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Research on the Effect of Minimum Wage on the Bargaining Power of Chinese Manufacturing

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Abstract: Based on the data of China's industrial enterprise database from 2003 to 2013 and the national minimum wage data at county (city) level, this paper investigates the impact of minimum wage policy on China's manufacturing bargaining power. The results show that (1) the increase of minimum wage will reduce the price markup of Chinese manufacturers and weaken the bargaining power of Chinese manufacturers. (2) Compared with the minimum wage adjustment in the lag period, the cost impact of the minimum wage in the current period is more intense in weakening the bargaining power of the manufacturing industry.

Keywords: Minimum wage; price markup; bargaining power.

1. Introduction

For a long time, China's manufacturing enterprises have made use of the comparative advantage of labor cost to obtain certain competitive advantage in the international market. However, the cost comparative advantage at the cost of distorting the labor market has not changed the fact that the price mark-up rate of Chinese enterprises is low.A rise in the minimum wage would raise the average wage of businesses, further raising their labor costs (Mayerneis et al. 2016, Dube et al. 2010) [1] [2]. The increase of enterprise cost is bound to increase the production and operation pressure of enterprises, and then affect the sustainable development of China's manufacturing industry. Therefore, the study of minimum wage policy on China's manufacturing economy is particularly critical.

As a policy tool to regulate labor factor market, minimum wage has aroused the attention and research of many scholars. At present, the study of minimum wage mainly has the following two aspects: First, the impact of minimum wage on labor income distribution. The minimum wage raises the wages of low-income earners and pushes up the average wage of businesses, reducing inequality in the distribution of labor income, meaning that the potential economic effects of a minimum wage policy may outweigh its own individual cost effects (Autor, 2016)[2]. Second, the impact of minimum wage on employment. According to the classical perfect competition theory, the minimum wage will increase the average wage in the labor market, which will lead to the gradual reduction of employment. But, according to existing research, firms will not necessarily cut back on employment to offset their labor costs when the minimum wage rises, and it is debatable whether rising minimum wages will raise unemployment (Neumark, 2014; Mayneris, 2016) [1] [4].

The bargaining power of manufacturing industry reflects the market profitability of manufacturing industry and is closely related to profit and income growth of manufacturing industry. The Arkolakis (2012) monopolistic competition model, based on invariant substitution elasticity (CES), assumes that the price premium is exogenous, which makes it impossible to analyse the pro-competitive effects of trade liberalization[5]. In order to influence the endogenous bargaining power, some literatures relax the assumption of monopolistic competition. Parenti (2017) research shows that, when the number of firms is given, the Cournot oligopoly equilibrium leads to higher price markups and greater bargaining power than the Bertrand oligopoly equilibrium, whereas when firms freely enter the market, monopolies produce a wider range of products at lower prices than oligopolies [6].

Although some literatures have studied the influencing factors of bargaining power from many aspects, there is little research on it from the perspective of minimum wage pair. In this paper, we study the effect of minimum wage on bargaining power, which is helpful to evaluate whether the increase of minimum wage will have adverse effect on profit and competitiveness.

2. Data Processing and Research Design

2.1. Data processing

The data used in this paper mainly comes from the database of China's industrial enterprises, the Statistical Yearbook of China's Cities and the monthly minimum wage data provided by the labor security department of all provinces. Based on the data of manufacturing enterprises in China from 2003 to 2013, this paper measures the bargaining power of China's manufacturing industry by using the GDP per capita index of China Urban Statistics Yearbook as the control variable at the city level.

For the database processing of Chinese industrial enterprises, the data matching method proposed by Brandt (2012) for Chinese industrial enterprise database shall be referred to for data matching, and the method uses enterprise code, enterprise name, legal person name, enterprise location, postal code, etc successively for matching, which improves the efficiency of use of sample data. Deal with the samples containing abnormal values, and delete abnormal values that meet the following conditions: (1) Enterprises whose total assets are less than the net value of fixed assets or whose total assets are less than the current assets; and (2) Enterprises whose key variables are missing, or enterprises whose total industrial output values, intermediate inputs and other variables are missing. In order to eliminate the impact of price changes on relevant indicators, the reduction index provided

by Brandt (2012) was used. At the same time, in order to avoid the impact of extreme value on the empirical results, the price markup at the level of 1% of the enterprise to carry out tail reduction. After data processing is completed, such indicators as total industrial output value, capital stock, number of employees, intermediate input, industrial added value and employee compensation payable are retained for the calculation of enterprise price markup. (3) The database of China's industrial enterprises includes such industries as "manufacturing industry", "extractive industry" and "production and supply of electricity, gas and water". The data of such industries as "extractive industry" and "production and supply of electricity, gas and water" are deleted and only the relevant data of "manufacturing industry" are retained. According to the database code classification of China's industrial enterprises, the manufacturing industry is mainly classified as follows: ① raw material processing manufacturing industry ② equipment manufacturing industry ③ food manufacturing industry ③ textile manufacturing industry ⑤ wood furniture manufacturing industry ⑥ paper, printing, cultural and educational supplies manufacturing industry ⑦ chemical raw materials and supplies manufacturing industry

2.2. Research design

2.2.1. Measurement of bargaining power

In this paper, the index of bargaining power is price plus. Bargaining power refers to the ability of product price to remain above marginal cost, and price addition is defined as the ratio of product price to marginal cost. The higher the price markup, the stronger the bargaining power. Conversely, the lower the price markup, the weaker the bargaining power. The specific formula is as follows:

$$\frac{P_{it}-C_{it}}{P_{it}}=1-\frac{1}{markup_{it}}=\frac{valueadd_{it}-wage_{it}}{valueadd_{it}+midinput_{it}} \quad (1)$$

Convert the above formulas to:

$$markup_{it}=\frac{1}{1-\frac{valueadd_{it}-wage_{it}}{valueadd_{it}+midinput_{it}}} \quad (2)$$

Among them, P_{it} is the product price of the enterprise i in the t year, C_{it} is the marginal cost of the enterprise i in t year. $Markup_{it}$, defined as the ratio of unit product price to marginal cost, $\left(\frac{P_{it}}{C_{it}}\right)$, is a measure of bargaining power. $Valueadd_{it}$ represents the industrial value added of the enterprise, $wage_{it}$ represents the total payroll payable of the enterprise, and $midinput_{it}$ represents the total intermediate input of the enterprise.

2.2.2. Modelling

Referring to the relevant studies on price markup, this paper establishes a fixed-effect model to analyze the impact of minimum wage on price markup. The specific models are as follows:

$$\ln markup_{cijt}=\beta_0+\beta_1 minwage_{ct}+\beta_2 X_{cijt}+\beta_3 Z_{ct}+\lambda_i+\delta_t+\eta_c+\varepsilon_{cijt} \quad (3)$$

Among them, c, i, j, t represent respectively the c city, i enterprise, j industry and t year. $\mathrm{Ln}\,markup_{cijt}$ is an explanatory variable that represents the price markup of the city c industry j enterprise i in the t period. $Miniwage_{ct}$ represents the minimum wage for the year c of the city where the enterprise i is located; X_{cijt} represents the set of major characteristic variables at the enterprise level; Z_{ct} represents the set of characteristic variables at the year c of the city where the enterprise i is located; λ_i, δ_i and η_c represent the fixed effects of the enterprise, time and province respectively; the fixed effects of time control the influence of factors such as external macro-environment that changes with time on the price addition; the fixed effects of the enterprise control the influence of the unobservable variables at the enterprise level on the price addition (such as the enterprise idea, enterprise culture and enterprise learning ability, etc.); the fixed effects of the province control the influence of the unobservable control variables at the provincial city level on the price addition (such as regional development potential and policy development advantage, etc.); ε_{cijt} represents the unobservable error items at the enterprise level, which follow the normal distribution.

2.2.3. Description of main control variables

1. Control variables at the enterprise level. The main control variables at the firm level include：(1) the firm's intermediate input ratio ($\ln minput$): the ratio of intermediate inputs to total industrial output is used. Generally speaking, the larger the index, the higher the cost and the lower the price markup. (2) The capital intensity of an enterprise ($\ln kl$): The higher the capital density of an enterprise, the larger the scale and the higher the efficiency of the enterprise, and the more likely it is to set a higher price markup and acquire a stronger bargaining power, as measured by the ratio of the net value of the fixed assets divided by the number of employees (employees) of the enterprise. (3) Age of the enterprise ($\ln age$): the enterprise's year minus the year of establishment shall be used for measurement.

2. Controlling variables at the city level. In order to control the common factors that affect both the minimum wage and the enterprise price markup at the urban level, we refer to studies by Gan et al. (2016) and Mayneris et al. (2016). The control variables at the urban level are mainly logarithms of urban GDP per capita ($\ln pergdp$).

3. Results of Empirical Analysis

3.1. Benchmark regression analysis

In the benchmark regression analysis, the minimum wage is the explanatory variable of this paper, and the price addition represents the bargaining power. In addition to the minimum wage of explanatory variables, this paper also adds control variables at the enterprise and city levels. Among them, the

control variables at the firm level are the intermediate input ratio, the capital intensity and the age of the firm, and the control variables at the city level are GDP per capita. The results of the baseline regression are as follows:

Table 1. Regression results of minimum wage and price plus benchmarks

VARIABLES	(1) ln markup	(2) ln markup	(3) ln markup	(4) ln markup
minwage	-0.0621***	-0.0031***	-0.0031***	-0.0097***
	(-143.90)	(-3.71)	(-3.71)	(-8.39)
ln minput		-1.3382***	-1.3382***	-1.3288***
		(-594.53)	(-594.56)	(-492.06)
ln kl		0.0059***	0.0059***	0.0055***
		(43.13)	(43.12)	(34.07)
ln age		0.0015***	0.0015***	0.0008***
		(7.46)	(7.45)	(3.81)
ln pergdp				0.0130***
				(11.64)
Constant	1.2054***	1.5611***	1.5612***	1.3485***
	(449.64)	(287.01)	(287.00)	(102.33)
Firm fixation effect	No	Yes	Yes	Yes
Fixed year effect	No	Yes	Yes	Yes
Province fixation effect	No	No	Yes	Yes
Observations	706,504	584,353	584,352	375,962
R-squared	0.028	0.933	0.933	0.939

Note: The values in brackets are t statistics. * * *, * * and * are significant at levels of 1%, 5% and 10%, respectively. The following table is the same

In column (1), we only add the minimum wage of the explained variable but not the control variable. The result shows that the price markup decreases and the bargaining power decreases as the minimum wage rises. For every 10% increase of minimum wage, the price markup of Chinese manufacturing decreases by 0.6%, that is, the bargaining power of Chinese manufacturing decreases by 0.6%, and the regression coefficient is significant at 1%. (2) Based on the fixed effect of controlling enterprises and years, control variables such as intermediate input ratio, capital intensity and age of enterprises are added. The result shows that the effect of minimum wage on China's manufacturing price markup is still negative at a regression coefficient of 1%. The price markup of China's manufacturing industry decreases by 0.03% with every 10% increase of minimum wage, that is, its bargaining power decreases by 0.03%. The baseline regression results for the provinces added to column (3) on the basis of column (2) are similar to those for column (2). Column (4) adds the control variable of GDP per capita at the city level on the basis of column (3), and the effect of minimum wage on China's manufacturing price markup is significantly negative. For every 10% increase in the minimum wage, China's manufacturing price markup falls by 0.09%, which means that its bargaining power is weakened by 0.09% and the regression coefficient is significant at 1%.

3.2. Robustness test

In the benchmark regression, the minimum wage of the county (city) of the current period is used as an independent variable. In order to confirm the robustness of the conclusion that the increase of the minimum wage will inhibit the cost plus, this paper chooses to replace this variable with the minimum wage of the county (city) of the lag period. The results are as follows:

Table 2. Robust Test Regression Results

VARIABLES	(1) ln markup	(2) ln markup	(3) ln markup
minwage	-0.0198***	-0.0039***	-0.0039***
	(-97.27)	(-6.55)	(-6.55)
Control variable	No	Yes	Yes
Firm fixation effect	No	Yes	Yes
Fixed year effect	No	Yes	Yes
Province fixation effect	No	No	Yes
Observations	395,549	308,385	308,385
R-squared	0.023	0.800	0.800

In column (1), we only add the minimum wage of the explained variable in this paper without adding the control variable and the fixed effect of enterprises, years and provinces. Each 10% increase in the minimum wage will result in a 0.19% drop in the price markup of China's manufacturing sector, which means that the bargaining power of China's manufacturing sector is weakened by 0.19% and the regression coefficient is significant at 1%. (2) Based on the fixed effect of controlling enterprises and years, control variables such as intermediate input ratio, capital intensity and age of enterprises are added. The result shows that the effect of minimum wage on China's manufacturing price

markup is still negative at a regression coefficient of 1%. The price markup of China's manufacturing industry decreases by 0.03% with every 10% increase of minimum wage, that is, its bargaining power decreases by 0.03%. The regression results of the provinces fixed effect listed in (3) on the basis of the second column are consistent with those of the second column.

4. Conclusions and Recommendations

4.1. Conclusion

In recent years, with the implementation of the minimum wage policy nationwide, the minimum wage has increased the labor cost of manufacturing industry. At present, China's manufacturing industry is still facing the problem of overcapacity, such as the urgent need for transformation and upgrading.

The results show that the impact of minimum wage policy on the bargaining power of manufacturing industry is a kind of cost effect, and it is difficult for enterprises to adapt to the improvement of minimum wage standard. The main reason is that the increase in the minimum wage will increase labor costs in the manufacturing sector in the short term, while the manufacturing-related enterprises will not be able to achieve higher production efficiency through capital adjustment, rapid innovation and improved technology in the short term, resulting in the productivity increase effect caused by the increase in the minimum wage that cannot offset the cost effect. As a result, most manufacturing firms have responded to the minimum wage hike with a lower price markup, but with a weaker bargaining power.

4.2. Recommendations

First，we will take various measures to raise the income of workers. It is undeniable that the implementation of the minimum wage policy is beneficial to the increase of the income level of laborers. However, it cannot be ignored that with the increase of the minimum wage, the price markup of China's manufacturing industry decreases, which leads to the weakening of the bargaining power of the manufacturing industry and disadvantage in competition. Therefore, when implementing and adjusting the policy on minimum wage standards, we shall not only take into account the legitimate rights and interests of laborers, but also fully consider the impact of minimum wage standards on the price markup and price advantage of manufacturing industries, so as to avoid considering one thing and losing another. While raising the minimum wage, the government can formulate other effective livelihood protection policies to increase the income level of workers, so as to protect the legitimate rights and interests of workers and further narrow the income gap.

Second, efficiency and fairness should be considered when setting minimum wage standards. The minimum wage will have an adverse impact on China's manufacturing sector in the short term, especially for labor-intensive manufacturing enterprises, whose cost burden will be greatly increased and their bargaining power significantly reduced. Most of these manufacturing enterprises are small and medium-sized private enterprises, which employ a considerable proportion of our labor force. Therefore, when protecting the legitimate rights and interests of low-wage workers, local governments shall properly consider the impact on the manufacturing industry, and include such impact in the formulation of minimum wage standards. When setting the minimum wage level, they shall pay attention to whether it is in line with the local actual conditions and local economic affordability, and prevent blind comparison between regions, so as to ensure both fairness and efficiency.

Third, promote active innovation in manufacturing enterprises. Although the cost effect of the minimum wage leads to the reduction of the price markup of the manufacturing industry, enterprises can improve their pricing ability by actively innovating and improving production technology and production efficiency, and offset the cost effect caused by the minimum wage increase with the productivity increase effect. Therefore, the government should take appropriate measures to encourage export enterprises to actively innovate. Firstly, the government shall strengthen the protection of intellectual property rights, patents and technologies of enterprises, further improve the relevant laws and regulations, and provide a more incentive external environment for promoting the technological innovation and the research and development of new products of export enterprises, so as to enhance the independent innovation capacity of enterprises.

Finally, the minimum wage adjustment is combined with the optimization of the resource integration capability of manufacturing enterprises. Although the minimum wage adjustment can improve the mismatch of enterprise resources, but the iron still needs its own hard. Accompanying with the economic globalization is the international flow of factor resources, which is the microcosmic foundation of the global economy and determines the important contents of the contemporary world economy, such as the pattern of world growth, international income distribution and the division of global value chain. Therefore, the ability of resource integration is a very important ability that manufacturing enterprises must possess in order to stand on the fierce international market competition. The Chinese manufacturing enterprises must have global strategic vision and the ability to integrate factor resources in the world if they want to realize the rising of the division of labor in the global value chain. Because transnational enterprises are the organization form of investment globalization, the organizer of factor flow, and the indispensable medium of enterprises to participate in economic globalization. The government should carry out the minimum wage policy step by step according to local conditions on the basis of comprehensive evaluation of the economic effect of the minimum wage.

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