)	Model(3)	Model(4)	Model(5)	Model(6)
lnw	-1.030*** (-5.07)	-1.060*** (-5.98)	-0.196*** (-4.19)	-0.095*** (-4.02)	-0.327*** (-3.50)	-0.169** (-2.37)
lnk	1.166*** (6.51)	1.153*** (6.68)	0.310*** (2.79)	0.304** (2.61)	1.313*** (6.86)	0.953*** (5.55)
OS	-2.582 (-1.23)	-2.422 (-1.20)	-2.282** (2.50)	-6.650** (2.51)	-12.519*** (-5.67)	-12.045*** (-5.40)
lnw*OS	1.292 (1.24)	1.218 (1.21)	-1.416** (-2.33)	-3.303** (-2.40)	-6.588*** (-5.67)	-6.764*** (-5.41)
LnRD	0.229** (2.22)	0.233** (2.30)	0.187* (1.86)	0.18 (1.14)	-0.167 (-1.20)	-0.137*** (-2.64)
lny	0.032 (0.31)		0.364*** (3.11)		0.445*** (3.50)	
Industry effect	Yes	Yes	Yes	Yes	Yes	Yes
Annual effect	Yes	Yes	Yes	Yes	Yes	Yes
R-squared	0.78	0.87	0.82	0.72	0.77	0.73
Observations	64	64	96	96	96	96

By examining the coefficients of the interaction terms in the three types of industries, it is found that international outsourcing reduces the labor demand elasticity of labor-intensive industries, but the effect is not significant. On the other hand, it significantly enhances the labor demand elasticity of

capital-intensive and technology-intensive industries. This is because labor-intensive industries primarily require low-skilled or unskilled labor, while service outsourcing mainly targets technical and information-related tasks. Therefore, the impact on the labor demand of labor-intensive industries is limited. In contrast, capital-intensive and technology-intensive industries, due to the homogeneity of positions, experience a substitution of domestic labor with foreign labor when engaging in service outsourcing. Specifically, through substitution effects, a 1% increase in international outsourcing leads to a 1.42% increase in labor demand elasticity for capital-intensive industries and a 6.59% increase for labor-intensive industries. Through scale effects, a 1% increase in outsourcing leads to a 3.30% increase in labor demand elasticity for capital-intensive industries and a 6.74% increase for technology-intensive industries. This indicates that the employment impact of international outsourcing is greater in technology-intensive industries.

### 5.5. Regression on the Employment Impact of Outsourcing on Different Skill Levels of Labor<sup>[4]</sup>

By classifying industries, we have already observed significant differences in the employment impact of outsourcing. Now, let's consider the impact of outsourcing on different types of labor. We divide labor into low-skilled and high-skilled categories and analyze the impact of outsourcing on these two types of labor. The model for analyzing the impact of international outsourcing on employment for different skill levels is as follows:

$$\ln L_s = \alpha_0 + \alpha_1 \ln Y + \alpha_2 \ln K + \alpha_3 \ln W_s + \alpha_4 OS + \alpha_5 \ln RD + \alpha_6 \ln W_s \times OS$$

$$\ln L_u = \alpha_0 + \alpha_1 \ln Y + \alpha_2 \ln K + \alpha_3 \ln W_u + \alpha_4 OS + \alpha_5 \ln RD + \alpha_6 \ln W_u \times OS$$

The results of the regression on the impact of outsourcing on employment for different skill levels are shown in Table 3. Models (1) and (3) represent the impact of international outsourcing on employment of high-skilled workers in China's manufacturing sector, while models (2) and (4) represent the impact on low-skilled workers. International outsourcing has a suppressive effect on the employment of both types of workers, but it enhances the labor demand elasticity of high-skilled workers and reduces the labor demand elasticity of low-skilled workers.

Table 3 The estimation results of the model

Dependent Variable(L)	Model(1)	Model(2)	Model(3)	Model(4)
$\ln w_s$	-1.198*** (-10.27)		-1.192*** (-10.74)	
$\ln w_u$		-0.585*** (-5.23)		-0.681*** (-6.17)
$\ln k$	0.244** (2.19)	0.940*** (9.93)	0.252** (2.43)	0.841*** (9.18)
OS	-3.438*** (-3.36)	-2.829*** (-5.06)	-3.477*** (-4.52)	-2.582*** (-4.55)
$\ln w_s \times OS$	-0.478*** (-3.17)		-0.479*** (-4.24)	
$\ln w_u \times OS$		0.315*** (5.20)		0.293*** (4.76)
$\ln RD$	0.736*** (12.84)	0.095 (1.64)	0.739*** (13.28)	0.069 (1.17)
$\ln y$	0.012 (0.17)	0.193*** (3.22)		
Industry effect	Yes	Yes	Yes	Yes
Annual effect	Yes	Yes	Yes	Yes
R-squared	0.84	0.63	0.85	0.61
Observations	224	224	224	224

Through the substitution effect, it can be observed that for every 1% increase in outsourcing, the labor demand elasticity of high-skilled workers increases by 0.48%. Through the scale effect, a 1% increase in outsourcing leads to a 0.48% increase in the labor demand elasticity of high-skilled workers. In other words, outsourcing causes greater fluctuations in the market for high-skilled labor, and an increase in outsourcing activities will significantly reduce the employment of high-skilled workers. On the other hand, when examining the impact of international outsourcing on low-skilled workers, it is found that both the substitution effect and the scale effect reduce the labor demand elasticity of

low-skilled workers, resulting in a negative impact on employment. Once again, this confirms that the motivation for outsourcing in China's manufacturing sector is the technological backwardness of the industry itself. Companies hope to solve tasks they cannot complete through outsourcing. Therefore, outsourcing has a stronger displacement effect on the employment of high-skilled workers. Engaging in international outsourcing has the potential to promote changes in China's labor market structure.

### 5.6. Regression on the Employment Impact of Different Types of Outsourcing in Industries

Different enterprises have different outsourcing needs. The service outsourcing studied in this article includes both low-end services such as transportation and high-end services such as computer technology. Due to the structural differences in employment, different types of services will inevitably have different impacts on employment in China. In this section, service outsourcing is further divided into high-end outsourcing (S2, S3, S4) and mid-to-low-end outsourcing (S1, S5, S6) based on the business type and industry classification. High-end outsourcing requires more knowledge-intensive tasks and high-skilled talents, while mid-to-low-end outsourcing is more labor-intensive and requires low-skilled talents. The model can be established as follows:

$$\ln L = \alpha_0 + \alpha_1 \ln Y + \alpha_2 \ln K + \alpha_3 \ln W + \alpha_4 OS_i + \alpha_5 \ln RD + \alpha_6 \ln W \times OS_i$$

The regression results on the employment impact of different types of outsourcing in industries are shown in Table 4. It can be observed that both types of outsourcing have a suppressive effect on employment, but the degree of suppression is different. Models (1) and (3) analyze the impact of high-end outsourcing on labor demand elasticity. High-end outsourcing reduces the labor demand elasticity, indicating a smaller suppressive effect on employment. For every 1% increase in outsourcing, the substitution effect leads to a 0.68% decrease in labor demand elasticity, and the scale effect leads to a 0.31% decrease. Models (2) and (4) analyze the impact of mid-to-low-end outsourcing on employment. It can be seen that it increases the labor demand elasticity. For every 1% increase in outsourcing, the substitution effect leads to a 0.40% increase in labor demand elasticity, and the scale effect leads to a 0.39% increase.

Table 4 The estimation results of the model

Dependent Variable(L)	Model(1)	Model(2)	Model(3)	Model(4)
lnw	-0.495*** (-3.66)	-0.533*** (-4.11)	-0.654*** (-4.94)	-0.707*** (-5.71)
lnk	0.856*** (9.13)	0.921*** (10.04)	0.766*** (8.22)	0.836*** (9.19)
$OS_h$	-5.967* (-1.85)		-2.275* (-1.79)	
$OS_L$		-3.531*** (-4.39)		-3.279*** (-3.99)
$\ln w \times OS_h$	0.683** (2.04)		0.311* (1.82)	
$\ln w \times OS_L$		-0.397*** (-4.54)		-0.378*** (-4.22)
lnRD	0.190*** (2.93)	0.150** (2.27)	0.158** (2.39)	0.129* (1.91)
lny	0.264*** (3.78)	0.245*** (3.62)		
Industry effect	Yes	Yes	Yes	Yes
Annual effect	Yes	Yes	Yes	Yes
R-squared	0.63	0.64	0.61	0.62
Observations	256	256	256	256

## 6. Research Conclusions

This article analyzes the impact of international service outsourcing on employment in China from two perspectives: transmission mechanisms and empirical analysis. Overall, international service outsourcing significantly suppresses employment in China and reduces the labor demand elasticity. When looking at different categories, international service outsourcing does not have a significant impact on employment in labor-intensive industries, but significantly suppresses employment in

capital-intensive and technology-intensive industries, while increasing the labor demand elasticity in these two types of industries. International service outsourcing reduces the employment demand elasticity for low-skilled workers and increases the employment demand elasticity for high-skilled workers. This is similar to the results of the industry-based regression, as outsourcing mainly involves high-skilled tasks, which replace relevant job positions in the country and increase the employment risk for high-skilled workers, while having a smaller substitutive effect on low-skilled workers. Lastly, mid-to-low-end outsourcing significantly enhances the labor demand elasticity in China, while high-end outsourcing suppresses the labor demand elasticity. This once again confirms that the employment structure in China's manufacturing industry tends to be low-skilled.

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