Job Switching, Job Tenure, and Wage Dynamics: An Empirical Study on College Graduates in Taiwan

Chu-Chia Lin and Chia-Hsian Lin*

Using a panel data set of college graduates in Taiwan, this study computes the wage dynamics for college graduates who have been on the market for just two years. A traditional wage function is estimated first with explanatory variables including job tenure, work experience, degree of job match, and individual characteristics such as level of education, field of study, and gender. Then, by using the estimated wage function, the impact of job tenure, work experience, job match, and job switching on wage dynamics are calculated separately. We find that, for all workers, job tenure accounts for 65.8% of wage changes, job switching for 26.5%, and work experience for 10.6%. To our surprise, the degree of job match has a slightly negative impact on wage changes, namely, −3.1%. When only workers who have changed jobs are considered, the proportion of wage changes accounted for by job tenure, job switching, work experience, and the degree of job match are 37.2%, 50.4%, 17.4%, and −5.0%, respectively.

Keywords: job switch, job tenure, job match, wage dynamics
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*Department of Economics, National Chengchi University and Department of Economics, National Chengchi University. The authors would like to thank two anonymous referees for their comments and the National Science Council, Taiwan, for financial support (NSC 91-2415-H-004-022).

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1 Introduction

When college graduates enter the job market, they have to worry about two things: finding a job which matches their needs, including the field of study, personal interests, and future development prospects, etc., and finding a job with good pay. In order to find a more satisfactory job, college graduates may often change jobs to find a better match. On the other hand, in order to get better pay, college graduates can either change to a better paying job or stay at the same job to accumulate working experience and thus receive better pay in the future.[1]

Traditionally, according to specific human capital theory and implicit contract theory, a worker's wage is usually determined by his years of schooling, job tenure, and working experience. For instance, Wu (1988) and Lin et al. (1993) apply an OLS model to estimate the marginal contribution for each determinant on the wage for college graduates in Taiwan. The variables in their models include the educational level, fields of study, working experience, sex, and age, etc.[2] In addition to working experience, Mincer (1986) and Topel and Ward (1992) both point out that job switching is a key method for young workers to increase their wages.[3] Additionally, there are some papers studying how job matching affects the wage and job duration, such as Bartel and Borjas (1981), Topel (1986), Kao and Lin (1996) and Lin and Hsu (2001). Jovanovic (1984) argues that job match, job turnover, and employment should be considered simultaneously.

Most of the above studies concentrate on studying only one or two factors affecting wages, such as job tenure, job search, job match, and so on. However, there has been little research on a full job history of college graduates, especially regarding wage changes. Therefore, one important incentive for this study is to compute the complete wage changes for college graduates in our model. It is significant to see how these key factors affect wage changes for college graduates who have just entered the job market. Moreover, it is also important for a new college graduate to know whether he/she

[1] Holzer (1987) and Topel and Ward (1992) also emphasize young workers in their study.

[2] There are numerous papers studying wage determinants, such as Abraham and Farber (1987), Altonji and Shakotko (1987), Addison and Portugal (1989), Jin and Magrabi (1991) and Altonji and Williams (1998).

[3] There are other studies on the effect of job switching on wage changes, such as Mincer and Jovanovic (1981), Topel (1991), Bunzel et al. (1993), Keith and McWilliams (1999) and Yu (1999).

should stay at his/her current job for advancement or look for a new job with higher pay. To answer this question, a college graduate needs to know how much he/she can obtain by job turnover at the expense of interrupting his/her current job tenure.

Here we are more interested in studying the wage dynamics for college graduates in Taiwan for two reasons. The first reason is that college graduates are more capable of changing their jobs, compared to other youth workers with less education. Therefore, both the number of job switches and returns from job switching for college graduates should be higher than those in the case of other youth workers.[4] The other reason is that college graduates usually have broader fields of study than other youth workers. Therefore, it is more meaningful to study job match in the case of college graduates.

This study uses a panel data set of college graduates in Taiwan who have been in the job market for two years to compute their wage dynamics in relation to their first few jobs. By estimating a wage function, we decompose wage changes into four parts including job tenure, working experience, job match, and job switch. We then calculate the percentages for each of these four types of contribution to total wage changes.

In Section 2, a simple wage function is first built. By using the property of the panel data set, the contributions of wage tenure, working experience, job match, and job switch are all included in this wage function. In Section 3, the variables are defined first, and then the basic statistics are described. In Section 4, a wage function is estimated using the ordinary least-squares method. The marginal contribution of each factor on each job for each person is calculated using the estimated wage function. Then the average contribution to wage changes for each factor is calculated, including job tenure, working experience, job match, and job switch. The conclusions are presented in Section 5.

2 The Determinants and Decomposition of the Wage Function

In order to understand the overall picture of wage dynamics as job changes for a specific worker (i), we include the worker's characteristic variables (Z_i), job specific variables ($X_{i,j}$) and other relevant variables. Therefore, we define

[4] Furthermore, the average duration of unemployment for college graduates is shorter than for other workers in Taiwan. For example, in the year 2003 the average unemployment duration for college graduates in Taiwan was 23.7 weeks, and it was 38.2 weeks for other workers with less education.

the wage function ($W_{i,j,k}$) for individual i having k jobs at the j-th job as follows:

$$W_{i,j,k} = Z_i \cdot \alpha + X_{i,j} \cdot \beta + M_{i,j,k} \cdot \gamma_{i,j,k} + \varepsilon_{i,j,k}, \tag{1}$$

where, Z_i represents an individual's characteristics, including sex, educational level, and field of study, which are fixed at each job; α is the coefficient vector with respect to Z_i; and $X_{i,j}$ represents observable job specific factors for individual i at the j-th job, including job tenure, previous working experience, and the degree of job match, which are all different among jobs. β is the corresponding coefficient vector. Furthermore, in order to estimate the pure marginal contribution of job changes to the wage, we build a dummy variable $M_{i,j,k}$ for individual i having k jobs and staying at the j-th job. The corresponding coefficient vector $\gamma_{i,j,k}$ represents the specific wage at the j-th job for individual i having k jobs.[5] Finally, $\varepsilon_{i,j,k}$ is the error term which follows standard assumptions for linear regression.

After obtaining the actual estimated wage function, we can use the estimated coefficient vectors to calculate the marginal contribution of the wage change for all factors, including job tenure, working experience, job match, and job switch, for every individual. When an individual switches jobs, his/her new salary may be higher (or lower) than the wage at the previous job for three reasons: past job experience,[6] a better match, or simply by chance or through better searching.[7] Since each of these three factors is determined when an individual gets his/her new job, there should therefore

[5]The coefficient $\gamma_{i,j,k}$ could be regarded as a component of wage change based on job switch, which could be contributed to simply by luck or by those unobservable factors for individual i at the j-th job. One may note that, since $M_{i,j,k}$ is a dummy variable, the coefficient of $\gamma_{i,j,k}$ represents the component of wage change which cannot be explained by job tenure, job experience, or job switch. In this sense, the component of wage change based on job switch defined here is more like a residual.

The way we choose dummies for $M_{i,j,k}$ is to calculate the "residual". The wage change cannot be explained by job tenure, job experience, or job match. Since we are sure that job switch could make the wage different, we use a dummy variable to calculate the average effect of job switch on the wage change. The reason why a dummy variable is a good way to control for the effect of a job change on the wage is that the effect of a job switch on the wage change is purely "random" in that the job market lacks information, so that there is real uncertainty before a person finds a new job.

[6]Here, we assume that past working experience affects only the starting wage, but not the subsequent wage thereafter. However, we agree that past working experience could have an impact on the return on the current job tenure.

[7]In fact, the pure return from the job search could be seen as being due to random shock from the search or from unobservable factors.

be three aspects to wage change from the previous wage to the new starting wage. Furthermore, a worker's salary increases along with job tenure. Therefore the current wage equals the starting wage plus the wage increase during the job tenure. In conclusion, the wage difference between two jobs (i.e., the difference in wages at the end of two adjacent jobs) can be decomposed into four parts, namely, returns from job tenure, total working experience, job match, and job search.

In other words, the wage change ($\Delta W_{i,j,k}$) for individual i having k jobs at the j-th job can be expressed as follows:[8]

$$\begin{aligned}\Delta W_{i,j,k} = {} & d_1 \cdot \mathrm{TENURE}_{i,j} + d_2 \cdot \mathrm{ACUEXP}_{i,j-1} \\ & + d_3 \cdot \left(\mathrm{MATCH}_{i,j} - \mathrm{MATCH}_{i,j} - 1\right) \\ & + \gamma_{i,j,k} \cdot M_{i,j,k} - \gamma_{i,j-1,k} \cdot M_{i,j-1,k}, \end{aligned} \tag{2}$$

where d_1, d_2, d_3, $\gamma_{i,j,k}$ and $\gamma_{i,j-1,k}$ are the estimated coefficients in the above wage equation. In Equation (2), $\mathrm{TENURE}_{i,j}$ is the length of staying at job j for individual i, and the longer the length of staying, the higher will be the wage for job j (i.e., d_1 is positive). $\mathrm{ACREXP}_{i,j-1}$ is the length of working experience before job j and d_2 is positive, too. $\mathrm{MATCH}_{i,j} - \mathrm{MATCH}_{i,j-1}$ is the difference in terms of the degree of job match between job j and $j-1$. Since d_3 is positive, so the return from job match depends on the degree of job match for the two consecutive jobs (j and $j-1$). Finally, the return from job switch also depends upon the different returns from the two consecutive jobs. However, since the returns from job switch based upon the two different jobs are different ($\gamma_{i,j,k}$ and $\gamma_{i,j-1,k}$), the net return from job switch is $\gamma_{i,j,k} \cdot M_{i,j,k} - \gamma_{i,j-1,k} \cdot M_{i,j-1,k}$.

3 Data Description

The data set applied in this study was obtained from Lin (2000, 2001), and the survey was conducted in two consecutive years.[9] In June 1999, an effective sample of 1,616 persons was collected from college graduates

[8] The definitions of the variables are shown in the next section.

[9] Some readers may be concerned that the period of our survey is somewhat short covering only two years. However, the college graduates in our data set are quite active in terms of changing jobs. For example, for the effective sample of 1,177 persons in our data set, there are 334 (28.4%) persons who have had two jobs, 191 (16.2%) persons who have had three jobs, and 142 (12.1%) persons who have had four jobs. Since more than half of our sample has had experience of changing jobs, we believe that it is meaningful to use our data set to compute

in Taiwan who had entered the job market and had got a job about one year ago.[10] In August 2000, 1,616 follow-up questionnaires were sent out to those who had responded to the first year survey. Of these, 1,487 questionnaires were returned, reflecting an attrition rate of 8.0%. After deleting incomplete questionnaires and those who had left the labor market from the 1,487 questionnaires returned, a sample of 1,177 persons remained for the purposes of this study. The effective attrition rate was thus 27.2%.[11],[12]

In order to track their job history, in each survey the college graduates were asked to answer questions in relation to all the jobs at which they had worked. At most, four jobs were recorded in each year's survey. Those who had more than four jobs in one year were asked to record the four most important jobs. Finally, the two consecutive surveys of one year each were combined and a maximum of four jobs were kept for each individual's observation.[13] In fact, there were some individuals who had more than four jobs in two years, but since the sample size was too small to give rise to significant analysis, we chose to neglect them. In other words, the maximum

the wage changes during job changes. Meanwhile, those college graduates who have just left school are the most active persons in the job market with much less information. Therefore, we believe it should be meaningful to study the effect of job tenure, job experience, job match, and job switch on wage changes in relation to them.

The important thing is that, in our regression, we find that all of the four important factors (job tenure, job experience, job match, and job switch) have a significant effect on wage changes just as we expected. Moreover, our estimates of the wage changes are quite close to the true wage, as shown in Table 6 of this paper, and so we believe that our model is suitable when it comes to describing our data set.

[10]The observations for female graduates were for those who had left school in June 1998, while the observations for male graduates were those who had left school in June 1996, since most male college students have to join the army for two years right after their graduation.

[11]$1 - (1{,}176/1{,}616) = 27.2\%$. The complete sample of 1,176 persons consists of those who have two complete years of job history in the data set.

[12]Since 27.2% of the persons in our sample in the first year left our sample in the second year, there may be concerned as to why they left our sample, and what their characteristics are. In Table B.1, in Appendix B, we have included some basic statistics both for 1,177 persons who stayed in the second year and for 439 persons who left our sample. One may see that in Table B.1, the basic statistics for the two types of groups of people are quite similar to each other, in terms of the demographic variables, the fields of study, and average income, and so on. The results show that there is no specific reason for those who left our data set, and therefore we are free from the possible selection bias problem. The authors would like to thank one of the referees for pointing out this potential issue.

[13]Due to resource constraints, the survey was conducted for two years only. Though the length of the panel is relatively short, the data set does provide rich results because of the high job transition rate of college graduates in Taiwan.

number of jobs for each individual in our data was four, as shown in Table 1. There were 1,177 effective sample points in our sample. Of those 1,177 persons, 510 (43.3%) of them had not changed jobs, while 334 (28.4%), 191 (16.2%), and 142 (12.1%) of them had held two, three, and four jobs, respectively.[14]

For details regarding the basic statistics for all variables in our data set, please refer to Tables A1 to A4 in the Appendix, which show the means and standard deviations of all relevant variables in the sub-samples based on sex, educational level, and the number of jobs. To save space, we leave the details to the readers.

Here, we describe some important and crucial statistics in our data set. Table 1 shows some basic statistics regarding wages, job duration, and the degree of job match for different jobs in our sample.[15] There are several noteworthy issues here. First, the average wage is growing both within and between jobs for every type of person.[16] This indicates that both job tenure and working experience have positive effects on wages, which is consistent with the human capital hypothesis. Moreover, the average wages are increasing among jobs, which show that the job search is also an important means by which an individual can increase his wage.[17]

Second, the starting wage in the case of the first job is higher for graduates with only one job. For instance, the starting salary for the first job for a person with only one job is NT$29,455.2, while it is only NT$23,646.7 for a person with four jobs. The results show that a worker has a strong incentive to stay in the current job when he/she gets a good starting salary. On the other hand, a lower starting salary is a crucial reason why a worker would like to switch his/her job.

[14]Moreover, there are 34 persons with five jobs and there are 15 persons with six jobs in our sample.

[15]In the survey, only questions related to current wages and the wages at the end of each job were asked. Therefore, the starting wage in Table 1 is calculated from the estimated wage function in Table 2. More specifically, the starting wage equals the current wage (WAGE) minus job tenure (TENURE) times its coefficient and then plus the square of job tenure (TENURESQ) times its coefficient.

[16]The findings here are consistent with Burdett (1978) who finds that job turnover is one of the major reasons for the wage growth of young workers and Mincer (1986) also finds that wages are usually higher after changing jobs.

[17]Topel and Ward (1992) find that, for workers who have graduated from high school, about one-third of their wage growth in the first ten years of their working history is from job switching.

Table 1: Basic Statistics for Job Duration, Job Match, and Wages

	Items	First Job	Second Job	Third Job	Fourth Job
Persons with one job	Starting Wage (NT$) (a)	29,455.2			
	Final Wage (NT$) (b)	35,205.9			
	Degree of Match (%) (c)	51.4			
	Job Duration (months) (d)	19.0			
	Accumulated Working Experience (months) e)	0.0			
	Number of Observations (persons) (f)	510.0			
Persons with two jobs	Starting Wage (NT$)	25,894.4	31,185.4		
	Final Wage (NT$)	27,640.7	33,338.3		
	Degree of Match (%)	47.6	39.2		
	Job Duration (months)	10.7	13.6		
	Accumulated Working Experience (months)	0.0	10.7		
	Number of Observations (persons)	334.0	334.0		
Persons with three jobs	Starting Wage (NT$)	24,915.8	26,701.9	31,505.2	
	Final Wage (NT$)	25,745.3	27,621.1	32,630.9	
	Degree of Match (%)	64.9	44.0	35.1	
	Job Duration (months)	7.3	8.2	10.0	
	Accumulated Working Experience (months)	0.0	07.3	15.6	
	Number of Observations (persons)	191.0	191.0	191.0	
Persons with four jobs	Starting Wage (NT$)	23,646.7	25,645.6	26,555.8	28,617.3
	Final Wage (NT$)	24,272.0	26,182.7	27,118.3	29,331.0
	Degree of Match (%)	46.5	43.0	36.6	29.6
	Job Duration (months)	8.0	6.8	6.8	8.7
	Accumulated Working Experience (months)	0.0	8.0	14.8	21.6
	Number of Observations (persons)	142.0	142.0	142.0	142.0
Weighted Average (f)	Starting Wage (NT$)	27,007.3	28,722.2	29,394.7	28,617.3
	Final Wage (NT$)	30,204.7	30,177.8	30,280.2	29,331.0
	Degree of Match (%)	51.9	41.4	35.7	29.6
	Job Duration (months)	13.4	10.6	8.6	8.7
	Accumulated Working Experience (months)	0.0	9.2	15.2	21.6
	Number of Observations (persons)	1,177.0	667.0	333.0	142.0

Source: This study.

Note: (a) Estimated.

(b) Actual surveyed figure.

(c) If a job is completely matched or matched with large part with a person's field of study, then MATCH = 1; otherwise if it is matched with a small part or not matched at all, then MATCH = 0.

(d) Job duration is the actual length of current job.

(e) Accumulated working experience is the total job duration before the current job.

(f) The weight is the number of individuals for each type of person.

Third, though there is no specific pattern for the degree of job match for persons with different numbers of jobs, the degree of job match in different jobs for a specific group of people tends, however, to drop as the number of jobs increases. For instance, the degree of match in the case of the first job for persons with four jobs is 46.5%, while the degree of match for the fourth job drops to 29.6% for the same group. This pattern holds for all types of persons with different numbers of jobs.[18]

Finally, the length of job tenure tends to increase with each additional job. For example, the average job durations for persons who have had three jobs are 7.3, 8.2, and 10.0 months, respectively.[19]

Before running the wage regressions, we define the variables in this paper as follows:

WAGE: Current monthly benefits (or monthly wage at the end of each job), including the wage and other benefits. The unit for WAGE is the NT$.

SEX: If a graduate student is male, then SEX = 1, otherwise SEX = 0.

UNIVERSITY: If a graduated student has a university degree (i.e., a bachelor's degree), then UNIVERSITY = 1; otherwise UNIVERSITY = 0.

MAPHD: If a graduated student has a master's or Ph.D. degree, then MAPHD = 1; otherwise MAPHD = 0. (That is, the reference group for the educational level is the group of junior college graduates.)

FIRST: If the fields of study for graduates are the humanities, law, the social sciences, and commerce, then FIRST = 1; otherwise FIRST = 0.

[18] Although the result may show that the degree of job match is not a significant reason for a job switch, the matching effect on the wage is controversial. For instance, Bartel and Borjas (1981), Topel (1986) and Lin and Hsu (2001) find that job match is important both for wage and job duration. However, in a few studies on Taiwan's college graduates, such as Kao and Hsu (1976) and Kao and Lin (1996), it is shown that job match has an insignificant effect in terms of college graduates choosing their jobs. Similar results may be found in almost all surveys conducted by the National Youth Commission, Executive Yuan.

[19] This result may indicate that more and more people have found a satisfactory career, and so their job stability is higher. However, we need a longer time span to test this hypothesis.

SECOND: If the fields of study for graduates are the natural sciences, engineering, and medicine, then SECOND = 1; otherwise SECOND =0. (That is, the reference group for the fields of study is the group of students from fields other than FIRST or SECOND.)

TENURE: The length of the current job. The unit for TENURE is the month.

TENURESQ: Square of TENURE.

ACUEXP: Accumulated length of working experience before the current job. The unit for ACUEXP is the month.

ACUEXPSQ: Squares of ACUEXP.

MATCH: If the job is completely or generally matched with the field of study, then MATCH = 1; otherwise, if the job is not matched at all or matched to only a small extent, then MATCH = 0.[20]

$M_{i,j,k}$: An index dummy variable. If an individual i having k jobs stays at the j-th job, then $M_{i,j,k} = 1$; otherwise $M_{i,j,k} = 0$.

4 Estimation Results

Applying the ordinary least squares method (OLS) to the data set with 1,177 persons, we first estimate their wage function (i.e., Equation (1)).[21] The estimation results are shown in Table 2. At the same time, the wage regressions for the sub-samples for different genders and educational levels are also shown in Table 2.

Basically, the estimation results are quite convincing in that almost all the coefficients of independent variables are significant with correct signs,

[20] In the survey, a worker is asked whether his/her job is completely matched, generally matched, matched to a small degree, or not matched at all with his/her field of study. Here, we transform these four choices into a dummy variable, i.e., completely or generally matched and matched to a small degree or not matched at all.

[21] Though there are 1,177 persons in our record, there are 2,319 observation sample points in our regression for the total number of graduates shown in Table 2, since we take each job as a single sample point. For example, if there are three jobs for one person, then there will be three sample points for this observation.

Table 2: Wage Regressions: Movers and Stayers

Dependent Variable: WAGE

Independent Variables	Total Graduates	Male Graduates	Female Graduates	College Graduates	University Graduates	M. A. and Ph. D.
SEX	4, 499.7	—	—	4, 742.4	4, 336.6	3, 252.4
	(11.040)***	—	—	(11.020)***	(6.161)***	(1.944)*
UNIVERSITY	6, 288.8	6, 552.3	6, 134.9	—	—	—
	(15.591)***	(7.934)***	(14.256)***	—	—	—
MAPHD	13, 810.2	13, 335.7	14, 322.8	—	—	—
	(21.314)***	(12.109)***	(17.938)***	—	—	—
FIRST	494.3	1, 811.8	101.4	−1, 188.6	935.8	4, 535.6
	(0.879)	(1.285)	(0.185)	(−2.041)**	(0.983)	(1.767)*
SECOND	2, 280.1	3, 406.5	1, 931.2	−42.7	3, 468.6	5, 436.6
	(3.867)***	(2.568)**	(3.141)***	(−0.072)	(3.280)***	(2.128)**
TENURE	376.1	408.6	349.4	243.7	500.4	449.2
	(12.911)***	(7.615)***	(10.484)***	(6.242)***	(10.315)***	(4.548)***
TENURESQ	−2.525	−2.848	−2.305	−2.061	−3.289	−3.200
	(−6.695)***	(−3.829)***	(−5.210)***	(−2.821)***	(−5.188)***	(−2.976)***
ACUEXP	184.9	217.6	150.5	201.3	296.6	365.5
	(4.316)***	(2.572)**	(3.124)***	(3.724)***	(4.137)***	(1.616)
ACUEXPSQ	−0.516	−1.151	−0.163	−3.187	−0.178	−2.749
	(−1.096)	(−1.035)	(−0.333)	(−3.718)***	(−0.235)	(−1.376)
MATCH	2, 241.8	1, 778.0	2, 416.0	1, 950.2	3, 028.6	292.5
	(5.855)***	(2.417)**	(5.692)***	(5.020)***	(4.454)***	(0.170)
$M_{1,1}$	19, 175.3	22, 960.5	19, 463.8	22, 695.7	23, 637.4	30, 657.9
	(24.476)***	(13.652)***	(23.023)***	(25.603)***	(19.262)***	(9.625)***
$M_{1,2}$	16, 008.9	18, 525.5	16, 992.4	19, 814.5	19, 488.3	27, 320.0
	(21.290)***	(11.295)***	(21.585)***	(26.201)***	(15.729)***	(7.754)***

Table 2: Wage Regressions: Movers and Stayers (Continued)

Dependent Variable: WAGE

Independent Variables	Total Graduates	Male Graduates	Female Graduates	College Graduates	University Graduates	M. A. and Ph. D.
$M_{1,3}$	15, 175.1 (17.855)***	18, 199.7 (9.771)***	15, 796.3 (17.919)***	19, 297.8 (23.141)***	18, 061.9 (12.559)***	25, 294.5 (58.813)***
$M_{1,4}$	15, 324.9 (16.823)***	17, 618.8 (9.144)***	16, 423.5 (16.998)***	18, 663.4 (22.303)***	18, 847.0 (10.848)***	25, 263.4 (4.300)***
$M_{2,2}$	19, 308.5 (22.664)***	23, 330.1 (13.157)***	19, 562.0 (21.171)***	22, 278.7 (24.744)***	22, 992.8 (16.632)***	27, 996.3 (6.522)***
$M_{2,3}$	15, 973.2 (18.235)***	18, 029.4 (9.522)***	17, 242.3 (18.730)***	19, 435.1 (21.912)***	18, 205.4 (12.486)***	30, 149.2 (6.601)***
$M_{2.4}$	16, 270.9 (17.399)***	18, 701.7 (9.613)***	17, 371.3 (17.261)***	19, 642.2 (22.472)***	18, 925.5 (10.692)***	26, 889.6 (4.295)***
$M_{3.3}$	19, 210.1 (19.349)***	23, 577.4 (11.341)***	19, 267.7 (18.083)***	21, 343.1 (20.539)***	21, 829.9 (13.280)***	35, 638.4 (6.874)***
$M_{3.4}$	16, 059.9 (16.096)***	19, 122.2 (9.458)***	16, 848.2 (15.446)***	19, 402.4 (20.239)***	18, 285.1 (9.800)***	28, 627.3 (4.355)***
$M_{4.4}$	16, 804.8 (15.572)***	19, 525.4 (9.051)***	17, 918.9 (15.111)***	20, 327.9 (19.129)***	18, 963.8 (9.539)***	31, 307.7 (4.584)***
Number of Obs.	2,319	888	1,431	1,113	948	258
Adj. R^2	0.926	0.916	0.935	0.946	0.918	0.925

Source: This study.

Note: The figures in the parentheses are t-values. Those with ***, **, and * are coefficients which are significantly different from zero at the 99%, 95%, and 90% significance levels, respectively.

and the adjusted R-squares are also higher than 0.9 for all regressions.[22]

Taking the wage regression for total graduates as an example, we see that SEX has a positive and significant coefficient (4499.7), which shows that on average the monthly wage for male workers is NT$4,499.7 higher than that for female workers. As for the educational level, the monthly wage difference between an individual with a bachelor's degree and one with a junior college degree is NT$6,288.8, while the difference between an M.A. or Ph.D. degree and a junior college degree is even higher (NT$13,810.2). This result is consistent with the basic human capital hypothesis. The graduates from the natural sciences, engineering and medicine all have a significantly higher wage (NT$2,280.1) than that of the reference group.[23] However, the wages for graduates from the humanities, law, the social sciences, and commerce are not significantly higher than those of the reference group (NT$494.3).

In addition, job tenure (TENURE) is also an important factor affecting the wage rate. Table 2 shows that the average wage goes up NT$376.1 per month and that the wage rate increases at a decreasing rate since TENURESQ has a negative and significant sign (−2.525). The accumulated working experience (ACUEXP) is also important for the young workers in our sample since the coefficient is 184.9 and is significantly different from zero.[24] Moreover, the positive impact on the wage exhibits a decreasing rate since ACUEXPSQ has a negative sign (−0.516), even though it is insignificant.

Furthermore, as we expected, the degree of match (MATCH) also has a positive and significant effect on the wage (2241.8). This result is consistent with the findings in Johnson (1978), Mincer and Jovanovic (1981), Bartel and Borjas (1981), and Topel (1986).

Finally, in order to evaluate the effect of job switch on the wage, we include the job index variables $M_{i,j,k}$ in the wage regression for each job. After considering all the relevant variables observed, the coefficient of $M_{i,j,k}$

[22]Since there is no intercept in our regression equation, the definition of R-squared is a little different from the traditional definition. If we put the constant term into our regression, the R-squared will drop to somewhere near 0.5 and it is still quite high for a cross-sectional data set such as ours. However, in our regression setting with the job index dummies $M_{i,j,k}$, we have to drop the constant term to avoid the multicollinearity problem.

[23]The reference group consists of the workers who are neither from the fields of the natural sciences, engineering and medicine, nor from the humanities, law, the social sciences, and commerce.

[24]It is also interesting to point out that the impact of the current job tenure is larger than that of past working experience since the coefficient of TENURE (376.1) is higher than that of ACUEXP (184.9).

can be seen as the return on unobservable job-specific variables for each job in question.

We also estimate the wage functions for individuals who have changed their jobs (movers), as shown in Table 3. Generally speaking, the signs and the sizes of the estimated coefficients on the movers' wage function are quite similar to those of graduates overall, and the adjusted R-squares are also quite satisfactory.

Components of Wage Changes Based on Job Switch

Having estimated the wage function for different jobs, we can calculate the wage contributions of each of the four factors, including job tenure, working experience, job match, and job switch. First, to compute the pure effect of job switch on the wage, we can simply check the differences in the coefficients of $M_{i,j,k}$ in Table 3.[25] The estimated returns from job switching are shown in Table 4.

In Table 4, we see that the average monthly return for a single job switch is NT$1,982.3. Additionally, there are several other noteworthy findings here. First, the average return for a single job switch for males is NT$2,434.6, which is 33.1% higher than that for females (NT$1,828.5). This result shows that a male worker has a higher chance of finding a job with better pay. Second, the average return for a job switch to an M.A. or Ph.D. graduate (NT$2,764.2) is higher than that for a bachelor degree holder (NT$1,990.8). Furthermore, the average return for a single job switch by university graduates is higher than that for junior college graduates (NT$1,128.8). This shows that college graduates with higher level degrees will have better chances of finding a job with higher pay, even after controlling for the returns from their degrees.

Finally, it is significant to note that the job switch process tends to cease after a big wage jump. For example, for those who have two jobs, their return from the first job switch is NT$3,579.7, which is much higher than that for the return from the first job switch for those who have had three and four jobs (NT$901.8 and NT$933.0), respectively. Similarly, the returns from the second job switch for those who have had three jobs is NT$3,431.9,

[25] Since we are computing the wage difference between two adjacent jobs, it is meaningless to include the stayers, i.e., those who have never changed their jobs, in our sample. However, if we are computing the total wage changes from the starting job to the current job, then we have to take both the movers and stayers into account.

Table 3: Wage Regressions: Movers Only

Dependent Variable: WAGE

Independent Variables	Total Graduates	Male Graduates	Female Graduates	College Graduates	University Graduates	M. A. and Ph. D.
SEX	4, 439.3 (10.217)***	— —	— —	4, 790.5 (10.283)***	4, 437.2 (5.991)***	60.8 (0.025)
UNIVERSITY	5, 797.4 (13.759)***	5, 799.3 (6.636)***	5, 692.1 (12.869)***	— —	— —	— —
MAPHD	14, 296.3 (18.223)***	12, 755.9 (9.516)***	16, 095.2 (16.815)***	— —	— —	— —
FIRST	642.5 (1.091)	1, 336.1 (0.885)	401.3 (0.715)	−1, 664.1 (−2.711)***	1, 633.9 (1.628)	7, 991.3 (2.108)**
SECOND	2, 082.9 (3.356)***	2, 339.1 (1.638)	2, 054.2 (3.232)***	−452.8 (−0.713)	3, 098.2 (2.767)***	7, 998.7 (2.062)**
TENURE	287.5 (8.503)***	445.2 (5.518)***	207.7 (5.622)***	303.7 (5.705)***	407.9 (7.487)***	182.9 (0.887)
TENURESQ	−2.016 (−4.334)***	−4.650 (−2.841)***	−1.289 (−2.946)***	−4.412 (−3.316)***	−2.800 (−4.462)***	−0.963 (−0.387)
ACUEXP	171.2 (4.218)***	232.4 (2.860)***	115.3 (2.569)**	204.3 (3.768)***	280.8 (4.203)***	355.6 (1.459)
ACUEXPSQ	−0.356 (−0.798)	−1.238 (−1.161)	0.182 (0.399)	−3.225 (−3.752)***	0.053 (0.075)	−2.673 (−1.235)
MATCH	2, 048.0 (4.989)***	1, 696.5 (2.101)**	1, 967.9 (4.431)***	1, 790.4 (4.239)***	2, 896.0 (3.974)***	−1, 722.5 (−0.642)
$M_{1,2}$	17, 166.3 (22.712)***	19, 734.5 (11.596)***	18, 365.3 (23.589)***	19, 996.9 (25.182)***	20, 186.1 (16.180)***	31, 098.4 (6.401)***

Table 3: Wage Regressions: Movers Only (Continued)

Dependent Variable: WAGE

Independent Variables	Total Graduates	Male Graduates	Female Graduates	College Graduates	University Graduates	M. A. and Ph. D.
$M_{1,3}$	16, 101.5 (19.225)***	19, 372.9 (10.193)***	16, 852.8 (19.771)***	19, 519.1 (22.648)***	18, 578.3 (13.186)***	27, 789.2 (4.793)***
$M_{1,4}$	16, 181.8 (18.169)***	18, 717.8 (9.628)***	17, 489.9 (18.838)***	19, 081.9 (22.253)***	19, 232.6 (11.546)***	27, 279.0 (3.826)***
$M_{2,2}$	20, 746.1 (24.323)***	24, 447.8 (13.416)***	21, 454.4 (23.434)***	22, 489.2 (23.893)***	23, 917.0 (17.383)***	32, 265.0 (5.816)***
$M_{2,3}$	17, 003.3 (19.755)***	19, 125.5 (9.946)***	18, 425.6 (20.773)***	19, 678.4 (21.532)***	18, 706.9 (13.266)***	32, 799.5 (5.572)***
$M_{2.4}$	17, 114.8 (18.787)***	19, 938.0 (10.245)***	18, 363.0 (19.103)***	19, 843.9 (22.079)***	19, 462.9 (11.493)***	29, 545.5 (3.916)***
$M_{3.3}$	20, 435.1 (21.014)***	24, 552.9 (11.751)***	20, 916.5 (20.331)***	21, 466.6 (19.996)***	22, 638.1 (14.265)***	37, 339.2 (6.022)***
$M_{3.4}$	16, 974.6 (17.506)***	20, 070.0 (9.923)***	18, 078.6 (17.362)***	19, 590.1 (19.914)***	18, 874.6 (10.624)***	30, 798.0 (4.014)***
$M_{4.4}$	17, 875.1 (17.054)***	20, 441.2 (9.512)***	19, 385.8 (17.112)***	20, 562.4 (18.916)***	19, 666.5 (10.407)***	33, 368.8 (4.245)***
Number of Obs.	1,809	683	1,128	950	723	136
Adj. R^2	0.927	0.916	0.938	0.944	0.925	0.916

Source: This study.
Note: The figures in the parentheses are t-values. Those with ***, ** and * are coefficients which are significantly different from zero at the 99%, 95% and 90% significance levels, respectively.

Table 4: Estimated Returns from Job Switch: Movers Only

Unit: NT$

Type of Persons		Returns from the first job switch	Returns from the second job switch	Returns from the third job switch		Total Returns
Total Graduates						
Persons with two jobs		3,579.7	—	—		3,579.7
Persons with three jobs		901.8	3,431.9	—		4,333.7
Persons with four jobs		933.0	−140.2	900.5		1,693.3
Average return from job switch (a)		2,082.2	1,766.6	900.5		—
Average return for a single switch (a)				1,982.3		
Graduates: by sex						
Persons with	Male	4,713.3	—	—		4,713.3
two jobs	Female	3,089.1	—	—		3,089.1
Persons with	Male	−247.4	5,427.5	—		5,180.0
three jobs	Female	1,572.8	2,490.9	—		4,063.8
Persons with	Male	1,220.2	132.0	371.2		1,723.4
four jobs	Female	873.1	−284.4	1,307.2		1,895.9
Average return	Male	2,581.8	3,309.8	371.2		—
from job switch	Female	1,906.3	954.4	1,307.2		—
Average return	Male			2,434.6		
for a single switch	Female			1,828.5		
Graduates: by education level						
Persons with	College	2,492.3	—	—		2,492.3
two jobs	University	3,730.9	—	—		3,730.9
	M. A. & Ph. D.	1,166.5	—	—		1,166.5
Persons with	College	159.2	1,788.3	—		1,947.5
three jobs	University	128.5	3,931.2	—		4,059.7
	M. A. & Ph. D.	5,010.3	4,539.6	—		9,550.0

Table 4: Estimated Returns from Job Switch: Movers Only (Continued)

Unit: NT$

Type of Persons	Returns from the first job switch	Returns from the second job switch	Returns from the third job switch		Total Returns
Persons with four jobs	College	762.0	−253.8	972.3	1,480.5
	University	230.4	−588.4	792.0	434.0
	M. A. & Ph. D.	2,266.4	1,252.5	2,570.8	6,089.8
Average return from job switch	College	1,406.5	845.6	972.3	—
	University	1,977.5	2,123.2	792.0	—
	M. A. & Ph. D.	2,019.9	4,466.1	2,570.8	—
Average return for a single switch	College		1,128.8		
	University		1,990.8		
	M. A. & Ph. D.		2,764.2		

Source: This study.
Note: (a) The weight is the number of persons with a different number of jobs.

which is much higher than the average return from their second job switch for those who have had four jobs (−NT$140.2).[26] This phenomenon of a large wage jump together with a cessation of job switching holds for both male and female workers, as well as for graduates with different levels of education.[27] This result confirms that the wage is the key reason why a worker will stay in the current job or move.[28]

Components of Wage Changes Based on Job Match

To calculate the wage return in relation to job match, we apply the coefficients for MATCH in Table 3 times the difference in the degree of match for the two consecutive jobs for every individual, and the estimated returns

[26]However, one may also notice that there is no significant wage jump on the third job switch for those who have had four jobs (NT$900.5). Our explanation is that those who have had four jobs may still be searching for good jobs.

[27]One exception is that the returns (NT$5,010.3) from the second job switch for M.A. and Ph.D. graduates who have had three jobs are higher than the returns (NT$1,166.5) from the first job switch for M.A. and Ph.D. graduates who have had two jobs.

[28]This result also shows that the college graduates in Taiwan follow a simple rule for stopping their job switching. According to McCall (1965), a simple stopping rule says that one should stop searching for a new job if the current wage is higher than the expected wage return; otherwise, he/she should keep searching.

Table 5: Estimated Returns from Job Match: Movers Only

Unit: NT$

Type of Persons		Returns from the first job switch	Returns from the second job switch	Returns from the third job switch		Total Returns from job match
Total Graduates						
Persons with two jobs		−171.7	—	—		−171.7
Persons with three jobs		−428.9	−182.3	—		−611.2
Persons with four jobs		−72.1	−129.8	−144.2		−346.1
Average return from job match (a)		−224.1	−159.9	−144.2		—
Average return for a single match (a)				−195.5		
Graduates: by sex						
Persons with	Male	−81.4	—	—		−81.4
two jobs	Female	−207.1	—	—		−207.1
Persons with	Male	−262.8	−167.3	—		−430.1
three jobs	Female	−475.6	−164.0	—		−639.6
Persons with	Male	61.7	−215.9	30.8		−123.4
four jobs	Female	−158.3	−45.2	−248.8		−452.4
Average return	Male	−101.4	−188.5	30.8		—
from job match	Female	−274.3	−114.1	−248.8		—
Average return	Male			−110.0		
for a single match	Female			−224.5		
Graduates: by education level						
Persons with	College	−71.6	—	—		−71.6
two jobs	University	−400.1	—	—		−400.1
	M. A. & Ph. D.	53.8	—	—		53.8
Persons with	College	−342.9	−95.2	—		−438.1
three jobs	University	−715.1	−214.5	—		−929.6
	M. A. & Ph. D.	215.3	645.9	—		861.2
Persons with	College	−175.2	−77.8	−58.4		−311.4
four jobs	University	197.5	−197.5	−394.9		−394.9
	M. A. & Ph. D.	−287.1	574.2	287.1		574.2

Table 5: Estimated Returns from Job Match: Movers Only (Continued)

Unit: NT$

Type of Persons	Returns from the first job switch	Returns from the second job switch	Returns from the third job switch		Total Returns from job match
Average return from job match	College	−175.9	−86.6	−58.4	—
	University	−397.3	−208.5	−394.9	—
	M. A. & Ph. D.	63.8	626.3	287.1	—
Average return for a single match	College		−131.2		
	University		−344.1		
	M. A. & Ph. D.		231.0		

Source: This study.
Note: (a) The weight is the number of persons with a different number of jobs.

from the job match are shown in Table 5. Since we have shown in Table 1 that the extent of the job match in our sample decreases with each job, the estimated return from the degree of job match as the job changes is negative as shown in Table 5. In Table 5, the average return for a single job match is −NT$195.5. The pattern of a negative return in relation to job match holds for workers of different genders and also holds for workers with different levels of education. The only exception is for workers with an M.A. or Ph.D. degree who have a positive return in relation to job match. Their average return from a job match is NT$231.0, a figure that is much smaller than the return from a job switch (NT$2,764.2). Our conclusion is that the degree of job match is not a crucial factor for college workers switching their jobs.[29]

[29] One may ask why job match is not important when a worker changes his/her job while, in Table 3, job match (MATCH) has a significant effect on the wage. Our answer is that, although job match has a large impact on the wage, those who are looking for new jobs may prefer to have a better chance of getting a new job or getting a job with better pay instead of getting a job that is a better match.

In fact, in our regression results in Table 2, MATCH does have a positive and significant effect on the wage. This means that a better matched job could result in higher pay. In our data set, we find that the average return of a single match is negative, which does not mean that the effect of a job match on the return is negative. The truth is that the average degree of job match is decreasing and so the return from the job match is decreasing. (However, for those who find a job with a better match, their wage should be increased, but not decreased.)

Now the problem is concerned with why the degree of job match is decreasing in our data set. The first thing we would like to say is that this kind of phenomenon is not unique in

Decomposition of Wage Dynamics

Having returns from job switch and job match, we are now ready to decompose wage changes with each passing job. To derive the contribution of working experience to the wage, we apply the coefficients ACUEXP and ACUEXPSQ in the estimated wage equation in Table 3 to compute the impact of working experience on the wage when a worker changes his job.[30] However, the accumulated working experience will increase after job changes, so if we add the impact of working experience on the wage, we will overestimate its real impact. Therefore, by using the number of persons in different types as the weight, we take the weighted average of the impact of working experience on the wage as the net contribution on the wage.

For the same reason, to obtain the contribution of length of tenure at the current job to the wage, we apply the coefficients of TENURE and TENURESQ in the estimated wage equation in Table 3 to compute the impact of job tenure on the wage at a certain job. Since the return from job tenure cannot be carried over from a previous job to the next one, we cannot add tenure in terms of its total contribution to the wage. Instead, we have to use the number of persons as the weight to compute the weighted average of job tenure on the wage as its net contribution.

The wage decomposition for all workers is shown in Table 6.[31] In fact, there are two ways of computing the total wage change. The actual wage change is computed simply by taking the difference between the starting wage of the first job and the current wage of the last job, while the computed

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our data set. The low degree of job match is a common phenomenon in almost all similar surveys conducted by the National Youth Commission, Executive Yuan. We believe that the joint entrance examination for colleges and universities may be the fundamental reason why the college graduates may choose jobs that may not match their fields of study (for these fields may not be the fields they are mostly interested in when they go to college, but they have no choice but to choose these fields mainly because of the joint entrance examination). After they graduate from college, they may choose the jobs in which they are interested, but the jobs may not match their fields of study. In fact, this is what happened in our data set and in other similar surveys. Since the average degree of job match is decreasing with each job, the observed return in relation to the degree of job match is decreasing, too.

[30] Addison and Portugal (1989) and Jin and Magrabi (1991) both argue that working experience gained from the previous job has a positive effect on the starting wage of the following job.

[31] Here we include all workers, i.e., both the movers who have changed jobs and the stayers who have never changed jobs. In addition, we use the estimated wage function in Table 2 to calculate the sources of returns for the four types of factors.

Table 6: Decomposition of Wage Dynamics: Movers and Stayers

	Total Returns		Sources of Returns (c)			
	Actual Average Wage Change (NT$) (a)	Computed Average Wage Changes (NT$) (b)	Job Tenure (%)	Accumulated Working Experience (%)	Job Match (%)	Job Switch (%)
Total	6,541.9	6,626.1	65.8	10.6	−3.1	26.7
Male	7,783.6	7,867.2	60.9	10.2	−1.4	30.3
Female	5,696.2	5,827.5	68.9	10.0	−4.7	25.8
College	4,602.9	4,529.5	58.5	13.8	−3.9	31.6
University	8,482.8	8,440.8	70.2	13.7	−3.8	19.9
M. A. & Ph. D.	7,072.8	7,083.5	72.1	10.3	−0.3	17.9

Source: This study.

Notes: (a) The actual average wage change is computed by the weighted average of wage difference of starting wage of the first job and the current wage of the last job.

(b) The computed average wage change is obtained by adding the wage changes from different sources, including job tenure, accumulated working experience, job match, and job switch.

(c) Based on the computed average wage changes.

wage change is calculated by adding up the wage changes from each of the four sources, including job tenure, working experience, job match, and job switch. In fact, the two figures are quite close to each other for the total sample (NT$6,541.9 vs NT$6,626.1) and for different sub-groups.

When comparing the sizes of the sources of return, we find that job tenure has the largest contribution to overall wage changes (65.8%), while job switching accounts for the second largest share (26.7%). The results show that, even for young workers, staying at the same job (and thus accumulating job tenure) is the best way to increase wages. Working experience accounts only for 10.6% of wage changes, while the wage contribution by job match is negative (−3.1%). The contribution to the wage accounted for by job tenure for male workers (60.9%) is smaller than that for female workers (68.9%), while the contribution to the wage resulting from job switching for male workers (30.3%) is larger than that for female workers (25.8%). In

considering different educational levels, Table 6 shows that the job tenure for workers with an M.A. or Ph.D. degree has the largest contribution to the wage changes (72.1%), while the workers from junior colleges rely more on job switching to increase their wages (31.6%).

Some people may argue that one of the reasons why job tenure accounts for such a high proportion of the wage is because there is a large number of people staying at their jobs.[32] To rectify the potential bias from the sample selection, we also decompose the wage changes for those who have changed their jobs (i.e. movers only). The wage decomposition for movers only is shown in Table 7.[33] As we expect, the percentage return from job tenure is much lower (37.2%) than before (65.8%). Now, job switching accounts for the largest proportion of the wage increases (50.4%). It is also significant that, when we consider only the movers, the return from job switching for female workers (58.5%) is higher than for male workers (44.8%). The same situation applies to workers with an M.A. or Ph.D. degree, in that their return from job switching is 46.9%, which is higher than that for workers from junior colleges (42.2%).[34]

Figure 1 provides an example of wage decomposition for persons who have had three jobs. The total starting wage for the first job is divided into four parts, i.e., the return from personal characteristics (NT$6,596.3), the return from basic match (NT$1454.9), the return from unobserved job-specific factors (NT$15,175.1) and the residual (NT$1,685.9). Meanwhile, the wage at the end of the first job is equal to the starting wage plus a wage return (NT$829.5) over the period of job tenure. The starting wage (NT$26,701.9) of the second job is equal to the previous wage

[32] Since the only source of wage change for the stayers is their job tenure, the more stayers there are in the sample, the higher the upward bias of the contribution ratio in relation to job tenure will be.

[33] To calculate the sources of return from the four different types of sources, we have to apply the estimated coefficients in Table 3 since there are movers only.

[34] Owing to the contradictory results of Tables 6 and 7, one may not be sure whether staying or moving is the best strategy for a worker to increase his wage. However, for us, the answer seems quite clear and trivial. From Table 1 of this paper, we find that the workers who have had less than three jobs are those who had a good wage at the beginning of their last jobs, compared to other workers. The implication is that if the worker in question has a wage that is higher than average, then he/she should stay at this job to accumulate his/her job tenure and so increase his/her wage. On the other hand, if his/her wage is lower than his/her average pay at the beginning of a certain job, he/she may consider switching to another job to increase his/her future return. In other words, a simple optimal stopping rule applies well here.

Table 7: Decomposition of Wage Dynamics: Movers only

	Total Returns		Sources of Returns (c)			
	Actual Average Wage Change (NT$) (a)	Computed Average Wage Changes (NT$) (b)	Job Tenure (%)	Accumulated Working Experience (%)	Job Match (%)	Job Switch (%)
Total	6,847.2	6,733.7	37.2	17.4	−5.0	50.4
Male	9,244.3	9,355.0	40.5	16.7	−2.0	44.8
Female	5,417.8	5,330.9	33.2	15.5	−7.2	58.5
College	4,905.2	4,888.2	43.4	19.3	−4.9	42.2
University	8,831.2	8,444.2	43.6	23.9	−6.6	39.1
M. A. & Ph. D.	10,130.8	8,940.7	23.3	25.9	3.9	46.9

Source: This study.

Notes: (a) The actual average wage change is computed using the weighted average of wage difference of starting wage of first job and the current wage of the last job.

(b) The computed average wage change is obtained by adding the wage changes from different sources, including job tenure, accumulated working experience, job match, and job switch.

(c) Based on the computed average wage changes.

(NT$25,745.3) plus the search return, including the return from job switching (NT$798.1), the return from job match (−NT$469.5), and the return from previous working experience (NT$429.2). Again, the wage at the end of the second job period is equal to the starting wage plus the return from job tenure (NT$919.2). The wage change in relation to the third job can be divided in the same way. Finally, we can divide the total wage difference from the start of the first job (NT$24,915.8) to the current wage at the end of the last job (NT$32,630.9) into four portions as follows: the job switch (53.5%), job match (−8.9%), working experience (17.6%), and job tenure (37.9%).

In order to see the division of wage changes more clearly for different types of people, we also calculate the sources of return for each type of person and also for the total sample (Table 8) and for movers only (Table 9). Table 8 shows that, for those who have only one job, the only source of wage change

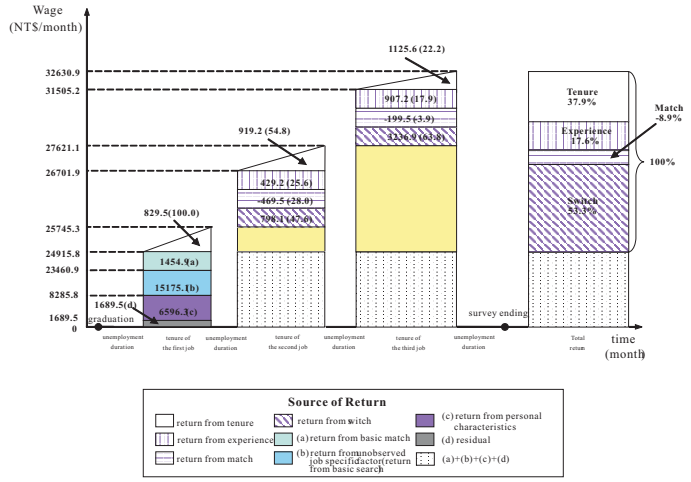

Figure 1: An Exposition of Decomposition of Wage Dynamics: Persons with Three Jobs

is job tenure, which is the reason why the estimated average return from job tenure may be upwardly biased. Moreover, those who have had two jobs have a very high return by job switching (53.2%) from their second job. A similar situation holds for those who have had three jobs, in that they have a very high return by job switching (63.8%) from their third job.[35]

Table 9 shows that, for movers only, the average return from a job switch is much higher than that for the total sample (including both movers and stayers). Moreover, the return from a job switch is even higher from the second job for those who have had two jobs (60.5%) and from the third job for those who have had three jobs (69.2%). However, for those who have had four jobs, their wage return from the job switch for the fourth job only accounts for 41.8%. Therefore, we may conclude that those workers will probably continue to search for new jobs in order to get better pay in the future.

[35] This is one of the reasons why those who have two (three) jobs will stop switching their jobs after having two (three) jobs.

Table 8: Decomposition of Wage Dynamics: Movers and Stayers

Unit: %

	First Job	Second Job	Third Job	Fourth Job	Total
Persons with one job ($n = 510$)					
Tenure	100.0	—	—	—	100.0
Experience	0.0	—	—	—	0.0
Match	0.0	—	—	—	0.0
Switch	0.0	—	—	—	0.0
Total (NT$)	5,750.7	—	—	—	5,750.7
Persons with two jobs ($n = 334$)					
Tenure	100.0	34.7	—	—	49.1
Experience	0.0	15.1	—	—	11.8
Match	0.0	−3.0	—	—	−2.4
Switch	0.0	53.2	—	—	41.5
Total (NT$)	1,746.3	6,203.4	—	—	7,949.7
Persons with three jobs ($n = 191$)					
Tenure	100.0	54.8	22.2	—	37.9
Experience	0.0	25.6	17.9	—	17.6
Match	0.0	−28.0	−3.9	—	−8.8
Switch	0.0	47.6	63.8	—	53.3
Total (NT$)	829.5	1,677.0	5,070.2	—	7,576.6
Persons with four jobs ($n = 142$)					
Tenure	100.0	31.0	68.7	32.4	45.3
Experience	0.0	19.0	74.4	40.9	34.2
Match	0.0	−4.6	−17.3	−7.2	−7.0
Switch	0.0	54.6	−25.8	33.9	27.5
Total (NT$)	625.3	1,733.8	819.1	2,200.2	5,378.5

Source: This study.

Table 9: Decomposition of Wage Dynamics: Movers Only

Unit: %

	First Job	Second Job	Third Job	Fourth Job	Total
Persons with two jobs ($n = 334$)					
Tenure	100.0	27.5	—	—	40.8
Experience	0.0	14.9	—	—	12.2
Match	0.0	−2.9	—	—	−2.4
Switch	0.0	60.5	—	—	49.4
Total (NT$)	1,325.7	5,920.4	—	—	7,246.1
Persons with three jobs ($n = 191$)					
Tenure	100.0	44.3	17.3	—	30.5
Experience	0.0	25.6	17.2	—	17.5
Match	0.0	−27.2	−3.7	—	−8.5
Switch	0.0	57.3	69.2	—	60.5
Total (NT$)	630.8	1,574.7	4,958.1	—	7,163.6
Persons with four jobs ($n = 142$)					
Tenure	100.0	25.7	57.9	25.1	37.4
Experience	0.0	19.9	78.7	39.8	35.4
Match	0.0	−4.6	−17.6	−6.7	−7.0
Switch	0.0	59.0	−19.0	41.8	34.2
Total (NT$)	473.6	1,582.6	739.2	2,154.7	4,950.1

Source: This study.

5 Conclusion

It is commonly seen that young workers from colleges frequently change their jobs due to lack of information concerning the labor market. In order to get better pay, there are two ways in which new workers can increase their wages: one is to stay at a certain job and let the wage increase with each job, and the other is to keep switching jobs until a satisfactory wage is obtained. Although there are some studies that analyze the separate effects of job tenure, working experience, the degree of job match, and job switching

on wages, there has been little research on combining all the above effects. The purpose of this study is to see the combined effect of these four effects.

By applying a panel data set for college graduates in Taiwan, we estimate the wage equation first and check the coefficients for all important determinants. Then, by using the wage function, we divide the contribution from wage changes for each job into four aspects, namely, job tenure, working experience, job match, and job switching. We find that for all workers, job tenure accounts for 65.8% of wage changes, job switching accounts for 26.5%, while working experience accounts for 10.6%. To our surprise, the extent of the job match has a slightly negative impact on the wage change, i.e., −3.1%, which shows that job match has an insignificant impact on wage changes for college graduates in Taiwan. Furthermore, in considering workers who have changed their jobs, it is found that the proportion of wage changes accounted for by job tenure is less important (37.2%), while job switch accounts for the largest contribution (50.4%) to the wage increase. In addition, the proportion of the wage change accounted for by working experience and job match are 17.4% and −5.0%, respectively.

There are numerous issues arising from this study. First, why do some individuals stop searching for a new job? How does the starting wage affect the probability of changing jobs? Second, if working experience affects the wage both when the individual changes jobs and when the job tenure continues, how do we disentangle the wage effect of job tenure and working experience? Finally, why is job match so insignificant in determining the wage change for college graduates in Taiwan? Are there any meaningful policy implications that we can draw from these observations? All of the above questions deserve further study.

Appendix A: Basic Statistics, by Jobs

Table A.1: Basic Statistics: First Job

	Total Graduates	Male	Female	College Graduates	University Graduates	M. A. and Ph.D.
WAGE	30, 204.700 (11, 555.100)	34, 022.900 (12, 494.800)	27, 789.900 (10, 215.200)	25, 028.500 (6, 826.100)	31, 618.000 (11, 864.000)	40, 849.400 (12, 868.800)
MALE	0.387 (0.487)	— —	— —	0.357 (0.480)	0.355 (0.479)	0.568 (0.497)
FEMALE (R)	0.613 (0.488)	— —	— —	0.643 (0.480)	0.645 (0.479)	0.432 (0.497)
COLLEGE (R)	0.424 (0.494)	0.391 (0.488)	0.445 (0.497)	— —	— —	— —
UNIVERSITY	0.426 (0.495)	0.390 (0.488)	0.449 (0.498)	— —	— —	— —
MAPHD	0.150 (0.357)	0.219 (0.414)	0.106 (0.307)	— —	— —	— —
FIRST	0.443 (0.497)	0.274 (0.447)	0.549 (0.498)	0.371 (0.484)	0.542 (0.499)	0.364 (0.482)
SECOND	0.424 (0.494)	0.643 (0.480)	0.286 (0.452)	0.505 (0.501)	0.313 (0.464)	0.511 (0.501)
THIRD (R)	0.133 (0.313)	0.083 (0.252)	0.165 (0.343)	0.124 (0.281)	0.145 (0.338)	0.125 (0.318)
TENURE	13.400 (12.413)	13.900 (13.849)	13.100 (11.412)	12.800 (11.565)	13.700 (11.750)	14.400 (16.036)
TENURESQ	333.900 (812.600)	384.200 (1, 079.200)	302.000 (583.100)	296.600 (660.500)	325.500 (533.200)	463.500 (1, 536.500)
ACUEXP	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)
ACUEXPSQ	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)
MATCH	0.519 (0.500)	0.515 (0.500)	0.522 (0.500)	0.437 (0.497)	0.542 (0.499)	0.688 (0.465)
UNMATCH (R)	0.481 (0.500)	0.485 (0.500)	0.478 (0.500)	0.563 (0.497)	0.458 (0.499)	0.312 (0.465)
$M_{1,1}$	0.433 (0.496)	0.450 (0.498)	0.423 (0.494)	0.327 (0.470)	0.448 (0.498)	0.693 (0.463)
$M_{1,2}$	0.284 (0.451)	0.274 (0.447)	0.290 (0.454)	0.301 (0.459)	0.303 (0.460)	0.182 (0.387)
$M_{1,3}$	0.162 (0.369)	0.155 (0.363)	0.166 (0.373)	0.188 (0.391)	0.161 (0.368)	0.091 (0.288)
$M_{1,4}$	0.121 (0.326)	0.121 (0.326)	0.121 (0.326)	0.184 (0.388)	0.088 (0.283)	0.034 (0.182)
$M_{2,2}$	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)
$M_{2,3}$	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)
$M_{2.4}$	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)
$M_{3.3}$	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)
$M_{3.4}$	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)
$M_{4.4}$	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)
Num. of Obs.	1,177	456	721	499	502	176

Source: This study.
Notes: (1) The figures in the parentheses are standard deviations.
(2) The variables marked by R are the reference groups.

Table A.2: Basic Statistics: Second Job

	Total Graduates	Male	Female	College Graduates	University Graduates	M. A. and Ph.D.
WAGE	30, 177.800 (11, 489.200)	34, 361.900 (13, 895.200)	27, 653.200 (8, 863.000)	25, 872.800 (8, 082.300)	32, 795.300 (12, 020.300)	43, 537.000 (12, 581.800)
MALE	0.376 (0.485)	— —	— —	0.357 (0.480)	0.365 (0.482)	0.556 (0.502)
FEMALE (R)	0.624 (0.485)	— —	— —	0.643 (0.481)	0.635 (0.482)	0.444 (0.502)
COLLEGE (R)	0.504 (0.500)	0.478 (0.501)	0.519 (0.500)	— —	— —	— —
UNIVERSITY	0.415 (0.493)	0.402 (0.491)	0.423 (0.495)	— —	— —	— —
MAPHD	0.081 (0.273)	0.120 (0.325)	0.058 (0.233)	— —	— —	— —
FIRST	0.451 (0.498)	0.286 (0.453)	0.551 (0.498)	0.390 (0.489)	0.538 (0.500)	0.389 (0.492)
SECOND	0.403 (0.491)	0.622 (0.486)	0.272 (0.445)	0.467 (0.500)	0.314 (0.465)	0.463 (0.503)
THIRD (R)	0.145 (0.325)	0.092 (0.271)	0.177 (0.352)	0.143 (0.306)	0.148 (0.345)	0.148 (0.339)
TENURE	10.600 (11.600)	11.600 (11.500)	10.000 (11.600)	9.700 (8.800)	10.800 (12.800)	15.400 (17.700)
TENURESQ	246.800 (1, 004.600)	267.500 (647.300)	234.300 (1, 169.100)	172.300 (291.300)	279.000 (1, 367.700)	545.500 (1, 507.600)
ACUEXP	9.100 (9.169)	9.600 (9.039)	8.900 (9.248)	8.200 (8.288)	9.700 (8.836)	12.300 (14.071)
ACUEXPSQ	167.600 (510.200)	173.200 (362.500)	164.300 (581.900)	135.400 (400.200)	171.900 (348.800)	345.900 (1, 259.500)
MATCH	0.414 (0.493)	0.450 (0.499)	0.392 (0.489)	0.345 (0.476)	0.444 (0.498)	0.685 (0.469)
UNMATCH (R)	0.586 (0.493)	0.550 (0.499)	0.608 (0.489)	0.655 (0.476)	0.556 (0.498)	0.315 (0.469)
$M_{1,1}$	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)
$M_{1,2}$	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)
$M_{1,3}$	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)
$M_{1,4}$	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)
$M_{2,2}$	0.501 (0.500)	0.498 (0.501)	0.502 (0.501)	0.446 (0.498)	0.549 (0.499)	0.593 (0.496)
$M_{2,3}$	0.286 (0.452)	0.283 (0.451)	0.289 (0.454)	0.280 (0.450)	0.292 (0.456)	0.296 (0.461)
$M_{2.4}$	0.213 (0.410)	0.219 (0.415)	0.209 (0.407)	0.274 (0.447)	0.159 (0.366)	0.111 (0.317)
$M_{3.3}$	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)
$M_{3.4}$	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)
$M_{4.4}$	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)
Num. of Obs.	667	251	416	336	277	54

Source: This study.
Notes: (1) The figures in the parentheses are standard deviations.
(2) The variables marked by R are the reference groups.

Table A.3: Basic Statistics: Third Job

	Total Graduates	Male	Female	College Graduates	University Graduates	M. A. and Ph.D.
WAGE	30, 280.200 (11, 834.800)	34, 982.500 (13, 254.000)	27, 417.900 (9, 868.100)	25, 689.800 (6, 873.400)	33, 776.000 (12, 775.600)	49, 227.300 (14, 103.100)
MALE	0.378 (0.486)	— —	— —	0.355 (0.480)	0.392 (0.490)	0.500 (0.512)
FEMALE (R)	0.622 (0.486)	— —	— —	0.645 (0.480)	0.608 (0.490)	0.500 (0.512)
COLLEGE (R)	0.559 (0.497)	0.524 (0.501)	0.580 (0.495)	— —	— —	— —
UNIVERSITY	0.375 (0.485)	0.389 (0.489)	0.367 (0.483)	— —	— —	— —
MAPHD	0.066 (0.249)	0.087 (0.283)	0.053 (0.225)	— —	— —	— —
FIRST	0.454 (0.499)	0.270 (0.446)	0.565 (0.497)	0.419 (0.495)	0.504 (0.502)	0.455 (0.510)
SECOND	0.399 (0.491)	0.658 (0.476)	0.242 (0.429)	0.430 (0.496)	0.336 (0.474)	0.500 (0.512)
THIRD (R)	0.147 (0.329)	0.072 (0.259)	0.193 (0.362)	0.151 (0.324)	0.160 (0.353)	0.045 (0.213)
TENURE	8.600 (7.900)	9.000 (9.000)	8.400 (7.100)	8.000 (6.800)	9.500 (9.200)	9.100 (7.800)
TENURESQ	136.000 (269.700)	161.900 (332.700)	120.200 (222.200)	109.400 (183.300)	174.500 (369.100)	140.900 (183.800)
ACUEXP	15.200 (13.544)	16.400 (13.865)	14.500 (13.326)	14.200 (11.281)	15.200 (12.570)	24.400 (27.349)
ACUEXPSQ	414.600 (1, 119.100)	460.400 (1, 065.900)	386.700 (1, 152.000)	327.700 (683.700)	386.400 (918.700)	1, 309.700 (3, 128.500)
MATCH	0.357 (0.480)	0.365 (0.483)	0.353 (0.479)	0.312 (0.465)	0.416 (0.495)	0.409 (0.503)
UNMATCH (R)	0.643 (0.480)	0.635 (0.483)	0.647 (0.479)	0.688 (0.465)	0.584 (0.495)	0.591 (0.503)
$M_{1,1}$	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)
$M_{1,2}$	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)
$M_{1,3}$	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)
$M_{1,4}$	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)
$M_{2,2}$	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)
$M_{2,3}$	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)
$M_{2.4}$	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)
$M_{3.3}$	0.574 (0.495)	0.564 (0.498)	0.580 (0.495)	0.505 (0.501)	0.648 (0.480)	0.727 (0.456)
$M_{3.4}$	0.426 (0.495)	0.436 (0.498)	0.420 (0.495)	0.495 (0.501)	0.352 (0.480)	0.273 (0.456)
$M_{4.4}$	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)
Num. of Obs.	333	126	207	186	125	22

Source: This study.
Notes: (1) The figures in the parentheses are standard deviations.
(2) The variables marked by R are the reference groups.

Table A.4: Basic Statistics: Fourth Job

	Total Graduates	Male	Female	College Graduates	University Graduates	M. A. and Ph.D.
WAGE	29, 331.000	32, 863.600	27, 097.700	25, 760.900	34, 204.500	48, 333.300
	(10, 131.700)	(10, 752.000)	(9, 093.100)	(6, 851.400)	(11, 255.100)	(8, 612.000)
MALE	0.387	—	—	0.348	0.455	0.500
	(0.489)	—	—	(0.479)	(0.504)	(0.548)
FEMALE (R)	0.613	—	—	0.652	0.545	0.500
	(0.489)	—	—	(0.479)	(0.504)	(0.548)
COLLEGE (R)	0.648	0.582	0.690	—	—	—
	(0.479)	(0.498)	(0.465)	—	—	—
UNIVERSITY	0.310	0.364	0.276	—	—	—
	(0.464)	(0.486)	(0.450)	—	—	—
MAPHD	0.042	0.054	0.034	—	—	—
	(0.202)	(0.229)	(0.184)	—	—	—
FIRST	0.451	0.254	0.575	0.435	0.477	0.500
	(0.499)	(0.440)	(0.497)	(0.498)	(0.505)	(0.548)
SECOND	0.423	0.673	0.264	0.424	0.409	0.500
	(0.496)	(0.474)	(0.444)	(0.497)	(0.497)	(0.548)
THIRD (R)	0.126	0.073	0.161	0.141	0.114	0.000
	(0.309)	(0.262)	(0.334)	(0.313)	(0.321)	(0.000)
TENURE	8.700	9.100	8.500	8.200	9.300	11.600
	(9.257)	(9.914)	(8.869)	(9.172)	(9.661)	(8.107)
TENURESQ	161.200	178.900	150.000	151.000	178.600	188.300
	(340.900)	(374.700)	(319.500)	(340.600)	(359.800)	(216.500)
ACUEXP	21.600	21.200	21.900	19.300	22.300	52.300
	(20.880)	(18.629)	(22.286)	(14.308)	(23.546)	(50.622)
ACUEXPSQ	899.300	788.100	969.600	574.000	1, 037.400	4, 875.000
	(2, 493.200)	(1, 806.800)	(2, 851.100)	(1, 124.100)	(3, 155.500)	(6, 751.600)
MATCH	0.296	0.327	0.276	0.294	0.295	0.333
	(0.458)	(0.474)	(0.450)	(0.458)	(0.462)	(0.516)
UNMATCH (R)	0.704	0.673	0.724	0.706	0.705	0.667
	(0.458)	(0.474)	(0.450)	(0.458)	(0.462)	(0.516)
$M_{1,1}$	0.000	0.000	0.000	0.000	0.000	0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
$M_{1,2}$	0.000	0.000	0.000	0.000	0.000	0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
$M_{1,3}$	0.000	0.000	0.000	0.000	0.000	0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
$M_{1,4}$	0.000	0.000	0.000	0.000	0.000	0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
$M_{2,2}$	0.000	0.000	0.000	0.000	0.000	0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
$M_{2,3}$	0.000	0.000	0.000	0.000	0.000	0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
$M_{2.4}$	0.000	0.000	0.000	0.000	0.000	0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
$M_{3.3}$	0.000	0.000	0.000	0.000	0.000	0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
$M_{3.4}$	0.000	0.000	0.000	0.000	0.000	0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
$M_{4.4}$	1.000	1.000	1.000	1.000	1.000	1.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Num. of Obs.	142	55	87	92	44	6

Source: This study.
Notes: (1) The figures in the parentheses are standard deviations.
(2) The variables marked by R are the reference groups.

Appendix B

Table B.1: Basic statistics (of the first year) for 1177 persons who stayed in the data set in the second year and for 439 persons who left the data set in the second year

	1177 Who Stayed	439 Who Left
Demographics: (%)		
Gender:		
Male	35.68	35.37
Female	64.32	64.63
Education:		
College	46.48	52.82
University	41.66	39.04
MA and PHD	11.86	8.14
Fields:		
Education	0.43	0.00
Art and Humanities	7.35	7.95
Social Sciences	5.86	3.05
Business and Management	31.84	30.46
Natural Science	1.38	1.69
Math and Computer	6.82	5.25
Medical School	11.93	8.97
Engineering and Planning	23.32	29.10
Agriculture	6.82	7.11
Communication and Tourism	4.26	6.43
Wages: (NT$)		
Total	32,210	31,120
Male	36,691	36,670
Female	29,699	28,097
College	26,766	26,294
University	34,597	35,290
MA and PHD	44,690	43,723

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工作轉換、工作期間、與薪資動態: 台灣地區大專畢業生之實証分析

林祖嘉
政大經濟系教授
林家賢
政大經濟研究所碩士

本研究主要目地在利用一組青輔會的大專畢業生縱橫資料 (panel data), 來估算初入勞動市場兩年的大專畢業生薪資變化的情況。我們先建立一個傳統的薪資決定模型, 其中包含工作期間、工作經驗、學用配合程度、及畢業生個人特性等解釋變數。然後, 利用此一薪資函數, 我們可以估計出工作期間、工作經驗、與工作轉換等個別因素對於薪資變化的影響。對於所有已有工作的畢業生而言, 我們發現工作期間對於薪資成長的貢獻高達65.8%, 工作轉換的貢獻爲26.5%, 以前的工作經驗的貢獻爲10.6%。出乎我們意料之外的是, 學用配合程度對於薪資變動的貢獻卻是負的, −3.1%。此外, 如果只考慮曾經轉換工作的畢業生, 工作期間、工作轉換、工作經驗、與學用配合對於薪資變動的貢獻比例, 則分別爲37.2%、50.4%、17.4% 及 −5.0%。

關鍵詞: 工作轉換, 工作期間, 學用配合, 薪資動態
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