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The Decomposition of Wage Differential in a Segmented Labor Market

Jun Kong[1,*], Tingting Niu[1], Qing Deng[1]

[1]*School of Economics and Management, Northwest University, China*

[*]Corresponding author**:** Jun Kong, department of public finance and taxation

Email: kongjun@nwu.edu.cn, 544790789@qq.com

Address: No.1 Xuefu Avenue, Guodu Educational and Industrial Zone, Chang'an District, Shaanxi, Xi'an 710127, China

Telephone:(0086)-29-84497410

Abstract

Through theoretical frame design and number simulation, a new approach on nondiscriminatory wage structure is established so as to decompose wage differential by linking the labor market and product market, assuming a segmented labor market. Results indicate that the nondiscriminatory wage structure may be overestimated, and the coefficient value may exceed the range of respective coefficients for whites and blacks regressed under the condition of labor market segmentation.

Keywords: Decomposition, wage difference, nondiscrimination, labor market segmentation

Introduction

Becker (1971) fist introduced the concept of discrimination in a competitive labor market, and believed that wage distribution would be discriminatory. He further defined discrimination factor *D,* inspiring economists to measure it.

Oaxaca (1973) expressed the wage difference in logarithmic terms as

$$\ln \overline{W}^{w} - \ln \overline{W}^{b} = \ln MP^{w} - \ln MP^{b} + \ln(D+1) \qquad (1)$$

where the left-hand term denotes the observed average wage difference between whites and blacks. $\ln MP^{w} - \ln MP^{b}$, represents the white/black marginal product difference due to differences in white and black productivity, and $\ln(D+1)$ is the discrimination component. Oaxaca (1973) and Blinder (1973) provided a similar ingenious method of wage decomposition using expressions (2) and (3) as follows:

$$\ln \overline{W}^{w} - \ln \overline{W}^{b} = \beta^{w} \overline{X}^{w} - \beta^{b} \overline{X}^{b} = \beta^{w} (\overline{X}^{w} - \overline{X}^{b}) + \overline{X}^{b} (\beta^{w} - \beta^{b}) \qquad (2)$$

$$\ln \overline{W}^{w} - \ln \overline{W}^{b} = \beta^{w} \overline{X}^{w} - \beta^{b} \overline{X}^{b} = \beta^{b} (\overline{X}^{w} - \overline{X}^{b}) + \overline{X}^{w} (\beta^{w} - \beta^{b}) \qquad (3)$$

Generally, $\ln W$ can be estimated by $\beta \overline{X}$, where $\overline{X}$ refers to average productivity-determining characteristics, and β is the OLS coefficient.

The first terms on the right-hand sides of (2) and (3), respectively, are estimates of $\ln MP^{w} - \ln MP^{b}$, and the second terms are estimates of $\ln(D+1)$. Expressions (2) and (3) only leave a term of productivity difference if *D*=0;that is, $\beta^{w} = \beta^{b}$ without discrimination. Nevertheless, completely different results regarding wage decomposition are derived from (2) and (3) based on whether whites or blacks are considered the nondiscrimination group (Ferber & Green, 1982; Cotton, 1988). Hence, the main drawback of Oaxaca-Blinder wage decomposition lies in its inappropriate basis of comparison. The algebraic manipulations of wage decomposition violate a reasonable economic connotation namely the assumption that whites enjoy premium wages while blacks suffer wage loss in accordance with the reality of the labor market. Thus, neither whites nor blacks should be considered as a decomposing base of nondiscriminatory wage structure because these two groups invoke *D* simultaneously. Oaxaca called this an index number problem. Therefore, it is crucial to identify a nondiscriminatory wage structure to compare with the observed real wages of different groups in the labor market.

Nondiscriminatory Wage Structure

Wage decomposition can be deduced among different groups using the following expression if a real nondiscriminatory wage structure, coefficient β^*, exists.

$$\ln \overline{W}^w - \ln \overline{W}^b = \beta^*(\overline{X}^w - \overline{X}^b) + \overline{X}^w(\beta^w - \beta^*) + \overline{X}^b(\beta^* - \beta^b) \tag{4}$$

Oaxaca (1973) demonstrated that the value of coefficient β^* is between β^b and β^w. Reimers (1983) proposed $\beta^* = \alpha\beta^w + (I - \alpha)\beta^b$, where I is a unit matrix and α is an arbitrary matrix. Cotton (1988) believed that the differences in the blacks and whites' wages would not persist in the absence of discrimination in the long run. He created a nondiscriminatory wage structure, $\beta^* = f^w\beta^w + f^b\beta^b$, where f^w and f^b are the respective proportions of white and black males employed in the labor force.

Cotton's viewpoint regarding a nondiscriminatory wage structure was based on several of rigorous assumptions: first, that whites would receive a lower average wage than they currently do and blacks would receive a higher average wage without discrimination; second, that the nondiscrimination wage coefficient β^* is a linear function of β^b and β^w; third, that the nondiscriminatory wage structure would be closer to the current white wage structure than to the current black wage structure because white males account for the majority of the employed male labor force; and finally, that neither the total actual output nor the total wage bill would change without discrimination. The only effect would be a redistribution of income and jobs.

Neumark (1988) calculated a nondiscriminatory wage coefficient, $\beta^* = \Omega\beta^w + [I - \Omega]\beta^b$, and defined $\Omega = (X'X)^{-1}X'^wX^w$. However, Neumark's deduction process was defective in that full samples were used to calculate Ω. Full samples do not control for the difference between two groups with different wage mechanisms; therefore, β^* is not a real nondiscriminatory wage structure coefficient when calculating Ω.

The abovementioned scholars believed that blacks would earn the same wage as whites for equal qualifications in the absence of discrimination. They tried to identify a unitary and nondiscriminatory wage structure using the average wage differential; however, they considered labor market segmentation to be an exogenous factor with different wage pricing mechanisms stemming from product market differentiation.

Segmented labor market theorists believe that mobility barriers result from skill gaps, and formal and informal institutional rules. Thus, the labor market is balkanized with institutional rules establishing boundaries that are increasingly difficult to cross between labor markets (Kerr, 1954). Along occupational lines, mobility barriers exist between the primary labor market, consisting of jobs with high wages, job security, and access to promotional ladders, and the secondary labor market, consisting of jobs with low wages, high turnover, and poor working conditions (Doeringer & Piore, 1971). Different wage pricing mechanisms reveal that internal rules facilitate wage regulation in the primary market and competitive wages in the secondary market (Levinson, 1967; Bulow, 1986; Arai, 1999). Furthermore, both markets contain whites and blacks, and whites in the primary market enjoy more generous internal wage packages compared with those in the secondary market. The same is true for blacks. If total samples are used to conduct regression analysis, the resultant coefficients may obscure and confound this wage disparity. Therefore, a nondiscriminatory wage structure for a segmented labor market is discussed in the following section.

Wage Decomposition in a Segmented Labor Market

This study defines a nondiscriminatory wage structure as $\beta^* = f^w \beta^w + f^b \beta^b$ according to Cotton's description. The measured weights, f^w and f^b, are clearly different from Cotton and Neumark's discourses in a segmented labor market. Several assumptions apply. First, the labor market is divided into primary and secondary markets. Second, only whites and blacks are employed in the labor market; there are no other ethnic groups[1]. Meanwhile, white employees occupy the highest proportion and blacks the smallest proportion of the primary market, whereas whites are less frequently employed than blacks in the secondary market. Third, β^* is also a linear function of β^b and β^w, and $\beta^b < \beta^w$ because of discrimination. Fourth, a monopolistic competition structure prevails in the product market; capital-intensive or large enterprises dominate in the primary labor market, whereas labor-intensive or small enterprises crowd the secondary market (Berger & Piore, 1982). Finally, total actual output and the total wage bill remain unchanged in the absence of discrimination.

Accordingly, f^w should involve segmentation in the labor market. We associate the labor market with the product market via product market shares for different groups because a large product market share represents higher profits and can support higher wages in the internal labor market, which prevails in the primary market. f^w is recalculated using the following

[1] The number of ethnic groups is very small and can be omitted.

expression:

$$f^w = f_{pw} \bullet f_{pms} + f_{sw} \bullet f_{sms} \tag{5}$$

$$f^b = f_{pb} \bullet f_{pms} + f_{sb} \bullet f_{sms} \tag{6}$$

where f_{pw} and f_{sw} denote the respective proportions of employed white males, and f_{pb} and f_{sb} are the respective proportions of employed black males in the primary and secondary labor markets. f_{pms} and f_{sms} are the respective product market shares of enterprises in the primary and secondary labor markets. f_{pms} and f_{sms} refer to value ratios of the primary and secondary markets to total product value, respectively. Hence, f^w and f^b involve not only labor market factors but also product market factors.

Cotton (1988) found that American white workers occupied 90% of the total labor market in 1979. According to his formula $\beta^* = f^w \beta^w + f^b \beta^b$, the nondiscriminatory wage structure is $\beta^* = 0.9\beta^w + 0.1\beta^b$. In this study, we postulate that the total employed number is equal to 1 and maintain a 90% ratio to be compared to Cotton's outcome. The different coefficients should be satisfied, specifically $f_c^w = f_{pw} + f_{sw}$, $f_c^b = f_{pb} + f_{sb}$, $f_{pw} + f_{sw} + f_{pb} + f_{sb} = 1$, and $f_{pmc} + f_{smc} = 1$, with number simulation values in (5) and (6) listed in the table below.

Table: Number simulations of coefficients in a nondiscriminatory wage structure

Type	Proportion of employed whites		Proportion of employed blacks		Product market share		Coefficients for whites and blacks		Cotton's result	
(1)	f_{pw} (2)	f_{sw} (3)	f_{pb} (4)	f_{sb} (5)	f_{pms} (6)	f_{sms} (7)	f^w (8)	f^b (9)	f_c^w (10)	f_c^b (11)
1	0.9	0	0	0.1	0.8/0.7	0.2/0.3	0.72/ 0.63	0.02/ 0.03	0.9	0.1
2	0.8	0.1	0.01	0.09	0.8/0.7	0.2/0.3	0.66/ 0.59	0.026/ 0.034	0.9	0.1
3	0.8	0.1	0.02	0.08	0.8/0.7	0.2/0.3	0.66/ 0.59	0.032/ 0.038	0.9	0.1
4	0.8	0.1	0.03	0.07	0.8/0.7	0.2/0.3	0.66/ 0.59	0.038/ 0.042	0.9	0.1

5	0.8	0.1	0.04	0.06	0.8/0.7	0.2/0.3	0.66/ 0.59	0.044/ 0.046	0.9	0.1
6	0.7	0.2	0.01	0.09	0.8/0.7	0.2/0.3	0.60/ 0.55	0.026/ 0.034	0.9	0.1
7	0.7	0.2	0.02	0.08	0.8/0.7	0.2/0.3	0.60/ 0.55	0.032/ 0.038	0.9	0.1
8	0.7	0.2	0.03	0.07	0.8/0.7	0.2/0.3	0.60/ 0.55	0.038/ 0.042	0.9	0.1
9	0.7	0.2	0.04	0.06	0.8/0.7	0.2/0.3	0.60/ 0.55	0.044/ 0.046	0.9	0.1
10	0.6	0.3	0.01	0.09	0.8/0.7	0.2/0.3	0.54/ 0.51	0.026/ 0.034	0.9	0.1
11	0.6	0.3	0.02	0.08	0.8/0.7	0.2/0.3	0.54/ 0.51	0.032/ 0.038	0.9	0.1
12	0.6	0.3	0.03	0.07	0.8/0.7	0.2/0.3	0.54/ 0.51	0.038/ 0.042	0.9	0.1
13	0.6	0.3	0.04	0.06	0.8/0.7	0.2/0.3	0.54/ 0.51	0.044/ 0.046	0.9	0.1
14	0.5	0.4	0.01	0.09	0.8/0.7	0.2/0.3	0.48/ 0.47	0.026/ 0.034	0.9	0.1
15	0.5	0.4	0.02	0.08	0.8/0.7	0.2/0.3	0.48/ 0.47	0.032/ 0.038	0.9	0.1
16	0.5	0.4	0.03	0.07	0.8/0.7	0.2/0.3	0.48/ 0.47	0.038/ 0.042	0.9	0.1
17	0.5	0.4	0.04	0.06	0.8/0.7	0.2/0.3	0.48/ 0.47	0.044/ 0.046	0.9	0.1

This study assumes that white workers account for 80% of workers employed in the primary labor market, and 10% in the second market for a total 90% in the total labor market (see type

2 in the table). The extreme case (see type 1) assumes that whites comprise the entire primary market and blacks comprise the entire secondary market. Other types show different combinations with different proportions of employed whites, employed blacks, and market shares.

Such combinations, such as (0.7, 0.2), (0.6, 0.3), and (0.5, 0.4), appear in columns 2 and 3. Similarly, blacks occupy 1% of the primary market, and 9% of secondary market to comprise 10% of the entire labor market. Other combinations, such as (0.02, 0.08), (0.03, 0.07), and (0.04, 0.06), are shown in columns 4 and 5. Only two types of market share are assumed in columns 6 and 7, namely (0.8, 0.2) and (0.7, 0.3), demonstrating that the output for enterprises in the primary labor market accounts for 80% of the product market value; enterprises in the secondary market account for the remaining 20%, (or 70% vs. 30% in the second example). In columns 8 and 9, the figures are recalculated using expressions (5) and (6). Cotton's coefficient weight results appear in columns 10 and 11.

We can draw some interesting conclusions from the outcomes in the table. First, our coefficients are smaller than Cotton's: 0.72/0.63 (0.66/0.59; 0.60/0.55; 0.54/0.51; or 0.48/0.47) vs. 0.9, and 0.02/0.03 (0.026/0.034; 0.032/0.038; 0.038/0.042; or 0.044/0.046) vs. 0.1. Hence, the nondiscriminatory wage coefficient β^* became smaller and more distant from white workers' average wages than Cotton's conclusion, assuming a segmented labor market. In other word, Cotton overestimated the extent of discrimination towards blacks regardless of the prevalence of whites in the secondary labor market.

Second, β^* is not necessarily between β^w and β^b. According to Cotton's formula, $\beta^* = 0.9\beta^w + 0.1\beta^b$, $\beta^b < \beta^w$, so $\beta^b < \beta^* < \beta^w$ is confirmed. Oaxaca (1973), Reimers (1983), and Cotton (1988) also claimed that the nondiscriminatory wage structure, β^*, was between β^w and β^b. Their deductions were found to be void of strict theoretical proof. On the contrary, Neumark (1988) criticized their results and argued that the nondiscriminatory wage structure, β^*, can be beyond the range of β^b and β^w. However, the present study found a result of $\beta^* = 0.72\beta^w + 0.02\beta^b$ with 80% market share, $\beta^* = 0.63\beta^w + 0.03\beta^b$ with 70% market share, and other results with different coefficient values. β^* may not exceed β^w but may rather be smaller than β^b. Therefore, this study supports Neumark's viewpoint to some extent.

Conclusion

Brown *et al*. (1980) presented the idea of segmentation in wage decomposition. They also explored professional segmentation in the labor market. However, they did not examine the relationship between the labor market and product market; rather, they simply calculated the probabilities of whites and blacks entering different professions. The current study focused exclusively on the link between the labor market and product market. We believe segmentation in the labor market is closely related to production fluctuations, profit variability, and job position stabilization. Enterprises in the primary market enterprises employ an internal wage processing mechanism and represent a capital-intensive industry with stable production. Secondary market enterprises employ a competitive wage mechanism and reflect a labor-intensive industry with unstable seasonal production. It is therefore concluded that the nondiscriminatory wage structure may be overestimated, and the coefficient value may exceed the range of separate coefficients for whites and blacks regressed in a segmented labor market.

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