

# *Decomposition Analysis of China's Industry Income Gap*

—Based on Macroscopic Perspective

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**Abstract**—In this paper, the macroscopic industry data of China Statistical Yearbook for past years are adopted for the decomposition analysis of China industry income gap through Oaxaca-Blinder decomposition and Fields decomposition. The research result shows that the income gap is highly unreasonable; the high education of the employees is still the important cause for the high income in the monopolized industry; compared with the monopolized industry, the competitive industry has more reasonable wage determination system.

**Keywords**—Industry Income Gap; Oaxaca-Blinder Decomposition; Fields Decomposition

## I. INTRODUCTION

Since the reform and openness, the resident income gap and the resident income have been expanded synchronously in China. According to the data issued by the National Bureau of Statistics for 2016, the Gini coefficient of the resident income in China is 0.465 and has a slight increase compared with the value in 2015, but it is still higher than the international warning line. Along with the continuously deepened income distribution system reform, to narrow the urban resident income gap has become an important content of the present economic system reform in China. In recent years, the annual average growth of the Gini coefficient of the urban resident income has reached up to 5.2%, higher than the annual average growth of the urban resident income gap (1.6%) in the same period. This means that the expansion speed of the industry income gap is greatly higher than that of the urban resident income gap in China, and the industry income gap has become the main promoter for the continuous expansion of the urban resident income gap. Meanwhile, different from other disparity (e.g. urban-rural disparity and regional disparity), the industry income gap caused by such unreasonable factors as administrative monopoly can more easily induce people's psychological imbalance and accordingly threaten social stability. Therefore, for describing the industry income gap conditions in China, it is crucial to explore the industry income

gap formation mechanism in China and separate the reasonable part and the unreasonable part of the industry income gap.

## II. DATA AND MODEL

In this paper, 38 industries (except mining industry) are taken as the object of the empirical research, and the data are mainly sourced from China Statistical Yearbook and China Labor Statistical Yearbook for 2004 ~ 2016, and various factors influencing the industry income gap are deeply researched as well.

The Mincerian wage equation for the industries selected by Ren Zhong (2009)[1] is taken as the reference for the empirical model in this paper, and 5 indexes influencing the industry income gap are selected on the basis of previous literatures:

$$Y_{it} = \alpha_{it} + \beta_1 X_{1,it} + \beta_2 X_{2,it} + \beta_3 X_{3,it} + \beta_4 X_{4,it} + \beta_5 X_{5,it} + \varepsilon_{it} \quad (1)$$

Where explained variable  $Y_{it}$  is average industry wage;  $\alpha_{it}$  and  $\varepsilon_{it}$  are respectively constant term and random disturbance term;

Among the explanatory variables,  $X_1$  is the industry monopoly degree measured by industry nationalization degree, and is equal to  $X_1 = ((\text{employment figure of state-owned unit in industry } i / \text{employment figure in the same industry} + \text{assets of state-owned and state-controlled units} / \text{total assets of the industry}))^2$ ;  $X_2$  is the industry per capita profit used for measuring the industry profitability, and is equal to  $X_2 = \text{total profits in industry } i / \text{employment figure in the same industry}$ ;  $X_3$  is the foreign direct investment (FDI) proportion used for measuring the participation degree and the investment preference of FDI, and is equal to  $X_3 = \text{foreign (including Hong Kong, Macao, Taiwan) investment assets in industry } i / \text{total assets in the same industry}$ ;  $X_4$  is the industry employment scale used for investigating the industry employment scale, and is equal to  $X_4 = \text{employment figure in industry } i / \text{employment figure in total industry samples}$ ;  $X_5$  is the overall labor productivity for reflecting the industry

production capacity, and is equal to  $X_5$  = total industrial output value in industry  $i$  / employment figure in the same industry.

### III. INDUSTRY INCOME GAP REASONABILITY DECOMPOSITION ANALYSIS

For the monopolized industry, the high industry income itself may not be a problem, and the key lies in the reasonability of the cause for the income gap between the monopolized industry and the competitive industry [2]. In this paper, Oaxaca-Blinder decomposition method is adopted to quantitatively analyze the reasonable part and the unreasonable part of the industry income gap.

Oaxaca-Blinder decomposition method is the main method for researching the wage income gap between two groups, respectively proposed by Oaxaca (1973) [3] and Blinder (1973) [4] during sex or race wage difference research. In this paper, Oaxaca-Blinder decomposition method is adopted to divide the high income in the monopolized industry in order to decompose the reasonable part and the unreasonable part, compare the proportion of the unreasonable part and accordingly once investigate the reasonability of the high income in the monopolized industry.

Firstly, the corresponding Mincerian wage equations are respectively established for the monopolized industry and the competitive industry as follows:  $\ln w_m = \alpha_m + \beta_m X_m + \varepsilon_m$  and  $\ln w_c = \alpha_c + \beta_c X_c + \varepsilon_c$ , where  $\alpha$  is constant term;  $\ln w$  is logarithmic wage income;  $\beta$  is endowment characteristic return rate;  $X$  is endowment characteristic;  $\varepsilon$  is random disturbance term.

Subsequently, in consideration of the more marketized characteristic of the wage income in the competitive industry, the competitive industry is taken as the reference group, and the average logarithmic wage difference between the monopolized industry and the competitive industry is decomposed in order to investigate the degree of the deviation of the monopolized industry wage determination from the market. Specifically, the decomposition formula is as follows:

$$\overline{\ln w_m} - \overline{\ln w_c} = (\alpha_m - \alpha_c) + (\overline{X_m} - \overline{X_c})\beta_c + (\beta_m - \beta_c)\overline{X_m} \quad (2)$$

Where  $\overline{\ln w}$  is average logarithmic industry wage. The average logarithmic wage difference between the monopolized industry and the competitive industry is decomposed into two parts, namely:  $(\overline{X_m} - \overline{X_c})\beta_c$  is the income gap caused by endowment characteristic difference, and is deemed as explainable part or reasonable part;  $(\alpha_m - \alpha_c)$  and  $(\beta_m - \beta_c)\overline{X_m}$  are the income gaps respectively caused by constant term and endowment characteristic return rate, namely the income gaps caused by other factors except endowment characteristic, and is deemed as unexplainable part or unreasonable part (discriminated part).

The classification standards of Yu Liangchun and Wang Meichen (2014) [5] for the monopolized industry are taken as the reference for the classification standards for the monopolized industry in this paper. Specifically, the following five segmented industries ---- the petroleum and natural gas extraction industry, the petroleum processing, coking and nuclear fuel processing industry, the electric power and heating

power production & supply industry, the fuel gas production & supply industry, and the water production & supply industry are selected as the monopolized industries; the following nine segmented industries ---- the farm and sideline food processing industry, the textile industry, the textile & garment, shoes and cap production industry, the leather, fur and feather (down feather) and related products industry, the wood processing, wood, bamboo, rattan, palm and grass products industry, the furniture manufacturing industry, the stationery and sporting goods manufacturing industry, the plastic products industry, and the waste resources and materials recycling & processing industry are selected as the typical competitive industries.

In order to research the influence of the education degree of the employees in these industries on the income gap between the monopolized industry and the competitive industry, the education degree is also taken as a variable on the basis of considering the industry per capita profit and the overall labor productivity in Oaxaca-Blinder decomposition. Specifically, the education degree is measured by the proportion of the number of the employees with college degree or above in the number of the total employees in this industry. The decomposition result is as shown in TABLE I.

TABLE I. OAXACA-BLINDER DECOMPOSITION RESULT OF INCOME GAP BETWEEN MONOPOLIZED INDUSTRY AND COMPETITIVE INDUSTRY

	Education Degree Excluded		Education Degree Included	
	Coef.	Percentage	Coef.	Percentage
Reasonable Part	1959.09	12.74%	10136.34	65.91%
Unreasonable Part	13419.19	87.26%	5241.94	34.09%
Total	15378.28	100%	15378.28	100%

According to TABLE I, the average income gap between the monopolized industry and the competitive industry is 15,378.28. Before the education degree of the employees in the industry is considered, the reasonable part of the industry income gap occupies 12.74% while the unreasonable part occupies 87.26%; after the education degree variable is considered, the reasonable part of the industry income gap occupies 65.91% while the unreasonable part occupies 31.09%. The contribution of the education degree to the industry income gap reaches up to 53.17%, thus indicating that the human capital factor greatly explains the income gap between the monopolized industry and the competitive industry; in other words, the high income in the monopolized industry is significantly determined by the high education of the employees. Additionally, the unreasonable part of the income gap still occupies 34.09%, thus indicating that the industry monopoly is still an important cause for the industry income inequality.

### IV. INTERNAL INCOME GAP DECOMPOSITION AND COMPARISON OF MONOPOLIZED INDUSTRY AND COMPETITIVE INDUSTRY

In order to investigate the influence of the industry characteristics on the internal income gaps of the monopolized industry and the competitive industry, Fields decomposition method [6] is adopted in this paper for respectively

decomposing the internal income gaps of the monopolized industry and the competitive industry.

Firstly, the wage equation is assumed as  $\ln Y_{it} = a_t * Z_{it}$ , where  $Y_{it}$  is the average industry income in the  $i$ th industry at the  $t$ th year;  $a_t$  is the wage return rate of the industry characteristics,  $a_t = (\alpha_t, \beta_{1t}, \beta_{2t}, \dots, \beta_{jt}, 1)$ ;  $Z_{it}$  is the industry characteristic variable in the  $i$ th industry at the  $t$ th year,  $Z_{it} = (1, X_{i_1t}, X_{i_2t}, \dots, X_{i_jt}, \xi_{it})$ .

Subsequently, the following formula is obtained according to Fields decomposition:

$$s_j(\ln Y) = \frac{\text{cov}(a_j z_j, \ln Y)}{\sigma^2(\ln Y)} = \frac{a_j * \sigma(z_j) * \text{cor}(z_j, \ln Y)}{\sigma(\ln Y)} \quad (3)$$

Where  $s_j(\ln Y)$  is the explaining weight (contribution) of the  $j$ th industry characteristic influencing industry wages to the industry income gap. The contributions of all explanatory variables including the residual errors to the income gap are summed as 100%, and the contributions of the explanatory variables excluding the residual errors to the income gap are equal to coefficient  $R^2[7]$  of the multiple linear regression equation.

TABLE II. FIELDS DECOMPOSITION RESULTS OF INTERNAL INCOME GAPS OF MONOPOLIZED INDUSTRY AND COMPETITIVE INDUSTRY

	Competitive Industry (%)	Monopolized Industry (%)
Industry Per Capita Assets	27.64	20.26
Industry Per Capita Profit	20.42	35.28
FDI Proportion	40.14	21.34
Overall Labor Productivity	-16.13	17.37
Industry Education Degree	19.31	1.19
Residual Error	8.62	4.56
Total	100	100

According to the Fields decomposition results in TABLE II, different industry characteristics have different influence on the internal income gaps of the monopolized industry and the competitive industry. For the competitive industry, FDI proportion has maximum contribution ---- 40.14% to the income gap; for the monopolized industry, the industry per capita profit has larger explanation degree ---- 35.28% to the internal income gap thereof. Notably, the contribution of the education degree of the employees concerned to the income gap of the competitive industry is 19.31%, but the influence of the same variable on the internal income gap of the monopolized industry is only 1.19%. In other words, the education degree can significantly influence the internal income gap of the competitive industry but slightly influence that of the monopolized industry. Therefore, compared with the monopolized industry, the competitive industry has more reasonable wage determination system.

## V. CONCLUSION

From the macroscopic perspective, relevant industry data of China Statistical Yearbook for 2004~2016 are adopted in this paper for the decomposition analysis of the industry income gap in China. Specifically, Oaxaca-Blinder decomposition

method is adopted to quantitatively separate the reasonable part and the unreasonable part of the industry income gap; Fields decomposition method is adopted for the decomposition and comparison analysis of the internal income gaps of the monopolized industry and the competitive industry. The result of the empirical research shows: (1) the unreasonable part of the income gap is still as high as 34.09%, thus indicating that the industry monopoly is still an important cause for the industry income inequality; (2) the high income in the monopolized industry is greatly caused by the high education of the employees; (3) different industry characteristics have different influence on the internal income gaps of the monopolized industry and the competitive industry; (4) compared with the monopolized industry, the competitive industry has more reasonable wage determination system. At a certain economic development stage, moderate industry income gap may promote the economic growth, so the Chinese government should not only consider the reasonable part of the industry income gap, but also maximally avoid the expansion of the unreasonable part of the industry income gap.

## REFERENCES

- [1] Ren Zhong. Measurement and Decomposition Analysis of China's Industry Wage Gap [J]. Journal of Central University of Finance & Economics, 2009, 01:66-71.
- [2] Yue Ximing, Li Shi, Shi Taili. Discussion about High Income of Monopolized Industry [J]. Social Sciences in China, 2010,03:77-93+221-222.
- [3] Oaxaca R. Male-female wage differentials in urban labor markets[J]. International economic review, 1973,14(3): 693-709.
- [4] Blinder A S. Wage discrimination: reduced form and structural estimates[J]. Journal of Human resources, 1973,8(4): 436-455.
- [5] Yu Liangchun, Wang Meichen. Empirical Analysis for Influence of Industry Monopoly on Income Gap [J]. Research on Economics and Management, 2014,07:23-33.
- [6] Du Xin. Income Gap between Monopolized Industry and Competitive Industry in China: Research Based on Beijing Micro-data [J]. Nankai Economic Studies, 2010,05:111-124.
- [7] Fields G S. Accounting for income inequality and its change: A new method, with application to the distribution of earnings in the United States[J]. Research in labor economics, 2003, 22(1.38).