Effect of Changes in China's Manufacturing Wages OLS Algorithm Based on the Amount of Import and Export

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Abstract. Using the least square method, this paper makes an empirical analysis on the export data of Sichuan foreign trade, especially from the export cost of foreign trade, that is, from the perspective of raw materials and labor costs, and compares and analyzes the export performance of processing trade and general trade enterprises. The result of the empirical model analysis shows that wage increase has little impact on the export cost of the Sichuan manufacturing industry. In response to the rise in raw materials and wages, Sichuan's countermeasures to expand exports are to adjust and optimize the structure of export products, pay attention to salary performance management, and strengthen the implementation of national guidance policies.

Keywords: Rising Wages · Manufacturing · Export

1 Introduction

In recent years, the rise in labor costs has aroused widespread concern from all walks of life. In 2014, 27 provinces in China raised the minimum wage successively, and the wages in the Pearl River Delta and Yangtze River Delta regions increased by a large margin. Among them, the wages of Hong Kong-funded enterprises in the Pearl River Delta rose by 13%, the wages of Taiwan-funded enterprises around Shanghai rose by 14%, and the wage increases in the mainland were relatively small. In Chongqing, for example, the wages of related enterprises increased by 9%. A small number of enterprises have gone on strike because of low wages, and many enterprises have been forced to raise wages collectively [5]. The "shortage of migrant workers" and the "rising tide of wages" are bound to have a significant impact on China's future economy, so, how to rationally treat the impact of China's rising labor costs on enterprises and the economy as a whole will play a decisive role in China's future economic trend [1]. For example, will the rising labor costs in China affect the exports of enterprises and lead to the restructuring of the

industrial chain? If the rise in labor costs has an impact on corporate exports, what is the extent of the impact? Therefore, it is of practical significance to analyze the impact of rising labor wages on the exports of domestic enterprises.

This paper first analyzes the rise of prices and wages at home and abroad and then takes the manufacturing industry in Sichuan Province as an example, combined with the relevant theory and reality of economics to explore the countermeasures of enterprises, industries, and governments to deal with domestic wage increases.

2   The Basic Trend of Rising Wages in China

According to the survey of the National Bureau of Statistics, the total population of China reached 1.341 billion at the end of 2010. For the whole year, the per capita net income of rural residents was 5919 yuan, an increase of 10.9% in real terms over the previous year, adjusted for prices, while the per capita disposable income of urban residents was 19109 yuan, an increase of 7.8% in real terms. It is reported that in 2002, the average annual salary of on-duty workers in China was 12422 yuan, and by 2010 it had reached 37147 yuan. After deducting the price increase, the average annual growth rate is about 12%, 2.8% points higher than the average annual increase of 9.2% of per capita GDP in the same period, which is the fastest increase in the real wage income of Chinese workers since the reform and opening up. Among them, during the more than 30 years of reform and opening up, the overall increase in labor costs in China's manufacturing industry is relatively large. The average wage in the manufacturing industry rose from 597 yuan in 1978 to 30700 yuan in 2010, an increase of 51 times. After deducting price increases, the average annual growth of real wages of manufacturing workers from 1978 to 1997 was less than 4.36%, but from 1997 to 2006, real wages grew at an average annual rate of 12.3%. Since 2010, since Jiangsu Province took the lead in raising the minimum wage, 27 provinces, and cities, including Zhejiang, Guangdong, Fujian, Shanghai, Tianjin, Shanxi, and Shandong, have adjusted the minimum wage one after another, with adjustments of more than 10% in many provinces and more than 20% in some provinces. For example, the minimum wage in the Ningxia Hui Autonomous region has been increased by 27% and the minimum monthly wage in Beijing by 20%. Of course, in absolute terms, the wage level in our country is still low. Compared with Switzerland, which has the highest hourly wage in manufacturing, China is only 5.6%. However, it can be seen that since 1997, the average wage of manufacturing workers in China began to enter the stage of rapid growth. China is going through a period of rapid rise in wage and labor costs. According to a research report by Jassino Rourbe, an American consulting firm, labor costs in China are already higher than those in seven other Asian countries. The average labor cost in China's coastal areas is $1.08 per hour, while that in inland provinces is $0.55 to $0.80. India ranks seventh at 51 cents an hour, while Bangladesh has the lowest labor costs, which are only 1/5 of those in Shanghai and Suzhou.

3 An Empirical Analysis of the Impact of Wage Increases in the Manufacturing Industry on Exports in Sichuan Province

3.1 A Survey of Wage Increases in Sichuan Province

As one of the major industrial provinces in central China, Sichuan Province is developing rapidly. In recent years, the Sichuan provincial party committee and provincial government have issued a series of policies on industrial structure adjustment and improving industrial competitiveness. According to statistics, large-scale industrial production in Sichuan increased by 9.6% in 2014, down 2% from the previous year, but it was still 1.3% higher than the national average and ranked 15th in the country. Since 2002, the growth of large-scale industrial production in Sichuan has been higher than the national average, with an obvious growth trend, with an increase of 14.6% in 2012 and 11.6% in 2014. Sichuan's economic level has been in the middle of the country for 22 years in a row, ranking 10th in the country in 2014, accounting for 5.4% of the country. As a large manufacturing export province in China, Sichuan accounts for about 6% of the country's manufacturing exports. Recently, the minimum wage regulations of various provinces and cities have been issued continuously, and the manufacturing and wage levels of Sichuan Province, which is a relatively developed economy in China, are also gradually increasing.

Sichuan has adjusted the minimum wage 4 times since 1995–2014. Among the four adjustments from 2006 to 2014, the wage increases were different in each one, with a smaller increase in the first three, while the minimum wage increased the most in 2014. The rise in labor costs has entered a stage of rapid growth. China's labor costs have risen significantly over the past few years, with average manufacturing wages rising by more than 10% a year over the past few years. The average manufacturing wage in Sichuan Province rose from 16000 in 2005 to 40, 000 yuan in 2014, and the average annual wage has risen by more than 10% since 2005. In 2014, the Sichuan provincial government issued several policies to adapt to the new situation of "one belt, one department" economic development, and Changsha Customs and other relevant departments also introduced a series of measures to promote the stable growth of foreign trade. After 20 years of development, Sichuan's processing trade has accounted for about 70% of the province's import and export trade. At present, the export volume of the Hunan processing trade is increasing substantially year by year, accounting for more than 5% of the country's foreign trade export growth. Sichuan Province's export volume in 2014 was 190.7 billion yuan, an increase of 22.2%, the largest increase in the past three years. In 2014, the total import and export volume of general trade in Sichuan Province was 127.51 billion yuan, an increase of 20.6% over the previous year, accounting for 66.9% of the province's total import and export volume in the same period. At the same time, the import and export of processing trade totaled 53.55 billion yuan, an increase of 12.9%, accounting for 28.1%. From 2006 to 2014, Sichuan's GDP grew at an average annual rate of 13.3%, and its export dependence rose from 13.1% in 1978 to 65.2% in 2014.

3.2 Model Construction

This study set the index growth of the total export business of the manufacturing industry Y as the explained variable, the raw material purchase price index X1 and the manufacturing total wages payable X2 as the explanatory variables, and other factors deducting wages and raw material prices (subprime mortgage crisis, the credit crunch and RMB appreciation, etc.), the equation is as follows:

$$Y = c + aX_1 + bX_2 \tag{1}$$

The OLS method is used to estimate the parameters of the equation, and the output result is shown in Eq. (2). In this result, the positive and negative relationship between variables is eliminated, and only the correlation coefficient is considered. The estimated

Table 1. Total manufacturing exports, raw material purchase price index and total wages of employees in Sichuan Province

Years	Total exports (million dollars)	Price index%	Total wages of employees in general industry (100 million yuan)
2010	374667	105.7	236.2
2011	509401	112.9	123.2
2012	652342	90.2	193.4
2013	794781	100.1	79.9
2014	892921	103.3	143.5
2015	918772	107.8	7183.8
2016	100557	8 93.8	105

Table 2. Statistics of the total value, funds, and employees of machinery and electronics exports of Sichuan Province from 2009 to 2016

Year	Total exports (million dollars)	Fund K (100 million yuan)	Employees (ten thousand people)
2009	140.13	1041.13	5.19
2010	208.4	1088.19	6.79
2011	324.93	1377.36	7.93
2012	377.69	1623.8	9.93
2013	435.51	2219.46	11.87
2014	270113	2621.51	9.65
2015	356729	3246.32	6.94
2016	509792	3577.12	5.69

regression equation from the results of Table 1 is as follows (the figures in parentheses are t statistical values):

$$Y = -554.55 + 6.69X_1 + 0.25X_2$$
$$(-3.56)\ (3.82)\ (1.25)$$
$$F = 103.78; D - W = 1.62; \quad SE = 20.49 \tag{2}$$

According to the results of the equation, among all the explanatory variables, the impact of labor cost change on the total export business is only 0.25, while the impact coefficient of raw material cost change on manufacturing export business is 6.69. Due to the different dependence of different industries on labor and capital, wage increases naturally have different effects on labor-intensive industries and capital-intensive industries. The following is a discussion of the impact of wage increases in the export processing industries that account for the largest proportion in Sichuan Province. In this model, the C-D production function of each industry is calculated, and since all the output value in the export processing industry is used for export, the total export value is used instead of the total output value (Table 2).

Let the C-D production function model of Sichuan machinery and electronics industry be:

$$Y = AK^\alpha L^\beta \tag{3}$$

Based on the SPSS24.0 platform, the estimated regression equations are as follows:

$$LnY = -1.069 + 0.423X_1 + 0.931X_2$$
$$(-1.540)\ (1.622)\ (2.866)$$
$$R2 = 0.976 \quad F = 258.7 \quad DW = 2.36 \tag{4}$$

$$Y = 0.343K^{0.423} + L^{0.931} \tag{5}$$

$0.423 + 0.921 > 1$, indicating that the mechanical and electronic industry in Sichuan shows an increasing trend of scale income. By the same token, the export volume, capital and employees of Sichuan textile industry are as follows:

According to Table 3, the estimated regression equation is:

$$LnY' = -0.591 + 0.161X_1 + 1.229X_2$$
$$(-0.209)\ \ (0.207)\ \ (1.561)$$
$$R2 = 91.53 \quad F = 30.941 \quad DW = 2.09 \tag{6}$$

Finally, it is obtained that the estimated C-D production function equation is:

$$Y' = 0.604K'^{0.161} + L'^{1.229} \tag{7}$$

$0.161 + 1.229 > 1$, indicating that the textile industry in Sichuan also shows an increasing trend of scale income. From the above empirical model, it is easy to know that manufacturing capital-intensive industries and labor-intensive industries have different

Table 3. Statistics of Export value, funds and employees of Textile Industry in Sichuan Province from 2009 to 2015

Years	Total import and export (100 million yuan)	Capital (100 million yuan)	Employees (ten thousand people)
2009	24258	539.7	3.6
2010	24897	634	3.64
2011	24830	653.5	4.04
2012	24964	823.7	5.3
2013	2527	882.4	3.45
2014	26192	977.1	2.66
2015	26650	1082	3.05
2016	28420	1160.5	3.2

responses to wage increases. As a capital-intensive industry, the degree of dependence of the electronic machinery industry on labor is only 0.931, while that of the textile industry, as a labor-intensive industry, is as high as 1.229. Therefore, when labor wages generally rise, the impact on the textile and other industries is far greater than that of the mechanical and electrical industries. This is not only in line with economic theory because the mechanical and electronics industry is relatively a capital and technology-intensive industry, while the textile industry is a labor-intensive industry, which also provides a corresponding improvement direction for different export processing industries [2].

3.3   Empirical Conclusions

Take Sichuan Province as an example, for China's manufacturing industry, it still has a large number of the labor force with relatively low prices and high quality of labor, and the cost of the labor force is still dominant. However, the price of the labor force in our country must maintain a momentum of continuous rise, but it will be a gradual process. The empirical results also verify the inference: although the wage level will continue to rise and have varying degrees of impact in different industries, in the current manufacturing industry, the rise in labor costs does not have a great impact on the performance of export enterprises. For some time in the future, the trend of China's export growth will continue, which will also make China have strong competitiveness in the global manufacturing field. At the same time, it should also be noted that in the long run, some investments and projects that rely solely on cheap labor will be withdrawn, but other industries and other capital will follow at the same time, which is the so-called industrial transfer and upgrading. With the improvement of residents' purchasing power and the transformation of the model of economic development, it is believed that we will not always rely on the low-cost advantage of labor, and then rely on the continuous upgrading and optimization of the industry to regain the competitive advantage of global manufacturing exports [4].

4   Countermeasures for Sichuan to Deal with the Pressure of Export Competition

4.1   Adjust and Optimize the Structure of Export Products

After the international financial crisis, countries have taken corresponding measures to expand domestic demand to adapt to the changes in international market demand. Therefore, Chinese enterprises are facing greater pressure on export competition. In the face of the rapid rise in the prices of raw materials and labor, export enterprises should adjust the product structure and speed up the integration of resources according to the requirements of users. First of all, it is necessary to gradually reduce the export of products with "high pollution, high energy consumption, and resource dependence", and continue to carry out industry innovation, technological innovation, and process innovation. We should respond to rising wages and raw material prices and speed up the research and development of high value-added high-tech products. Large enterprises should enhance their competitiveness, establish brands with independent intellectual property rights, improve their core competitiveness through brand effect, and actively open up the international market. Generally speaking, Sichuan still lacks influential brands in the international arena. It is necessary to support enterprises with good development prospects, such as Zoomlion and Sany, to help them start their brands, promote the sales of their products in the international market, and expand exports [3].

4.2   Attach Importance to Performance Management of Salary Scale

In the face of rising wages, first, enterprises should use overall compensation rather than monetary incentives to deal with the issue of employee compensation. Because money conforms to the diminishing rule of incentive utility, 100 yuan may have a good incentive effect on people 10 years ago, but now the incentive effect of 100 yuan is very small. There are two reasons, on the one hand, inflation limits the ability to pay, on the other hand, the marginal utility of monetary incentives is decreasing. Therefore, the monetary reward should be regarded as the basic element of incentive and non-monetary reward as a supplementary incentive element. Second, corporate compensation is to buy intelligence rather than coolies, and efficient work is the fundamental manifestation of the improvement of the labor force. On average, the working week in the United States is shorter than that in China, but the level of productivity in China is only 10% of that in the United States. The reason is that the United States buys employees' intelligence, and our national compensation system focuses on buying employees' coolies. Third, enterprises should pay attention to team spirit and employee participation. Us team incentive programs account for 90% of incentives, but Chinese incentive programs account for 90% of individual incentives, so we need to make great improvements in this area. It is necessary to stimulate team spirit and improve overall efficiency.

4.3   Strengthen the Implementation of National Guidance Policies

First of all, the provincial government should strengthen the protection of intellectual property rights, technology, and patents, provide support for technological innovation

and the development of new products, and enhance the ability of independent innovation and research and development of enterprises. Secondly, the government can encourage enterprises to invest in R & D through tax policies, and provide tax and technical support to some enterprises, such as increasing the export tax rebate rate, to maintain technological innovation in the export industry. At the same time, it can effectively solve the financing problem that has plagued small and medium-sized foreign trade enterprises for a long time. Finally, through industrial policy, the government should cultivate a good competitive environment, encourage market competition, make use of the competitive pressure among multinational corporations, introduce new products and new technologies of multinational corporations, and promote the technological progress and industrial upgrading of the domestic manufacturing industry. Based on summarizing the experience at home and abroad, we should reform and adjust the policy of cultivating and supporting large enterprises, and adjust the support object, support means, and support process, to enhance the competitiveness of small and medium-sized foreign trade export enterprises.

5   Conclusion

In a word, through the empirical analysis of the impact of the wage growth of the manufacturing industry in Sichuan on foreign trade exports, we believe that the wage growth of the manufacturing industry has a relatively small impact on Sichuan's foreign trade exports. The main reason is that the improvement of labor efficiency is faster than that of wage growth, and at the same time, most enterprises are in the stage of increasing scale returns, which is also the main reason for maintaining the advantage of foreign trade exports. We do not have to worry about the impact of wage growth on foreign trade exports. Wage growth just shows that Chinese workers can share the fruits of economic development, which is also the due purpose of foreign trade growth and economic growth.

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