

Testing the Labor Market Dualism in Korea

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The existence of the dual labor market in Korea is tested under the two different definitions of the labor market dualism. First, the estimation results from widely used tools such as Heckman's sample selection model support the existence of two wage equations, advocating the presence of labor market dualism in Korea. Second, the labor market dualism index suggested by Hudson (2007) supports that there is some degree of bifurcation between the good job conditions and bad job conditions.

Keywords: Labor market, Labor market dualism, Sample bias correction

JEL Classification: C24, J31, J40, J81

I. Introduction

With globalization and population aging, there have been many debates whether there are structural changes in the labor market. Among possible changes, especially with the increase in the non-regular or non-standard type of work arrangements, the labor market can be structurally divided into two groups of workers, as Doeringer and Piore (1971) once argued. Since the structural bifurcation of the labor market can cause many inefficiency problems such as labor demand-supply mismatches, and subsequent larger long-term unemployment and lower economic growth, the more attentions have to be made on the issue of labor market dualism.

This paper examines the existence of labor market dualism in Korea using various methods suggested by previous studies. Since the pioneering works by Dickens and Lang (1985) and Heckman and Hotz (1986), most of the previous studies on the labor market dualism have been testing the existence of double wage equations of an economy using their tools. In addition to that, this paper tries to incorporate the concept of dual labor market prevailed in the sociology literature, which we believe poses itself nearer to the perception of the labor market dualism of Doeringer and Piore (1971) and public in general.¹⁾

Doeringer and Piore (1971) provided the basic idea of the dual labor market theory, writing “the labor market is divided into a primary and a secondary market. Jobs in the primary market possess several of the following characteristics: high wages, good working conditions, employment stability, chances of advancement, equity and due process in work rules. Jobs in the secondary market, in contrast, tend to have low wages and fringe benefits, poor working conditions, high labor turnover, little chance of advancement, and often arbitrary and capricious supervision (p. 165).” Development Economists such as Gordon (1972) also claimed the existence of the dual labor market, with poor workers confined to the low-wage labor market. Their description of the labor market somewhat captures what we see in the real labor market. For example, in

1) Empirical analysis on the labor market duality in Korea can be found in Nam (1995) and Grubb et al. (2007).

the Korean labor market, the term “dual labor market” typically denotes the existence of non-standard work arrangements, and it is widely acknowledged that workers with standard work arrangements have the primary labor market characteristics while workers with nonstandard work arrangements have the secondary labor market characteristics. Succinctly, the labor market structure is dual if some institutional barrier separates workers into the two groups.

Although it seems agreeable in most of the cases that the labor market dualism is the consequence of the systemic partitioning of workers, the concept of the dual labor market is defined rather differently under the efficiency wage literature from under the sociology literature.²⁾ In the efficiency wage literature, it is defined as “equally skilled workers receiving different wages in different jobs (Bulow and Summers, 1985, p. 380).” On the other hand, sociologists interpret the idea of the dual labor market as the following perception, “the good job characteristics are bundled with other good job characteristics, and the bad job characteristics are bundled together in the same way (Tilly, 1996, p. 56).”

According to the efficiency wage literature, whether a salary schedule reflects the level of human capital of workers at the aggregate economy level makes a key difference between the primary market and secondary market. In the literature (see Yellen 1984, Bulow and Summers, 1985, and Kruger and Summers, 1988 for more detail), the development of the dual labor market is due to the efficiency wage scheme of firms to maximize workers’ efforts.³⁾ The implication of the efficiency wage literature is that in the primary market, workers are receiving higher wage according to their level of human capital,

2) Additionally, general public including media and government organizations often takes labor market dualism as wage polarization, but those two are separately used in this paper. As noted in the text, labor market dualism denotes systemic separation between workers that treats the workers in the secondary market unfairly by providing either poor legal protection or less compensation for the human capital. However, wage polarization is a consequence of market structure including industry composition or labor market dualism (if there is one). Thus, for example, even if an economy that has a well-built workers’ insurance system and a single salary schedule in terms of human capital, implying no institutional barrier between workers, wage polarization can occur if the economy is composed of a high-wage industry and a low-wage industry.

3) In Yellen (1984), “[there are] four benefits of higher wage payments [in the primary market]: reduced shirking by employees due to a higher cost of job loss; lower turnover; an improvement in the average quality of job applicants; and improved morale (p. 200).”

whereas the workers in the secondary market encounter competitive wages that are relatively flat with respect to the level of human capital, i.e. the human capital of workers in the secondary market is not rewarded compared to that in the primary market.

Meanwhile, in the sociology literature, the workers' compensation bifurcation is the key idea of the dual labor market. In identifying the existence of the dual labor market in terms of this definition, Hudson (2007)'s concept of "clustering", or the covariation of job quality characteristics to examine the degree of dualism of the labor market is useful. For example, if the nonpecuniary aspects of workers' compensation such as health insurance and retirement plans are only provided for the high wage workers' group, there exists the labor market dualism. However, it should be noted that the wage gap does not automatically imply the existence of the dual labor market. For example, if the Gini coefficients are high while the legal or business level protections such as unemployment insurance, health insurance or retirement plans are all applied to high wage workers as well as low wage workers, the labor market can be "polarized," but not "dual."

In both literatures, the restricted mobility between the two labor market segments is a common necessary condition in verifying the existence of two discrete labor market segments. In the efficiency wage literature, the existence of separate wage profiles in terms of workers' characteristics is kind of self-proving the restricted mobility between the two labor market segments in that two separate wage functions cannot exist in a competitive economy with the sufficient labor mobility. On the contrary, if we adopt the view that the covariation of job quality characteristics supports the existence of the dual labor market, we additionally need to examine how many workers can move between the two labor market sectors. More specifically, three conditions should be satisfied in order to verify the existence of the labor market dualism in terms of working condition bifurcation, and those conditions are as follows: 1) the occupational change from the secondary market to the primary market is restricted by the rationing of the primary market, 2) good job characteristics are bundled with other good job characteristics, and 3) bad job characteristics are

bundled with other bad job characteristics in the same way.

This paper attempts to identify the dual labor market hypothesis in the Korean labor market in terms of the both efficiency wage literature and sociology literature. Thus, some statistical tests to identify the existence of two separate wage equations are conducted, and the labor market dualism index representing how many workers' benefit characteristics are clustered together is constructed. Workers' mobility between labor market sectors is also explored.

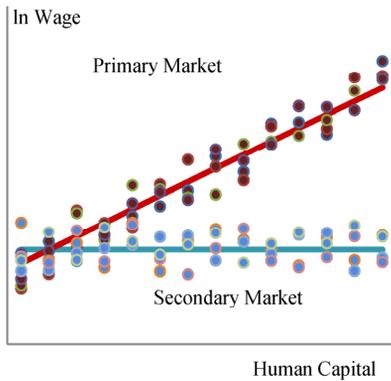
In section 2, the formal tests for the existence of separate wage functions in different labor markets, proposed by Dickens and Lang (1985) and Heckman and Hotz (1986), are introduced, and applied to the Korean labor market data. In section 3, the dual labor market index of Korea is constructed based on the idea suggested by Hudson (2007), and the sample hazard of individuals remaining in the secondary labor market is estimated using the same data set to see how many secondary market workers move to the primary market throughout time. The results of the separate wage function test and the dual labor market index are summarized, compared, and interpreted in the last section.

II. Test of the Existence of Two Wage Equations

In this section, the traditional tools suggested by Heckman and Hotz (1986) and Dickens and Lang (1985) are used to test the dual labor market hypothesis. It is found that in many cases, two wage equations can be identified when we segment the labor market into the low- and high-wage group, or we impose two equations in estimating the wage curve, the estimation results are in favor of the dual labor market hypothesis. On the contrary, if we do not enforce two wage equations using Dickens and Lang (1985), the segmentation is not evident.

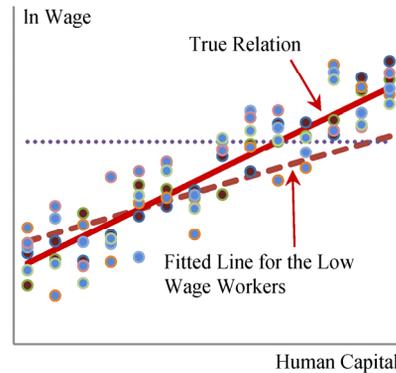
As Dickens and Lang (1985) asserts, "the key issue is whether there are qualified individuals who would like to work in the primary sector but cannot find a job there (p. 794)." Thus, if there are two separated labor markets, one rewarding human capital and the other not rewarding it, we should observe two wage equations fit the data better than one wage equation as shown in Figure 1.

Figure 1: Hypothetical Scatter Plot of Dual Labor Market



Source: Modified from Dickens and Lang (1985, p. 795)

Figure 2: Hypothetical Scatter Plot of Single Labor Market



Source: modified from Heckman and Hotz (1986, p. 523)

In the primary market there should be a positive correlation between wage and human capital variables such as education and experience, while in the secondary market a relatively flat wage equation should be observed.

However, in testing the existence of a separate wage equation for the primary and secondary labor markets, Dickens and Lang (1985) and Heckman and Hotz (1986) both stressed the need for correcting sample selection bias. Separating workers into two groups and estimating the wage equation of each group without any correction can result in identifying two separate wage equations even in a situation where there is only one wage equation. For example, as in Figure 2, if we separate workers using a certain level of a cutoff point in terms of wage, the distribution of the wage of higher human capital workers tends to be truncated above the cutoff point. Thus, when estimating a wage equation with the sample of low wage workers, the coefficient associated with human capital can be biased toward zero.

To correct the bias resulting from dividing the samples into two groups, wage equations are estimated using Heckman's sample selection bias correction. Following Heckman and Hotz (1986), the wage equation for the Korean labor market, assuming the singular labor market, is presumed to be equation (1). In

testing the existence of the dual labor market, equation (1) works as the null hypothesis that there is a single labor market.

$$\ln y = \beta_0 + \beta_1 school + \beta_2 exp + \beta_3 exp^2 + X\gamma + \varepsilon \quad (1)$$

- (1) where $\ln y$ is the log of the wages of observed workers,
 $school$ is the years of schooling
 exp is the years of working experience
 X is individual characteristics, and
 ε is the Gaussian error term.

For low wage workers ($\ln y < cutoff$), the bias corrected wage equation looks like equation (2), and for high wage workers ($\ln y > cutoff$), we have a similar equation to equation (2) with the inequality signs facing the opposite sides.

$$E(\ln y | school, exp \text{ and } X, \ln y < cutoff) = \beta_0^L + \beta_1^L school + \beta_2^L exp + \beta_3^L exp^2 + X\gamma^L + E(\varepsilon | school, exp \text{ and } X, \ln y < cutoff) \quad (2)$$

(2) Also, note that suppose F be the distribution of the standardized error term under the null hypothesis, then the probability that a worker belongs to a low wage group, or the switch equation look like equation (3).

$$\Pr(\ln y < cutoff) = F\left(\frac{cutoff - (\beta_0 + \beta_1 school + \beta_2 exp + \beta_3 exp^2 + X\gamma)}{\sigma_\varepsilon}\right) \quad (3)$$

(3) Under the null hypothesis, the coefficients of wage equation (1) should be proportional to the coefficients of the linear probability model of equation (3). In principle, the independent variables in equation (3) do not necessarily be identical with those in equation (1) or (2) since the determinants can be different between the wage profile and the selection of market segments. Nevertheless, the same set of independent variables is included in both the

Table 1: Sample Statistics

Variable	(N=5,308)	mean	std.dev
(ln y)	Log of monthly wage (in 10,000 KRW)	5.25	0.68
(school)	Years of schooling	13.06	3.37
(exp)	Years of working experience	22.51	14.99
(gender)	Female=1	0.41	0.49
(marriage)	Married=1	0.81	0.40
(child)	Having child=1	0.43	0.50
(add)	Additional worker in the same household=1	0.36	0.48
(region)	Living Seoul or Kyungki=1	0.71	0.45

wage equation and selection equation in order to compare the estimated coefficients between both equations and test the hypothesis.

In sum, by comparing the coefficients of wage functions from equation (2) and those of the high wage worker counterpart, we can identify whether there are two separate wage functions. Also, by comparing the proportionality of the coefficients of equation (1) and (3), we can see if the characteristics determining the low wage status are determining the wage profile of entire workers in the same manner, which supports the null hypothesis that there is no dualism in the labor market.

Using the Korean Labor and Income Panel Study (KLIPS) collected by the Korean Labor Institute, Heckman's wage equation with sample selection bias correction is estimated. KLIPS incorporates 17 years of panel survey data which have been collected from the year 1998, and in each year, about 5,000 households have been interviewed. Among them, the most recent survey result of the year 2014 (17th wave) is selected for the test.

The data contains 13,170 individuals with 5,308 wage workers. The dependent variable is the log monthly wage of wage workers, and years of schooling and working experiences are the proxies for the level of human capital. Since the survey only provides the year of the first employment of workers, years of working experience are calculated using the difference between

the current year and the year when the object is first employed.⁴⁾ Other control variables are selected to control individual workers' characteristics.⁵⁾ The list of variables is shown in Table 1.

As in Dickens and Lang (1985) and in Heckman and Hotz (1986), workers' working environments such as firm size, industry sector, union membership, health insurance coverage and other nonpecuniary aspects of worker's compensations are not controlled. Since in most cases higher wage is associated with better nonpecuniary employment benefits⁶⁾, controlling those variables is equivalent to controlling the traits of the primary and secondary markets, leading to contradicting the assumption of the wage equation of how many individual characteristics affect individuals' outcome or position in the job market. In order to recognize the possibility that the market segmentation is resulted from the industry segmentation or other institutional differences, the variables related to working conditions are not controlled.

Following Heckman's two step estimation procedure, the estimated coefficients are presented in Table 2. The cutoff point between low wage and high wage workers is set to be 1.63 million KRW/month, which is the minimum cost of living for a family size of four in the year 2014 announced by the Ministry of Health and Welfare.

The first column of the table (column A) is the wage equation estimated on the full sample. All of the coefficients are meaningful at 5% significance level. Wage is positively correlated with human capital variables such as years of schooling and working experiences. Other control variables are also in concord with our conventional expectations.

4) Thus, the years of working experience can be exaggerated if a worker had left the labor market for years due to health problem or additional schooling before having his/her current job. However, cases like this should be negligible since from year 2013 survey data, it is found that more than 99.9% of the wage workers working in year 2014 also worked in year 2013, implying that workers do not frequently move job in Korean labor market. In addition to that, an alternative series that counts the years worked in current position can significantly underestimate the working experience since some workers in construction and manufacturing sector frequently moves their job within the industry, preserving their human capital assets.

5) Other controls such as the number of child, and more alternative sets of regional dummies are also tried, but they rendered very similar results regarding human capital variables. Thus, the most parsimonious variables are used as controls in the end.

6) It can be verified in the next chapter when constructing labor market dualism index using Hudson's (2007) idea.

Table 2: Wage Equation Estimation Results

	OLS (A)	Heckman Selection Model			C – B	D/A
		Low Wage (B)	High Wage (C)	Switch (D)		
constant	4.1620** (0.0486)	4.1150** (0.0635)	4.4600** (0.0462)	-1.6500** (0.2749)	0.3451** (0.0784)	-0.3966** (0.0662)
school	0.0696** (0.0028)	0.0313** (0.0037)	0.0620** (0.0028)	0.1983** (0.0165)	0.0307** (0.0046)	2.8540** (0.2646)
exp	0.0342** (0.0017)	0.0337** (0.0024)	0.0209** (0.0019)	0.0827** (0.0103)	-0.0128** (0.0030)	2.4230** (0.3250)
exp ²	-0.0007** (0.0000)	-0.0006** (0.0000)	-0.0003** (0.0000)	-0.0023** (0.0002)	0.0003** (0.0001)	3.2500** (0.3043)
gender	-0.4654** (0.0147)	-0.1280** (0.0241)	-0.1644** (0.0134)	-2.1700** (0.0765)	-0.0364 (0.0278)	4.6680** (0.2210)
marriage	0.1206** (0.0247)	-0.1219** (0.0399)	0.1111** (0.0206)	0.4797** (0.1259)	0.2330** (0.0450)	4.1720** (1.5220)
child	0.0484** (0.0178)	-0.0596** (0.0277)	0.0471** (0.0156)	0.2427** (0.0948)	0.1067** (0.0318)	5.5650** (52.600)
add	-0.0545** (0.0150)	0.0157 (0.0224)	-0.0454** (0.0123)	-0.2272** (0.0762)	-0.0611** (0.0256)	4.6180** (2.6910)
region	0.0395** (0.0154)	0.0602** (0.0226)	0.0169 (0.0129)	0.0666 (0.0795)	-0.0434 (0.0262)	1.7620 (111.20)
σ	0.5020** (0.0049)	0.4622** (0.0073)	0.3257** (0.0040)	1.0000** -		
DIC ⁽⁷⁾	7758	4575				

Notes: () : Standard errors ** : Significant at 5% level

The Standard deviation (σ) of the switch equation (D) is standardized to be 1

When the wage equations are separately estimated, it is found that the coefficients associated with the level of human capital and other individual characteristics are different between each group. The second and the third column of the table (column B and C) are the wage equations of the low wage group and high wage group respectively. The comparison of the two columns exhibits that the high wage group is more rewarded in terms of years of schooling, but less rewarded in terms of working experience, and the differences in human capital coefficients between the high and low wage groups (column C minus column B) are significant at 5% level. Deviance Information Criteria (DIC) also suggests the two wage equations better predict the wage profile of Korean workers than the single wage equation.

Also, by comparing the coefficients of the OLS equation and the linear probability model of the switching equation (column D), we can see that the high and the low wage status cannot be predicted from the single wage equation. If the ratios of the coefficients from OLS and the switching equation are all equal, the wage equation from the full sample should also determine the wage status of the workers. However, the ratio falls between 2~5 with 5% significance level, which obviously reveals that this is not the case.

Problems with Heckman's Selection Model

Although the fact that two wage equations fit the observation better than one is one of the supporting evidence of the existence of the two labor market, it does not automatically prove that there is dualism in the labor market. There are several more requirements in order to confirm the existence of the labor market dualism.

For example, we are lacking a logical basis on the way of segmenting workers into the two groups in the previous test. The assumption that workers can be divided into two groups based on their wage level with the cutoff point of 1.63 mil KRW/month earnings is rather a strong assumption. A different cutoff point or different criteria of segmentation other than the wage level can result in different estimation results, as in Table 3.

Segmenting workers by other arbitrary criteria can also end up having results inconsistent with the previous results or dual labor market hypothesis. For instance, lowering the high- and low-wage cutoff point to 1 mil KRW/month results in even larger differences in schooling and experiences between the two groups of workers. The low wage group is more rewarded in terms of working experiences, while high wage workers show higher correlation between wage and years of schooling. For another instance when segmenting workers

7) Deviance Information Criterion (Schwarz Criterion), similar to Akaike Information Criterion, a model with smaller DIC is preferred to one with larger value.

Table 3: Wage Equation Estimation Results with Different Worker Segmenting Criteria

	Low and High Wage Cutoff =1 mil KRW/month			Segmentation According to Work Arrangement		
	Low Wage	High Wage	Switch	Standard	Nonstandard	Switch
constant	3.6830** (0.0872)	4.4130** (0.0437)	-6.0330** (0.3149)	4.0683** (0.2001)	4.2091** (0.1229)	-0.1986 (0.1217)
school	0.0189** (0.0049)	0.0623** (0.0026)	0.3217** (0.0186)	0.0701** (0.0050)	0.0693** (0.0034)	-0.0076 (0.0071)
exp	0.0425** (0.0035)	0.0214** (0.0016)	0.1372** (0.0115)	0.0399** (0.0030)	0.0306** (0.0022)	-0.0056 (0.0044)
exp2	-0.0007** (0.0001)	-0.0004** (0.0000)	-0.0029** (0.0002)	-0.0008** (0.0001)	-0.0007** (0.0000)	0.0001 (0.0001)
gender	-0.0929** (0.0378)	-0.3299** (0.0120)	-1.8560** (0.0770)	-0.4678** (0.0263)	-0.4597** (0.0184)	0.0634 (0.0367)
marriage	-0.0930 (0.0653)	0.1127** (0.0199)	0.7307** (0.1226)	0.1146** (0.0429)	0.1177** (0.0299)	-0.0258 (0.0627)
child	0.0185 (0.0426)	0.0723** (0.0150)	0.3471** (0.0929)	0.0658** (0.0309)	0.0417 (0.0219)	0.0135 (0.0456)
add	-0.0349 (0.0361)	-0.0483** (0.0122)	-0.1815** (0.0747)	-0.0821** (0.0266)	-0.0386** (0.0184)	-0.0403** (0.0381)
region	0.0068 (0.0337)	0.0151 (0.0124)	0.1686** (0.0779)	0.0402 (0.0288)	0.0402** (0.0200)	0.0773 (0.0391)
σ	0.4691** (0.0114)	0.3687** (0.0039)	1.0000 -	0.5334** (0.0095)	-0.7355** (0.0125)	1.0000 -

Notes: () : Standard errors ** : Significant at 5% level

The Standard deviation (σ) of the switch equation is standardized to be 1

according to work arrangements, the interpretation of the estimated coefficients is even more challenging because the workers with nonstandard work arrangements exhibit a steeper wage profile in terms of human capital than those with standard work arrangements.

To remedy this problem, Dickens and Lang (1985)'s switching model with unknown regime can be an alternative testing strategy. Their model has basically the same structure as Heckman's selection model except that the data is selected to switch between the two labor markets as in equation 4.

$$y^* = Z\delta + e^s \quad (4)$$

(4) where y^* is a latent variable measuring the tendency to be in the primary market, thus if $y^* > 0$, the worker belongs to the primary market.

Or, alternatively, we can simply construct a switching equation based on the least square estimation idea. To minimize the sum of squared residuals in the presence of two wage equations, we should compare the squared residuals of two wage equations as in equation (5).

$$Z^* = \frac{(\ln y - (\beta_0^s + \beta_1^s \text{school} + \beta_2^s \text{exp} + \beta_3^s \text{exp}^2 + X\beta_4^s))^2}{\sigma_s^2} - \frac{(\ln y - (\beta_0^p + \beta_1^p \text{school} + \beta_2^p \text{exp} + \beta_3^p \text{exp}^2 + X\beta_4^p))^2}{\sigma_p^2} \quad (5)$$

(5) where Z^* measures the relative distance of an observation from two wage equations, β_i^s and β_i^p ($i = 1, 2, 3, 4$) are coefficients associated with secondary and primary labor market wage equations respectively, σ_s^2 and σ_p^2 are variances of secondary and primary wage markets respectively, and similarly, if $Z^* > 0$, the worker belongs to the primary market.

Similar to the ordinary least square (OLS) method, this equation minimizes the sum of squared residuals in the existence of two equations. The first term of the equation is the squared residual of the secondary market wage equation that is discounted by the variance of the secondary market wage equation. The second term of the equation is the primary market counterpart. Thus, if the relative distance of an observation is closer to the primary market wage curve, the observation belongs to the primary market.

This OLS estimation with two equations is in between Heckman's model and endogenous switching model in that it does not pre-segment workers into two groups, but assumes the existence of two wage equations. In other words, the difference between Dickens and Lang (1985)'s model and the OLS estimation with two equations is that the latter acquires two wage equations after the regression in any case while the formal model can end up with only one wage equation after the regression if all of the workers belong to the primary (or secondary) market. Table 4 presents the results of these alternative specifications.

The estimation results using Dickens and Lang (1985)'s switching model

Table 4: Wage Equation Estimation Results without a Pre-segmentation of Workers

	Dickens and Lang (1985) Switching Model with Unknown Regime			OLS with Two Wage Equations		
	Secondary	Primary	Switch	Secondary(A)	Primary(B)	A – B
constant	0.3476 (101.70)	4.1620** (0.0487)	10.8600** (2.5330)	3.5410** (0.0635)	4.1880** (0.0497)	-0.6466** (0.0703)
school	0.0899 (101.10)	0.0696** (0.0028)	0.3487 (0.2921)	0.0637** (0.0036)	0.0781** (0.0029)	-0.0144** (0.0041)
exp	0.5677 (100.20)	0.0343** (0.0017)	1.3530 (0.1834)	0.0494** (0.0028)	0.0405** (0.0024)	0.0090** (0.0025)
exp2	-1.6590 (100.50)	-0.0007** (0.0000)	0.9965** (0.0046)	-0.0010** (0.0000)	-0.0007** (0.0000)	-0.0003** (0.0000)
gender	0.9752 (100.30)	-0.4653** (0.0145)	0.3577 (5.0850)	-0.5328** (0.0311)	-0.3497** (0.0243)	-0.1831** (0.0207)
marriage	0.5539 (99.96)	0.1199** (0.0247)	-2.5280 (1.9620)	0.2818** (0.0426)	0.1720** (0.0294)	0.1098** (0.0368)
child	0.4964 (99.34)	0.0487** (0.0180)	-2.4160 (2.9520)	0.0791** (0.0322)	0.0658** (0.0239)	0.0134 (0.0253)
add	1.9940 (100.00)	-0.0546** (0.0150)	-2.2610 (2.0330)	-0.0925** (0.0256)	-0.0982** (0.0167)	0.0057 (0.0220)
region	1.1440 (99.93)	0.0394** (0.0154)	-1.3480 (4.0380)	0.0715** (0.0248)	0.0178 (0.0174)	0.0537** (0.0217)
σ	14.74 (29.61)	0.5021** (0.0049)	1.0000	0.3740** (0.0064)	0.2808** (0.0060)	

Notes: () : Standard errors ** : Significant at 5% level

The Standard deviation (σ) of the switch equation is standardized to be 1

with unknown regime show that the secondary market individual characteristic-wage profile is completely flat. However, the existence of the labor market dualism in Korea is inconclusive since only seven workers out of 5,308 are involved in the market categorized as non-primary. Compared to the U.S. result presented in Dickens and Lang (1985), the number of workers who belong to the secondary market is too small. This might be due to the different patterns of migrant workers observed in the labor market. The majority of non-secondary market participants in the U.S. is composed of immigrants, whereas immigrants are not one of the major work force groups in Korea. Even in Dickens and Lang (1985)'s original study, they also estimated that about 79%

Table 5: Sample Statistics of Primary and Secondary Market Workers
(N=5,308)

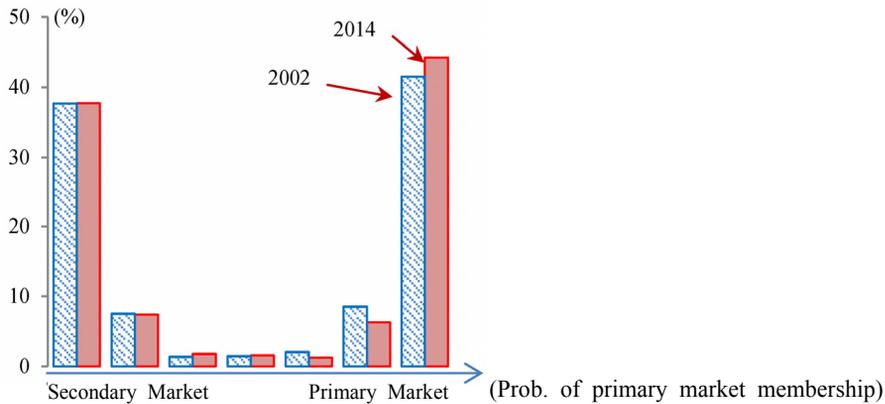
	Secondary Market (N=2,001)		Primary Market (N=2,348)	
	mean	std_dev	mean	std_dev
Nonstandard Work Arrangement=1	0.58	0.50	0.23	0.44
Monthly Wage (mil KRW)	140.11	71.41	318.00	159.84
Years of Schooling	12.75	3.22	13.28	3.51
Years of Working Experience	25.16	14.31	20.66	15.46
Age	46.87	12.28	42.73	12.58
Female=1	0.43	0.50	0.40	0.49
Married=1	0.88	0.32	0.74	0.44
Having Child=1	0.46	0.50	0.41	0.49
Number of Child	0.76	0.93	0.69	0.93
Additional Worker in the same Household	0.34	0.48	0.36	0.48
Seoul or Kyungki=1	0.73	0.45	0.71	0.45

of workers fall into the category of the primary market with the probability over 90%, and only 3% of workers belong to the secondary market with the probability over 90%. This might suggest that, the existence of the dual labor market detected in the switching model with unknown regime is an immigration issue rather than a labor market structure issue even in the U.S since the secondary market of the U.S. covers only about 3% of the total wage workers. Conclusively we cannot reject the null hypothesis that there is no dualism in the Korean labor market based on this model.

On the contrary, the two equation OLS estimation results suggests that there are two distinct wage equations, the results of which are very similar to those from Heckman's model. Primary sector workers are rewarded in terms of years of schooling. Using the estimated probability of being in the primary sector workers, the sample statistics of primary and secondary market workers are presented in Table 5.

According to the results from the two-equation OLS estimation, the most distinct difference between the primary and the secondary market workers is a

Figure 3: Percentage Distribution of Workers



wage level. Around the median wage, it seems like the labor market can be segmented into two categories. Also, the secondary market workers tend to have larger portion of nonstandard work arrangement and lower monthly wage on average, but the nonstandard work arrangement status or the low wage status does not automatically put the worker in the secondary market worker's category, and the variances are also high for these traits. Other individual characteristics concord with our expectations similarly, although they are not decisively classifying the secondary and the primary workers.

Compared to the workers sample in 2002, the portion of primary workers slightly increased in year 2014, as in Figure 3.⁸⁾

From the various testing results, we can derive several implications in identifying two wage equations. First, two wage equations can be identified only we assume that there exist two wage equations. Second, wage level is the key distinguishing characteristic of the primary and secondary markets, which is also in concord with the common belief that the labor market dualism is related to workers' compensation or wage.

8) By coincidence, the percentage change of the primary and the secondary workers between year 2002 and 2014 shows very similar trend that is calculated in later section using dualism index.

III. The Labor Market Dualism Index

Another aspect of the dual labor market argument is that the traits for good jobs are clustered together, and the bad job traits are also clustered in the same way. Hudson (2007) formally defines that, “the marginal distribution of secondary labor market characteristics and the level of covariation among them determine the degree of discrete labor market segmentation (p. 292).” In other words, Hudson (2007) argues that by looking at the degree of segmentation between primary and secondary market job characteristics, the labor market dualism can be identified. Thus, his view of the dual labor market is similar to the original concept of bifurcation of working conditions, whereas the efficiency wage literature’s views are about discriminating human capital.

The basic idea of how to calculate the degree of clustering of working conditions can also be found in Hudson (2007), but this idea still suffers from the arbitrary selection of “good” status, especially regarding the wage level. Suppose there are working conditions, such as wage, health insurance, retirement benefit, and so on. If the good and bad traits of working conditions are bundled together, we can state that the labor market is segmented according to Doeringer and Piore (1971)’s concept of the dual labor market. Since there are multiple dimensions in working conditions, if there is no segmentation in the labor market, working conditions can also be distributed relatively evenly across all jobs. Hudson’s (2007) index aims to look at how many those good (or bad) characteristics are covarying with workers in various jobs.

Specifically, we use the condition that if incident and are positively related, $p(a \cap b) = p(b)p(a|b) > p(b)p(a)$, i.e. the probability of observing the combination of and is larger than the multiple of the probabilities of observing and . In other words, in the absence of the labor market dualism, job traits will be distributed evenly across jobs, and the probability of each combination of working conditions will be almost the same as the simple multiplication of the probabilities of observing individual working conditions. For example, if we observe $a\%$ of workers are receiving high wage, $b\%$ of workers are receiving health care, and $c\%$ of workers are receiving both high wage and health care,

then we expect $c = a \times b\%$ under no dualism in the market.

From the sample probabilities calculated using the idea described above, the Dualism Index (DI) can be calculated as in equation (6):

$$\widehat{DI} = \frac{(P_o - P_e) + (S_o - S_e) - |(P_o - P_e) - (S_o - S_e)|}{(C - 2)/C} \times 100 \quad (6)$$

where P_o : observed proportion of workers in primary market

P_e : expected proportion of workers in primary market under no dualism

S_o : observed proportion of workers in primary market

S_e : expected proportion of workers in primary market under no dualism, and

C : number of combinatorials

If there is no dualism in the labor market, then the index becomes zero, whereas if there is a perfect dualism, the index becomes 100.⁹⁾

One notable difference between the idea of DI and the identification of the two wage equation is that DI admits the existence of some jobs with intermediary characteristics. Dickens and Lang (1985) and Heckman and Hotz (1986) also identify workers who are in between the primary and secondary markets, but they are more like residuals rather than intermediary workers. On the contrary, Hudson's (2007) index does not strictly segment the labor market into two categories, and the dualism is a matter of degree of bifurcation in a situation where the primary and secondary markets are already assumed to exist.

As in Hudson (2007), four variables are selected to characterize workers' conditions: (a) wage level, (b) health insurance, (c) retirement benefit and (d)

9) In this sense, the DI is different from the wage polarization in that the wage can be distributed more unevenly while DI can have smaller values. While the cause of the wage polarization is more related to the change of the industry structure such as the expansion of the service sector or globalization, nonpecuniary aspects of workers compensations that consists a large part DI are mostly determined by institutional factors. In other words, DI is not about the wage level, but about the degree of clustering of worker benefits.

Figure 4: Distribution of Workers according to the Job Traits in year 2014

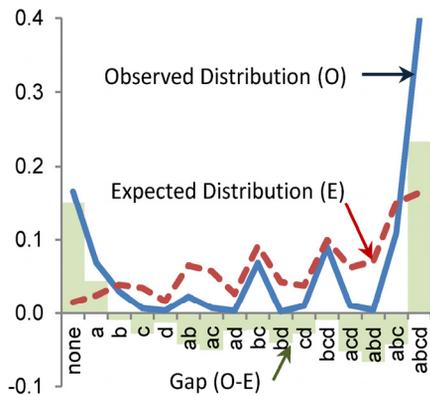
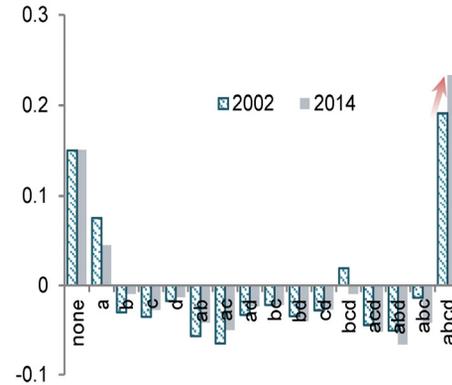


Figure 5: Gap between Observed and Expected Distribution of Workers



job security. The cutoff level of good wage is the minimum cost of living for a family size of four. If workers have all four positive job characteristics (a,b,c and d), they belong to the primary market, and likewise, if workers have none of the four positive job characteristics, they belong to the secondary market.

The expected and the observed distributions are presented in Figure 4. About 17% of workers belong to the secondary market and about 40% belong to the primary market according to this categorization scheme. Clearly, the sample probability of being in either primary or secondary sector exceeds the expected probability under the condition that there is no dualism in the market. The gap between the observed and expected distributions of workers (Figure 5) increases in 2014 compared to 2002 mainly due to the increase in jobs having the primary sector traits.

The calculated DI along with the proportion of workers in the primary and secondary sectors is 34.4 in year 2002 and 34.5 in year 2014. DI calculated in Hudson (2007) using U.S. data ranges from 36 to 40 in the late 1990s which are similar to the DI from Korean data. Meanwhile, the proportion of workers who are not in the intermediary sector, representing how many workers are polarized into two categories, has been increased from 47.1% in year 2002 to 56.4% in

year 2014. Goos et al. (2009) finds that the job polarization is mainly due to the trend that “routine tasks concentrated in manufacturing and clerical work (p. 62)” are taken over by technologies in European countries¹⁰). This trend is also found in the Korean labor market with the phenomenon in which the manufacturing portion of the total job numbers has been decreasing over time.

One critical problem with DI is that the selection of the cutoff point of “good” wage level is critical in constructing the index. If we set the cutoff point at 150% of the minimum cost of living for a family size of four, the DI in year 2002 becomes 30.2 and it dramatically increases to 40.5 in year 2014. The proportion of workers who are not in the intermediary sector is also changing with the alternative cutoff point, from 45.5% in year 2002 to 48.6% in year 2014. Unlike other fringe benefits such as health insurance and retirement benefits, the wage level is not a binary variable, rather, it is one of the most critical aspects of job characteristics, making it harder to construct a robust labor market structure index.

The final aspect of the labor market dualism is mobility, and it can be assessed by utilizing the results of the DI construction: by counting the number of secondary sector workers moving to the primary sector, we can estimate the mobility of workers. The count cannot represent the degree of mobility if workers choose to stay in the secondary market even if they can move to the primary market; however, a rational worker would move to the primary market if he/she has the chance since the primary market is absolutely better than the secondary market in every aspect of workers’ benefits. The mobility of worker in year 2002 was 0.127%, but it became lower to 0.055% in year 2014. Also, as it is shown in DI, the mobility figure is not robust against the selection of the cutoff point of “good” wage level. If we set the cutoff level as 150% of the original cutoff, the mobility is 0.076% in year 2002 and 0.018% in year 2014.

10) Autor and Dorn (2013) also finds that “[R]ising employment and wages in service occupations account for a substantial share of aggregate polarization and growth of the lower tail of the US employment and earnings distributions between 1980 and 2005 (p.1590)”

Although the basic idea of measuring the degree of the labor market dualism suggested by Hudson (2007) is straightforward and agrees with the common notion of the labor market dualism, it suffers from the problem due to the discretionary selection of “good” wage level. DI is useful in verifying the existence of bifurcation in working conditions in the Korean labor market, but measuring the degree does not pass the robustness check. Thus, before constructing DI, the logical background to decide good- or bad-working conditions should be set up.

In any case, however, it is certain that the number of workers belonging to the primary or the secondary labor market, and the mobility values both have aggravated in 2014 compared to 2002, suggesting that the labor market dualism is becoming more evident in Korea.

IV. Summary and Conclusion

The discussion of the labor market dualism in Korea is related to the income inequality issue in which high wage workers belong to the primary market while low wage workers belong to the secondary market. Historically, the discussions of the labor market dualism have evolved with other problems such as racial discrimination and immigration workers in the U.S. labor market. In the case of the Korean labor market, however, where workers are mostly native citizens with the identical racial background, discussions about the labor market dualism are related to the level of incomes as in Heckman and Hotz (1986)’s study on the Panamanian labor market.

The empirical test of the existence of two separate labor market sectors is also based on the division of workers into high- and low-wage groups. However the test is conducted on the grounds of two different definitions of the labor market dualism since the definition of the labor market dualism found in Doeringer and Piore (1971) is interpreted into two different ways. The efficiency wage literature sees it as the existence of two wage equations, whereas

sociology regards it as the bifurcation of workers' benefits, although both of them agree that immobility between the sectors or the rationing of the primary market is the necessary condition of the labor market dualism. This paper tries to assess these various aspects of the labor market dualism in Korea.

The test of the existence of two wage equations reveals that there exist two separate wage equations regardless of pre-sectioning of workers into high and low wage groups. Additionally, by constructing the index of the labor market dualism, it is revealed that there is some degree of clustering of good (bad) job traits in the Korean labor market. However, the index value suffers from the problem due to the arbitrary selection of the cutoff point of "good" wage level, thus the interpretation of DI should be done with care.

By utilizing the results from this paper, we can analyze some issues related to more practical purposes in policy making. For example, the effects of the labor market structure on the youth can be predicted using the index values calculated in section 3: because of the market segmentation, the youth workforce might hesitate to get into the secondary market when they cannot get into the primary market (Doeringer and Piore, 1975). If the degree of the segmentation and bifurcation between the primary and secondary markets enlarge, the reserve force for the primary labor market may increase, extending the searching process in the job market, and thus increasing unemployment. Additionally, as the segmentation of the labor market lasts longer, the labor income distribution will be more polarized, creating social tensions. Therefore, if there is the considerably high degree of dualism in the labor market, inefficiency can be generated in terms of labor force utilization, necessitating the policy effort to enhance the labor market flexibility.¹¹⁾ The combination of relaxing the employment protection legislation on the primary labor market and the enhancement of the social safety net can be one example. Some possible effect

11) Currently, the government is suggesting various labor market policies such as relaxing the employment protection legislations, amending part-time and dispatch labor contract related regulations and other policy measures.

of the labor market dualism along with the example above is that severe segmentation can discourage incentives for workers to develop human capital when workers first get their job in the secondary market. Likewise, potential workforce might accumulate excessive human capital in order to get into the primary market, creating mismatches between workers' skills and job requirements (Wald, 2005), but the study on the relationship between the labor market structure and employment is left for the future study.

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<Abstract in Korean>

우리나라 노동시장 이중구조에 관한 연구

정성엽*, 정선영**

본고에서는 우리나라의 노동시장에 이중구조가 존재하는지 여부를 두 가지 정의를 이용하여 실증분석하였다. 먼저 복수의 임금함수 공존 여부를 Heckman and Hotz (1986)의 방법을 이용하여 추정한 결과 2개의 임금함수의 존재가 통계적으로 유의한 것으로 나타났다. 또한 Hudson (2007)이 제안한 제도적 보상수준의 횡단면 분석에서도 보상수준의 양극단에 상당수 근로자가 분포하여 분기화 특성이 뚜렷한 것으로 나타났다.

핵심 주제어: 노동시장, 노동시장 이중구조, 표본편의 수정모형

JEL Classification: C24, J31, J40, J81

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10	인구 고령화와 정년연장 연구 (세대 간 중첩모형(OLG)을 이용한 정량 분석)	홍재화 · 강태수
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