
Are Labor Markets Segmented across Occupations ?

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The purpose of this paper is to confirm both theoretically and empirically that labor markets are segmented across occupational as well as industrial divisions. After providing a conceptual ground of market segments across occupations, I test the occupation-based labor market, dualism hypothesis employing Current Population Survey March, 1991 and the Dictionary of Occupational Titles (the 4th edition). The test proceeds in three stages. In the first stage, I identified the existence of distinct wage setting regimes across occupational divisions by means of examining the actual distribution of regression coefficient estimates of education across occupations. In the second stage, I demonstrate that the distinct wage setting regimes match with dual labor market theory in terms of major job characteristics such as earnings, job stability, work complexity, autonomy, and authority. In the third stage, I compare male and female labor force with respect to the market dualism hypothesis. The comparison of male and female indicates that the dual labor markets hypothesis is supported only among males while not among females. The theoretical implication of labor markets segmentation across occupations, distinct from the segmentation across industries, is widely discussed throughout the paper as well as the difference between male and female with respect to markets structure and its impacts on gender inequality.

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Despite nearly twenty years of research, the "New Structuralist" approach to labor market segmentation has failed to provide a definitive identification of labor market segments (Zucker and Rosentein, 1981; Coverman, 1986; Harrison, 1989). Indeed, some scholars still dispute the existence of such segmentation (Cain, 1976; Anderson et al., 1987) arguing that there is only weak evidence of either barriers to mobility between segments or of differential rates of return to human capital between segments. In this paper, I try to add to this debate by studying the actual distribution of educational rates of return across occupational labor markets. This study can provide clearer insight on the issue of differential rates of return as criteria of labor market segmentation.

Dual labor market theorists have argued that jobs have a contextual effect on an individual's earnings independent of one's human capital. According to their arguments, labor markets are divided into two or three segments across which rewarding processes of employees are heterogeneous. Dimensions of market dualism

vary among researchers. Examples of those are a sector division by industry (Beck, Horan and Tolbert, 1978; Hodson, 1983), an occupational labor market segmentation (Osterman, 1975; Rosenberg, 1975; Coverman, 1986), market shelters constructed both by occupational and industrial criteria (Freeman, 1976; Sakamoto and Chen, 1991), and internal labor markets characterized by a set of organizational traits (Doeringer and Piore, 1971).

Even though Stolzenberg (1975) drew attention, more than two decades ago, to the importance of occupational labor markets, relatively few studies have been done in this area in contrast to a fairly large amount of literature accumulated on industry-based labor markets. There has been little effort to test formally the occupational labor market dualism (e.g., Osterman, 1975; Rosenberg, 1975) in contrast to many attempts made on the industrial labor market dualism (e.g., Tolbert, Horan and Beck, 1980; Dickens and Lang, 1985; Sakamoto and Chen, 1991). As a counterbalancing effort, this paper will focus on occupation-based labor markets. The main task of this paper is

to test whether occupational labor markets have dual wage-setting regimes in terms of the educational rate of return.

In the next section, I review some of the noteworthy empirical works on occupationbased dual labor markets after describing briefly the key concepts of occupational labor market dualism.

I. Empirical Works on the Occupational Labor Market Dualism

Piore (1973) provided a conceptual scheme or occupational labor market segmentation. According to his conceptualization, the primary market consists of "good jobs" which possess traits such as high wages, employment stability, good working conditions, opportunity of advancement, etc., while the secondary market consists of "bad jobs" having the opposite traits. He elaborated the primary market further into an upper-tier primary and a lower-tier primary by the degree of work autonomy and the amount of participation in decision-making process.

Rees and Schults' study (1980) of Chicago male workers employed in selected occupations suggested that occupational labor markets were segmented by differential rates of return to human capital. Stolzenberg (1975) also indicated that labor markets tend to be fragmented along occupational lines. He maintained that labor markets are segmented because the occupational skills are not easily transferable across different occupations and the processes governing wage attainment vary from one occupation to another.

Research testing the labor market segmentation hypothesis has tended to attack one of two key points deduced logically from the market homogeneity assumption of human capital theory. One way to repudiate the market homogeneity assumption was to demonstrate that there is little or no mobility across labor markets because there are non-economic barriers to labor market mobility. Researchers have neither proved that there is little or no mobility across occupational labor markets (Leigh, 1976; Griffin, Kalleberg and Alexander, 1981), nor shown that an empirically solid set of mobility

clusters exist in occupational labor markets (Harrison, 1989).

The other conventional way to repudiate the market homogeneity assumption was to demonstrate that the wage-setting mechanisms are different among various segments of labor markets. Most researchers studying occupational labor market dualism have argued that human capital variables such as education and experience are rewarded at different rates between primary and secondary labor markets. They have used two kinds of strategy to demonstrate this point.

One strategy was first to determine a priori groupings of jobs based upon theoretical specification of the relevant jobs. Having thus divided the sample, they next tested for differences in the earnings equation for each segment. Some studies found patterns corresponding roughly to occupational dual labor market theory (Osterman, 1975; Rumberger and Carnoy, 1980; Rosenberg 1975). Others found only partial or little support for the hypothesis (Coverman, 1986; Lorence, 1987). The major drawback of this strategy is that how to make groupings of occupations into

market segments is left to researcher's discretion. Classification schemes of researchers often did not coincide with one another. As a result of this arbitrary classification, anomalous findings could not be unambiguously interpreted or compared. They could not conclude convincingly whether the problem lay in market segmentation theory, or with the classification scheme of market segments. Basically, those researches could not avoid criticism on the validity of any given classification of labor market segments. For example, Rumberger and Carnoy (1980) used the Dictionary of Occupational Titles' (DOT) job characteristics (mainly Specific Vocational Skills (SVP) and Work Involvement with People) as the criteria of grouping. On the other hand, Rosenberg (1975) and Coverman (1986) used a DOT characteristic (SVP) and average earnings of an occupation as the criteria of classification. None of these researches gave a consistent conclusion to the hypothesis that the educational rate of return is higher in primary labor markets than in secondary labor markets, as the theory predicted.

The other strategy to identify

segments did not assume how jobs should be grouped into a set number of segments. Instead, labor market segments were defined as a group of occupations aggregated by means of clustering techniques without assuming any fixed number of market segments. Having thus divided the sample, they also tested the equality of earnings equations across segments. This method has the advantage of not requiring prior knowledge of membership by segments. On the other hand, its drawback is that there are no objective criteria for deciding how many clusters of occupations should be derived from the data. This method also gave rise to anomalous and varying classifications partly because the clusters varied with the job or worker characteristics used to define them. For example, Freeman (1976) configured occupation-and-industry-based labor markets into fourteen to sixteen shelters using criteria such as full-time-full-year employment status, collective bargaining coverage, licensing coverage, establishment size and government employment. On the other hand, Anderson and his colleagues (1987) used as the clustering

criteria a little bit different set of job traits. Those are wage, quit probability, layoff probability, unionism, unemployment rate, tenure, absences, and schooling. They reported a negative result arguing that no conclusive evidence of a dual or multiple labor markets was observed at any point in the clustering process. Lorence (1987) showed that occupations converged into different sets of clusters depending upon whether occupational traits were aggregated for male workers or for female workers. In sum, we can see that in order to provide evidence for the dual labor market theory, most dual labor market researchers have focused on demonstrating that labor markets do not operate in the way the human capital theory indicated.

Concerning the structure of occupation-based labor markets, I attempt to test the market dualism hypothesis by not assuming prior knowledge of classification into market segments. In order to avoid the problem of cluster analysis that clusters vary for different sets of criteria, I will use the most principal criteria of segmentation hypothesis, that is, differential rates of

return to formal education. Other criteria will be employed after dual market structure is discerned using the principal criteria. This approach has advantage over prior studies using cluster analysis in that it gives a more focused test of segmentation hypothesis concerning the key issue of whether the rates of return to education are heterogeneous across market segments. The logic behind the approach and its adequacy for this problem will be discussed in the next section.

II. Data and Method

As dual labor market theorists have argued, if worker's mobility is not free (i.e., does not follow the neo-classical wage equilibrium model of labor markets), then labor markets become "vulcanized", creating institutional barriers to mobility. This vulcanization or segmentation creates distinct wage setting regimes for each market segment. Dual labor market theorists presented various rationales for the distinct wage setting regimes of primary and secondary markets. "Monopoly wage", "Efficiency

wage", "Internal labor markets", and "Difference in worker's organizational power" are a few of the concepts used to explain why primary labor markets reward worker's skills more favorably than do secondary labor markets (Gorden, Edwards and Reich, 1982; Kalleberg, Wallace and Althausen, 1981; Ehrenberg and Smith, 1991; Kalleberg, 1989). Most empirical studies of the wage setting regimes have concentrated on the issue of the differential rates of return to human capital, particularly formal education. This parallels the fact that human capital theory has displayed a high degree of specification on the issue of educational rates of return (Becker, 1975; Mincer, 1974).

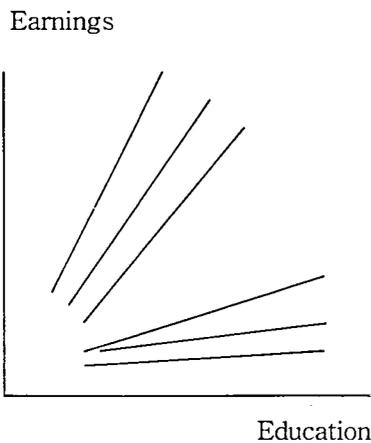
In this paper, I try to test the major argument of dual labor market researchers', that is, the rates of return to formal education are higher in primary labor markets than in secondary markets. If their argument is true, we can infer logically that educational rates of return should display a bimodal distribution across all occupations. This point will be clearer in the following figures.

Suppose that labor markets in the

economy consist of six occupations, and that each line in Figure 1-a and 1-b corresponds to a regression line of an earnings determination equation in each occupation. If the dualism hypothesis of occupational labor markets is true, then educational rates of return across the six occupations should display a bimodal distribution as shown in Figure 1-a.

The distribution of slopes in Figure 1-a looks like a mixture of two separate distributions. The two separate distributions identified by two distinct modes/ means of the slopes imply that the wage-setting mechanism in the economy is not homogeneous across the two groups of occupations.

(a) Dual labor market theory



(b) Human capital theory

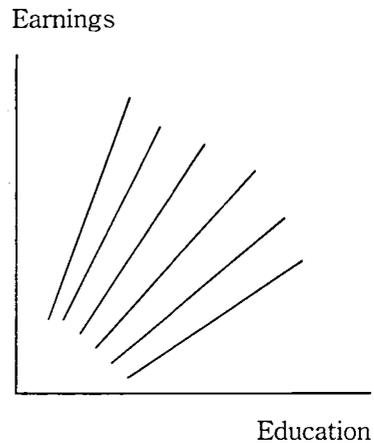


Figure 1. Hypothetical regression lines

According to the dualism hypothesis, primary labor market jobs should construct a distinct set of positive slopes on formal education, while secondary labor market jobs display slopes near to the zero rate of return.

On the other hand, if the dualism hypothesis is not true, then the slopes indicating educational rates of return will be distributed with one mode/ mean or be evenly dispersed across occupations as shown in Figure 1-b¹⁾. In

reality, these ideal types can not be observed in the pure forms. Many occupations may display variations not predicted by these ideal types²⁾. I expect that these ideal types can serve as a touchstone to test the existence of labor market dualism.

In order to obtain the educational rates of return, I applied an earnings determination regression model for each occupational category. The model used in this research was originally constructed by Mincer (1974).

The equation is

$$Y = b_0 + b_1 ED + b_2 EX + b_3 EX^2,$$

where, Y is natural-log of annual earnings; ED is education measured by years of school attended; EX and EX² are potential labor market experience calculated as age - years of schooling - 5, and its squared form to model the known curvilinear association³⁾.

Earnings are not determined only by education and experience. Nevertheless I

1) I borrowed this framework from Dickens and Lang(1985). They hypothesized a flat rate of return in secondary markets and a positive rate of return in primary markets in the context of industry-based labor market segmentation.

made a decision to include only human capital variables in the model following Mincer in consideration of the following point. According to previous studies (Hodson, 1983; Kalleberg, et al., 1981), other variables such as sex, race, and region are often used for the estimation of earnings, which supports market segmentation theory. However, there is no evidence that these factors interfere with occupation or industry in the creation of market segments. Rather it seems that these factors construct fairly independent dimensions in labor markets separately from occupation or industry. If this is the case, in order to repudiate the argument of human capital theory, it is more efficient to test its argument by following their original model rather than by applying a more complicated model. For this reason, human capital

2) This point will be discussed further in the section to examine the actual pattern of educational returns.

3) Many researchers have indicated the inaccuracy of this translation formula for female labor forces. In this study, I substituted the corrected formula proposed by Beck, Horan and Tolbert (1980:1113), which supplied deflated values of labor market experience by gender, marital status, and racial affiliation.

theorists as well as markets segmentation theorists conventionally used this simplified model for the benefit of efficiency of parameter estimation (Armitage and Sabot, 1986; Papanicolaou Psacharopoulos, 1979).

A logarithmic transformation of the dependent variable has been conventionally used in the literature since it corrects a skewed distribution of earnings to satisfy the normality assumption of the regression model. The semi-log function provides additional advantage for this study. The logarithmic transformation makes it meaningful for us to compare metric coefficients collected from many different regressions because it erases the effect of differences in the means of earnings among occupations. In the semi-log function, the metric coefficient of education is interpreted as the increase in the proportion of earnings on average for a one unit increase in years of schooling (Stolzenberg, 1975).

The method used in this research has following weakness, even though it overcomes the problem of arbitrariness related to the cluster analysis in previous studies. That is, since a

distribution of earnings in each occupation is obtained from censored observation, a comparison of coefficients derived from the distribution might not be a appropriate approach. If labor markets are really segmented, this problem can not be a serious concern. On the other hand, if labor markets are homogeneous in terms of educational rates of return, this approach increases the possibility to obtain a biased result. Given the circumstance that there is no efficient way to avoid this problem, the result of this research should be interpreted with this limitation in mind.

The test proceeds in three stages. In the first stage, I identify the existence of distinct wage-setting regimes across occupational divisions by applying the logic as described above. In this stage, I show that partial regression coefficients of education collected from a regression in each occupation displays a shape of a mixture of two distinct distributions. In the second stage, I demonstrate that the distinct wage-setting regimes identified in the first stage match with market segments as described in dual labor market theory. In the third stage, I compare male and

female labor force with respect to the labor market dualism hypothesis. In this stage, I will check for whether labor market segmentation is limited to male work force or universal across the gender division.

The data used in this research is from the self-weighted 1991 March Current Population Survey. Civilian non-farm labor forces aged 16 to 65 were selected for this analysis. Self-employed and unemployed workers were excluded. These series of selection processes left a sample size of 64,929⁴). The survey used the 1980 Census occupational classification system with 503 detailed categories. Instead of using all three-digit occupational categories, I chose occupations employing at least fifty workers in order to assure stability of the parameter estimates. This selection left 227 occupational categories. Table 1 shows a descriptive comparison of labor force between the selected occupations and the deleted occupations.

We can see in Table 1 that the selected 227 occupations employed more

than 93.4% of whole labor forces. Even though workers employed in the deleted 253 occupations display a little bit higher levels of average earnings, education, experience, and percentage male than those in the selected occupations, they are also more variant among themselves than workers in the selected occupations.

Taking into account these points, it is reasonable to limit the analysis to the selected occupational categories for the sake of parsimony. In order to examine the match between the distinct wage-setting regimes and dual labor market distinction, I rely upon the Dictionary of Occupational Titles (DOT) fourth edition (England and Kilbourne, 1989) for the occupational characteristics of each occupation.

III. Results

Table 2 presents the estimates of the baseline model for the labor force in the whole occupations. We can see that the direction and magnitude of regression coefficients follow the pattern from many previous studies. The percentage of the explained variances of

4) The original sample size before the selection is 158,477.

Table 1. A Comparison of Workers in the Selected and the Deleted Occupations

		Selected Occupations	Deleted Occupations	All Occupations	Occupations
N of Occupations		227		253	480
N of Labor	Forces	60,629		4,300	64,929
	Mean	267.09		17.00	135.27
	S.D.	371.63		13.46	284.39
Earnings	Mean	22,315		24,717	23,586
	S.D.	10,267		11,894	11,207
Education	Mean	13.27		13.61	13.45
	S.D.	1.69		2.35	2.07
Experience	Mean	15.23		17.22	16.28
	S.D.	4.11		6.06	5.32
Sex Ratio ¹⁾	Mean	.57		.68	.63
	S.D.	.31		.33	.33

1) Sex Ratio indicates the percentage of male workers in each occupation.

Table 2. OLS Regression of Log-annual Earnings for Workers in the Whole Occupations

Variable	Metric Coefficients	Standardized Coefficients
ED	.141 (93.38)	.329
EX	.094 (84.52)	.895
SQEX	-.001 (-54.00)	-.575
Constant	6.816 (302.51)	
R ²		.232
Degree of Freedom		64,928

(t-statistics in parentheses)

log-earnings, 23.2%, is also a reasonable size. In the next section, I analyze the distribution of educational rates of return for all workers in the selected occupa-

tions. A comparison of the male distribution and the female distribution then follows.

A. An Analysis for all Workers in the Selected 227 Occupations

In order to obtain the partial regression coefficients of education, the baseline model was applied to the sample employed in each occupation. Table 3 shows the distribution of occupations with respect to significance levels of the partial regression coefficients of education obtained from the 227 regressions.

In Table 3, We can see that about half the occupations have significant coefficient estimates at $\alpha = .10$ (one-tailed test). The interpretation of the insignificant educational returns is slightly problematic. One reason a coefficient estimate is not significant might be because the educational rate of return in an occupation is really negligible, which is the main argument of the dual labor market theory. However, other possible causes of insignificant estimates exist. One cause is that the variation of education among the incumbents of an occupation is very small. The small variation can occur for two reasons. On the one hand, this

is likely when credential requirements are enforced, which would be typical of a primary market job. On the other hand, this could result from a lack of educational requirements in poorly paying jobs. Another possibility is that the size of an occupation is too small to estimate a low rate of return as different from zero because of sampling variability. I examined the occupations having provided insignificant estimates of education to check for these points. I replaced the insignificant estimates at $\alpha = .10$ with zeroes. This is a conservative decision because the main purpose of this study is to test whether the distribution of coefficient estimates of education has more than one modes/means or not. Choosing the smaller conventional α (.05) would result in treating more occupations as having zero rates of return and would thus push any conclusions further toward accepting a hypothesis of duality. This replacement made 80 zero points. Figure 2 shows a histogram after the replacement with zeroes⁵).

5) Two extreme outliers, one to the positive direction and the other to the negative direction, were excluded in Figure 2. The positive outlier is

Table 3. Number of Occupations by Significance Levels of the Coefficient Estimates of Education

Significant at	N of Occupations	N of Persons
$p \leq 0.05$	127	41,780
$0.05 < p \leq 0.1$	20	2,763
$0.10 < p \leq 0.15$	10	1,860
$0.15 < p \leq 0.2$	5	863
$0.2 < p$	65	13,362
	227	60,629

Figure 2 shows a clear pattern highlighting two points. The first point is that, except for a few negative estimates, all near-to-zero values turned out to be a result of the replacement of the insignificant estimates with zeroes⁶). The second point is that the zero values, on the one hand, and the group of positive coefficient estimates, on the other hand, show an apparent "break" between them. When we focus on the group of positive coefficients, we find that the distribution of positive estimates of education is considerably concentrated around the mean, which is far from the zero value (mean=.10592, SD=.04951). This observation indicates

that the occupations providing positive educational coefficient estimates are fairly likely to construct a distinct wage-setting regime corresponding to primary labor markets. The 144 occupations providing the positive estimates employ 44,120, which are 72.8% of the whole workers. If the insignificant coefficient estimates indicate truly zero rates of return to education, then the above observation can be taken as clear evidence of labor market dualism with respect to the differential rate of return to education. However, as mentioned above, all the insignificant coefficient estimates might not be due to the real zero rate of return to education. In

"Advertising and related sales occupations" (the coefficient estimate = .30946). The negative outlier is "Grader, dozer, and scraper operators" (the coefficient estimate = -.37259).

6) The significant negative coefficients are observed in the following occupations: Grader, dozer, and scraper operators; Records Clerks; Licensed practical nurses.

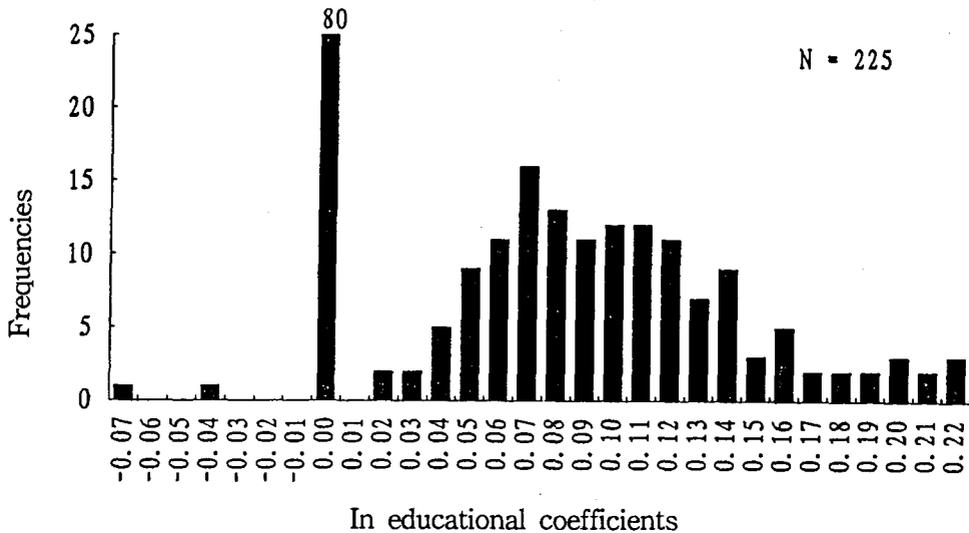


Figure 2. The Distribution of Educational Coefficients for all Workers

order to examine which factors might cause some occupations to produce insignificant estimates of education, I examined mean and standard deviation of years of schooling and size of these occupations⁷⁾.

I found that those occupations are not particularly small in size. The average number of persons in these occupations is 201, and more than half of those occupations employ at least 100 persons. This makes it unlikely that many of the insignificant coefficients result from small sample size. For some

7) The list of occupations is available on request from the author.

occupations employing highly educated persons in the list, small size might be one of the possible causes to have produced insignificant estimates⁸⁾. However, for the occupations employing highly educated people, small variation of education appears to be the major cause of insignificant estimates. For example, among five occupations employing workers educated at least 15

8) For example, among seven occupations employing persons educated 14 to 15 years, four occupations employ less than 70 persons. Those occupations are "Underwriter", "Recreation workers", "Painters, sculptors, and craft-artists", and "Airplane pilots and navigators".

years, four display a standard deviation less than 1.7 ("Biological and life scientists", "Pharmacists", "Lawyers", and "Editors and reporters").

This examination tells that for the majority of occupations, neither small sample size nor small variation in education can be the main cause producing insignificant estimates. For some occupations displaying small variation in education, e.g., "Secretaries", "Typists", "Telephone operators", "Bank tellers", numbers of persons working in such occupations are large enough to make coefficient estimates significant if they would provide a positive rate of return to education. For other occupations of relatively small size ("Hotel clerks", "Transportation ticket and reservation agents", "Kitchen workers", "Drywall installers", "Insulation workers", "Mixing and blending machine operators", and "Production helpers"), variation of education is also large enough to make coefficient estimates significant if they would provide a positive rate of return to education. When we consider all these possible factors producing insignificant estimates, I can safely conclude that the vast

majority of occupations providing insignificant coefficients do actually have close-to-zero rates of return to education. Except for a few highly credentialed primary market occupations, those occupations belong to a distinct wage-setting regime corresponding to secondary labor markets.

Skeptics might ask, "Even if you have proven the existence of two distinct wage-setting regimes, how could you assume that it is because of the reasons given by dual labor market theory?". Their question is quite relevant because differential rate of return to formal education is only one of many factors to determine labor market dualism. If the distinction of labor markets based on educational returns does not match the distinction based on other criteria, the existence of two wage-setting regimes based on differential educational returns can not be convincing evidence of labor market dualism.

In order to check for this possibility, I compared occupational characteristics aggregated from the Dictionary of Occupational Titles forth edition (DOT). The first group (Primary) are the occu-

pations providing significant and positive educational returns, which correspond to primary labor markets. The second group (Secondary) is the majority of occupations providing insignificant educational returns, which correspond to secondary labor markets. As mentioned above, a small number of occupations produced insignificant coefficients due to small variation of education or due to small sample size. Since it is clear that these occupations employing highly educated people do not belong to secondary labor markets, I separated out these occupations (Credentialled Primary) from the second group to make a comparison between the first (Primary) and the second group (Secondary) more focused⁹. Table 4 gives a summary of

9) I tried to minimize the number of occupations in the third group by choosing only those occupations providing clear grounds for concluding that the coefficients are not significant either due to small variation of education or due to small sample size. This is a conservative decision because the two major groups display clear difference with respect to various job characteristics as dictated by dual labor market theory. Because of this conservative decision many occupations were included in the second group (Secondary), even though they employ workers with relatively high levels of

aggregated occupational characteristics for the three groups of occupations.

We can observe that average earnings display the pattern dictated by dual labor market theory. Primary corresponding to primary labor markets provides considerably higher level of earnings than Secondary (\$ 23,587 vs. \$ 17,675). Primary employs a greater proportion of full-year and full-time-full-year workers than Secondary. Workers in Primary change employers slightly less often than those in Secondary. These three patterns of job stability follow dual labor market theory. On the other hand, Secondary employs a greater proportion of full-timers than Primary (88.1% vs. 86.8%). This observation appears not to follow dual labor market theory. However, many researchers (Pfeffer and Baron, 1988; Doeringer, 1991; Tilly, 1992) reported that coming to the 1980's "industrial restructuring" created many "good" part-time jobs for the benefit either of employers or of workers, particularly, female workers. Many workers with good human capital tend to choose part-time jobs voluntarily and

education.

Table 4. A Comparison of Aggregated Job Characteristics for the Three Groups of Occupations¹⁾

	Primary (144 Occs)	Secondary (73 Occs)	Credentialed Primary (10 Occs)
Earnings	\$ 23,581	\$ 17,675	\$ 30,891
Job Stability			
a) % of Full-Time	86.8%	88.1%	90.4%
b) % of Full-Year	76.2%	72.6%	86.1%
c) % of Full-Time- Full-Year	68.4%	65.1%	79.1%
d) N of Employers ²⁾	1.205	1.247	1.183
Work Complexity ³⁾			
a) DATA	3.13 (.11)	2.34 (-.42)	4.77 (1.22)
b) PEOPLE	2.17 (.10)	1.20 (-.46)	3.76 (1.01)
c) THINGS	2.18 (-.30)	3.28 (.26)	2.60 (-0.9)
Work Control ⁴⁾	25.9%	6.75%	24.74%
Work Routinization ⁵⁾	19.2%	30.66%	0.85%
Authority ⁶⁾	17.1%	5.58%	35.29%

1) Earnings and Job Stability were calculated from the Current Population Survey, 1991 May. The rest were calculated based on the Dictionary of Occupational Titles adapted by England and Kilbourne (1989).

2) Avenge number of employers each worker had last year.

3) Higher scores for the three measures refer to higher level of complexity. Parentheses indicated z-scores for each measure.

4) Adaptability to accepting responsibility for the direction, control or planning of an activity.

5) Adaptability to performing respectitive work, or to continuously performing the same work, according to set procedures, sequence or pace.

6) Adaptability to influencing people in their opinions, attitudes or judgements about ideas or things.

many employers tend to out-source high-skilled workers by making a work contract with them on part-time base. Taking into account these research results, the above observation might not be evidence of abnormality (refer to studies such as Appelbaum and Albin,

1990; Lorence, 1987; Tienda, Smith and Ortiz, 1987; and Noyelle, 1986).

We can observe in the table that Primary is composed of more complex jobs than Secondary with respect to the DOT measures of work function on DATA and on PEOPLE. Concerning the

work function on THINGS, Secondary includes more complex jobs than Primary. This is not unexpected because many jobs in primary labor markets are not manual jobs therefore have zero value on this DOT variable. On the other hand, many jobs in secondary labor markets are manual or blue-collar jobs having higher than zero value on the variable. We observe that Primary has higher levels of work control and authority, and is less routinized than Secondary.

To sum up, the first group of occupations assumed to belong to primary labor markets display higher level on all aspects of job characteristics (earnings, job stability, work complexity, autonomy and authority) as dictated by dual labor market theory than the second group. This set of observations indicate explicitly that the distinction of wage-setting regimes based upon differential educational returns is appropriate evidence of dual labor market theory.

B. A Comparison of Male and Female Workers with Respect to the Labor Market Dualism.

In this section, I look at the

distribution of estimates of educational returns separately for occupations employing at least 50 males and for occupations employing at least 50 females. The regression coefficients were estimated separately for male workers and for female workers¹⁰⁾.

Table 5 shows the distribution of numbers of occupation by significance levels of the coefficient estimates of education in the male and the female analysis respectively.

I replaced insignificant coefficient estimates at $\alpha=.10$ with zeroes. This replacement gave 62 zero values out of 153 occupations in the male analysis and 42 zero values out of 108 occupations in the female analysis. Figures 3¹¹⁾ and 4 show the distribution of educational coefficients in each analysis after the

10) In order to take into account an effect of the difference in size of an occupation between the male and female analysis, I also examined the weighted distribution of educational coefficients by number of males and females in each occupation. This analysis gave the same result as the un-weighted analysis reported in this paper.

11) One extreme outlier to the negative direction was excluded in Figure 3. The negative outlier is Occ 96, "Pharmacists" (the coefficient estimate = $-.15485$).

Table 5. Number of Occupations by Significance Levels of the Coefficient Estimates of Education in the Male and the Female Group

Significant at	N of Occ/Person (Male)	N of Occ/Person (Female)
$p \leq 0.05$	80 / 19,671	58 / 15,795
$0.05 < p \leq 0.1$	11 / 1,376	8 / 1,007
$0.10 < p \leq 0.15$	7 / 1,431	3 / 504
$0.15 < p \leq 0.2$	3 / 245	1 / 169
$0.2 < p$	52 / 6,490	38 / 9,461
	153 / 29,213	108 / 26,937

replacement of insignificant estimates with zeroes.

Both distributions share the fact that all near-to zero points result from the replacement of insignificant estimates with zeroes. However, there appears one striking difference between the two distributions. The positive coefficient estimates are much more concentrated around the mean in the male distribution than in the female distribution. When focusing on the group of positive coefficients, we can observe that the distribution of estimates for the male group is substantially concentrated around the mean, which is far from the zero point (mean=.09550, S.D.=.04853). In contrast, the female group displays a greater extent of dispersion among the positive

estimates (mean=.11717, S.D.=.05188). The "break" in the distribution of coefficient estimates between primary and secondary labor markets are more apparent in the male group than in the female group. This contrast indicates that the labor market dualism hypothesis is less supported in the female analysis than in the male analysis. This observation agrees with previous researchers (Coverman, 1986 and Lorence, 1987), who maintained that dual labor market theory can be applied to male workers more adequately than to female workers and that gender constructs an important dimension in earnings determination process independent of the dimension of labor market dualism.

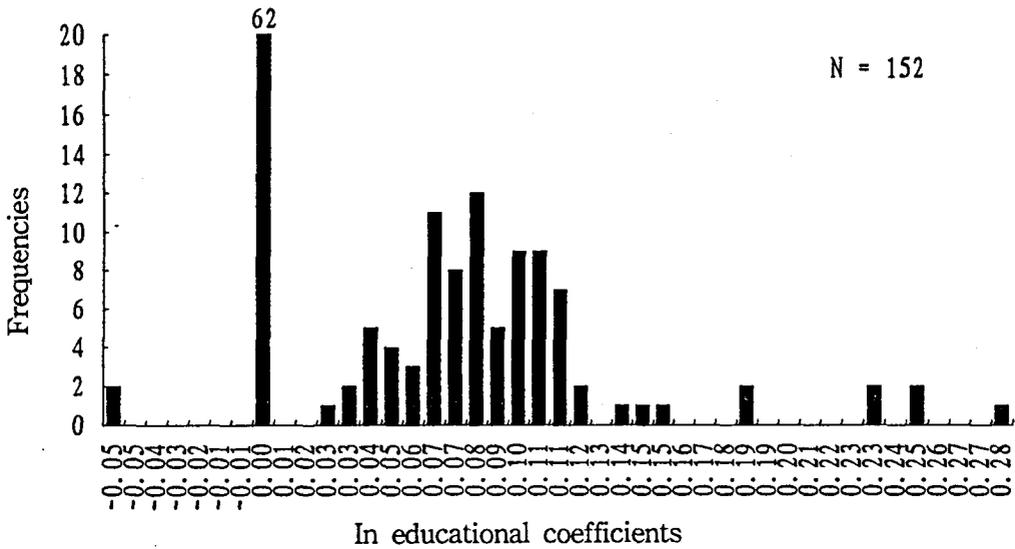


Figure 3. The Distribution of Educational Coefficients for Males

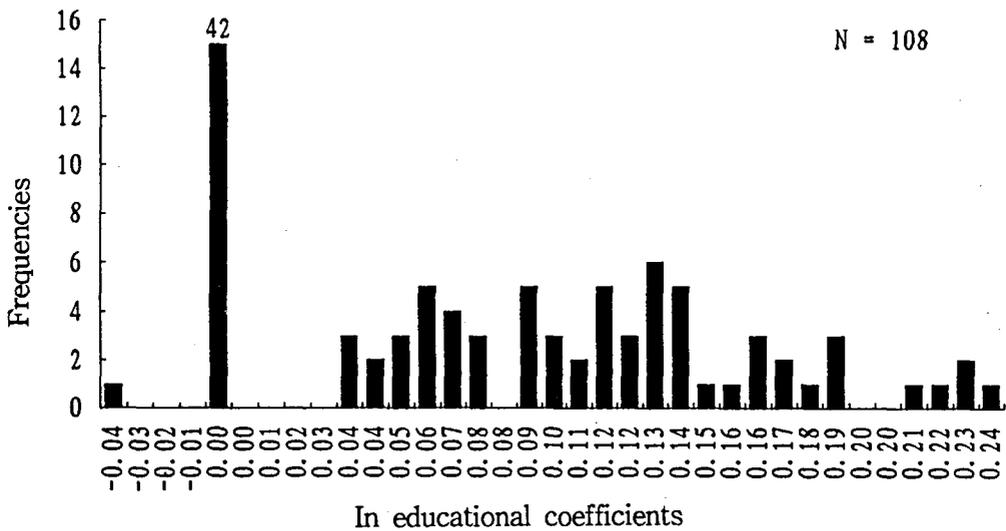


Figure 4. The Distribution of Educational Coefficients for Females

Some scholars might dispute this conclusion arguing that, since the above comparison was not made on the same

group of occupations, the difference between the two distributions might be produced by the difference in sexual

composition of occupations between the male distribution and the female distribution. This could be especially problematic given the great degree of occupational sex segregation. In order to check for this possibility, I looked at the distribution of coefficient estimates of education for the occupations employing at least both 50 males and 50 females. These occupations are less segregated by sex than the separate samples. The regression coefficients were estimated for male workers and for female workers separately¹²⁾. I replaced insignificant estimates of educational coefficients at $\alpha=.10$ with zeroes. This replacement provided 18 zero values both in the male and the female distribution out of the 67 occupations in total. Figures 5 and 6 show the distribution of coefficient estimates for each group after the replacement of insignificant estimates with zeroes.

A comparison of the two distributions yields the same result as in the

12) I also examined a weighted distribution of educational returns in the male and the female analysis in order to take account of the size difference between the two sets of samples. This analysis gave the same result as the unweighted analysis reported here.

separate analysis by sex. Even among the identical group of occupations, the male distribution is more concentrated around the mean than the female distribution. This result provides a firm ground for the statement that labor market dualism prevail more apparently among male workers than among female workers.

IV. Summary and Discussion

The purpose of this research was to test the occupation-based labor market dualism hypothesis using differential rates of return to education as the criteria. For this purpose, I took a simple strategy of examining the actual distribution of regression coefficient estimates of education across occupations. The existence of the labor market dualism was supported by a set of analyses of the distributions. I demonstrated that the two distinct wage-setting regimes identified by differential educational returns match with dual labor market theory in terms of major job characteristics such as earnings, job stability, work complexity, autonomy,

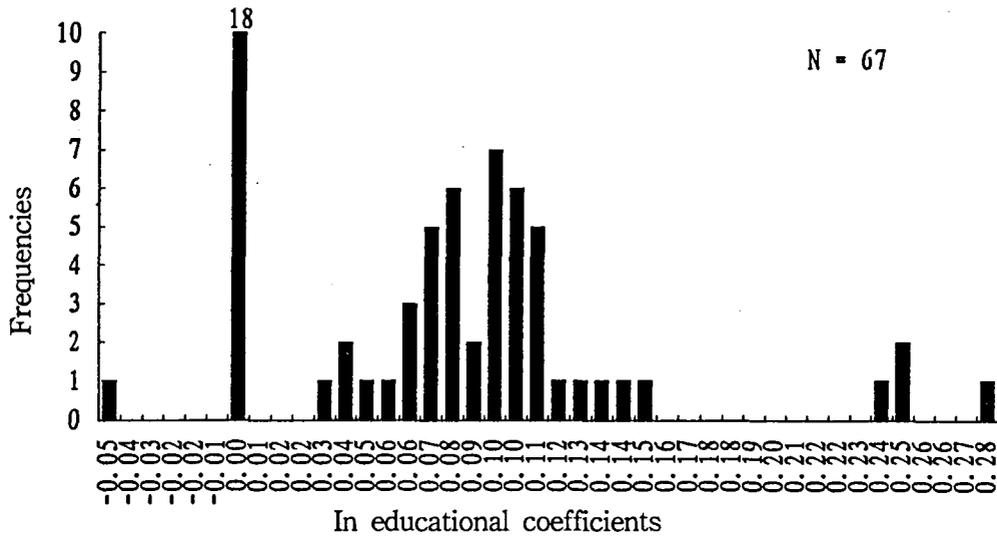


Figure 5. The Distribution of Educational Coefficients for Males in the Selected Occupations

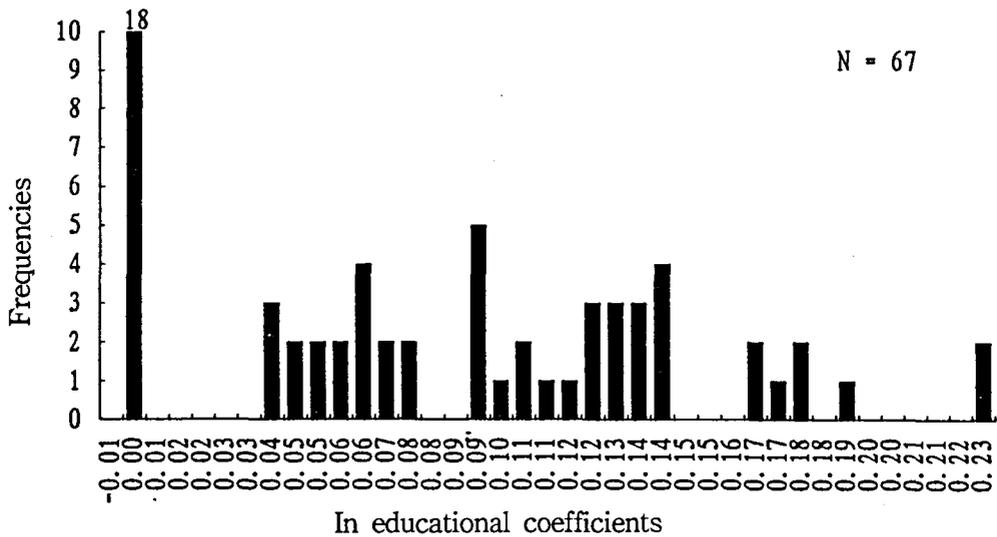


Figure 6. The Distribution of Educational Coefficients for Females in the Selected Occupations

and authority.

The other purpose of this paper was to compare males and females with

respect to the labor market dualism. I found that the dual labor market hypothesis is supported in the male

analysis while not in the female analysis. Positive coefficient estimates were more concentrated around the mean in the male group than in the female group. Even among relatively integrated occupations by sex, I also found that the labor market dualism hypothesis is better supported in the male analysis than in the female analysis. We know that dual labor market theory has a close relation to dual economy theory. Even though the distinction of primary versus secondary labor markets cross-cut the distinction of the core sector versus the periphery sector, the two different types of distinction share many similarities with each other. Both theories agree on the point that labor markets are segmented. Differential rate of return to education is the target concept on which the two theories centered when distinguishing the primary or the core from the secondary or the periphery. If this is the case, a scholar might ask a question, "How do you know whether the differential educational returns observed in this research are due to the dualism in occupational labor markets or are due to the dualistic industrial

structure?" On the theoretical level as well as on the empirical level, we do not know much about the interaction of occupational structure and industrial structure in earnings determination process. The fact that earnings vary more widely across occupations than across industries does not give any hint about what is a relative weight between the two structures contributing to the construction and continuation of labor market dualism. Neither dual labor market theory nor dual economy theory give a clear guidance to the questions such as "What is the effect of occupational structure on earnings level net of the effect of industrial structure?" or "Do the primary labor market jobs located in the periphery sector provide higher rates of return to human capital than do the secondary market jobs located in the core sector?" In this sense, the next step for research in this area should be to specify the configuration of market dualism defined by both occupation and industry. By using a large sample such as Decennial Census, we can test for the existence of market dualism among market positions identified in occupation-industry matrix.

Even though the existence of dual wage setting regimes with respect to differential educational return is supported in this study, I can not conclude that the labor market dualism hypothesis is absolutely correct. The fact that a certain level of human capital is rewarded at different rates across occupations is an anomalous observation from the view of human capital theory. However, as long as the reasons workers do not or can not move across different wage-setting regimes are not clarified, a snap-shot of differential rates of return to human capital does not give unarguable evidence for the continued existence of those differential returns, which is the key argument of dual labor market theory. A longitudinal study of labor force mobility are needed together with an effort to develop a theoretically coherent explanation of why mobility barriers should exist between subsets of labor markets. Research on "Internal Labor Markets" appears to be promising in this context.

To prove the existence of labor market dualism is one thing, and to identify each segment of dual labor

markets is another. As mentioned, many occupations producing insignificant coefficient estimates of education do not necessarily belong to the secondary labor market. The analysis presented here does not provide clear rules about where to draw the border line between primary market jobs and secondary market jobs. The gray area between market segments exists partly because the theory is not specified well enough to provide a measure having sufficient discriminating power. I suggest further research to overcome the limitations. One is that when using the full size sample of Decennial Census, we can have a clearer view of the full range of occupations including those having provided insignificant coefficient estimates in this analysis as well as those excluded in this analysis due to small sample size. Another point is that by looking at the distribution of educational returns with a large sample we can identify elements of the two distinct distributions more accurately. As Oster (1979) did, we can fit the hypothesized model of two normal curves to the actual distribution and derive a classification of which occupation

belongs to which normal curve under this hypothesis.

Notwithstanding these limitations, this study is meaningful in demonstrating the existence of dualism in occupation-based labor markets, which provides a clear guidance to the next step in the study of labor market structure. The next step, when applying a cross-sectional research framework,

should be to specify the configuration of occupational labor market structure on the one hand and to analyze the interaction of occupational structure and industrial structure in earnings determination process on the other hand. When applying a longitudinal research design, the change of labor market structure with respect to labor mobility should be the next research subject.

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〈國文要約〉

職業을 中心으로 한 勞動市場 分節論의 檢討

李 顯 松

본 논문은 職業을 중심으로 하여 二重勞動市場理論(Dual Labor Markets Theory)이 적용될수 있는가를 검증하는 데 목적이 있다. 1991년 Current Population Survey 자료와 1968년 The Dictionary of Occupational Titles (4th edition) 자료를 이용하여 3단계의 분석 과정을 거쳐 노동 시장이 職業을 중심으로 이중 구조를 이루고 있음을 증명한다.

첫 단계에서는 職業 구분을 중심으로 差別的인 賃金決定 構造가 노동시장에 존재함을 밝히고, 둘째 단계에서는 일의 다양한 성

격을 나타내는 指標(賃金, 作業의 複雜性, 作業의 獨立性, 職業 安定性, 權限 領域 등)에 있어 分節된 勞動市場間에 뚜렷한 차이가 있음을 밝힘으로써 二重的 賃金決定 構造가 二重勞動市場理論에서 주장하는 노동시장의 이중구조와 부합됨을 증명한다. 셋째 단계에서는 남성과 여성 근로자의 비교를 통해 二重勞動市場理論이 남성 노동자들에게만 적용될수 있음을 보인다. 아울러 職業 및 産業 구분을 둘러싼 勞動市場의 構造 및 이와 관련된 男女의 差別的 市場構造에 대한 論議가 檢討된다.