Assessing the Effects of Work-Integrated Learning on Academic Performance and Employment outcome
－The statistical analysis based on the KSU students' data－

Matsutaka, Tanaka, and Churton's paper presented in 2009 Wace International Conference in Vancouver analysed how students' awareness about academic studies and future employment prospects change during the university years based on a questionnaire to over 1300 students who took Career education courses. The main finding was that those who are well-focused academically do also have right focus about employment prospect with often successful outcomes. While these results provide us interesting insights into what goes on in students' minds, the study left out more objective facts such as academic performance and the employment outcome.

To complement this, therefore, the Centre of Research and Development for Cooperative Education at Kyoto Sangyo University has gathered the data for all 5473 students who graduated in 2008 and 2009, in which we can trace how each student entered our university, how well he/she performed academically and whether he/she took career education courses, and how he/she managed the job hunting. Furthermore, this data set covers all students – those with career education and those without, so that one can identify the effectiveness of such programmes.

The main aim of this paper is to analyse the effectiveness of career education courses in relation to more academically oriented courses in achieving successful employment outcomes, and to suggest other academics and practitioners one way to assess the career education programmes.

Based on this huge and detailed set of data on individual students, we apply a regression analysis to analyse the determining factors of academic performance and employment outcome and the effectiveness of the career education programmes in particular.

Table I

Equation	1		2		3		4		5		6		7		8	
Dependent Variable: Full-time employment									Dependent Variable: Listed Company							
	Coefficient	t-value	Coefficient	t-value	Coefficient	t-value	Coefficient	t-value	Coefficient	t-value	Coefficient	t-value	Coefficient	t-value	Coefficient	t-value
Constant	0.716	19.512	0.736	20.040	0.714	19.303	0.704	19.112	0.169	3.800	0.185	4.177	0.178	3.974	0.171	3.825
E	-0.037	-1.199	-0.030	-0.977	-0.033	-1.072	-0.038	-1.228	-0.010	-0.280	-0.005	-0.121	-0.005	-0.129	-0.008	-0.213
B	-0.042	-1.353	-0.029	-0.940	-0.031	-0.996	-0.043	-1.397	0.014	0.362	0.025	0.665	0.027	0.716	0.019	0.494
J	-0.126	-4.021	-0.123	-3.908	-0.120	-3.808	-0.125	-3.991	-0.053	-1.397	-0.050	-1.316	-0.047	-1.247	-0.051	-1.341
L	-0.103	-3.100	-0.087	-2.604	-0.091	-2.733	-0.100	-3.015	-0.119	-2.958	-0.105	-2.604	-0.105	-2.599	-0.111	-2.752
C	-0.072	-2.053	-0.077	-2.191	-0.068	-1.933	-0.076	-2.164	-0.076	-1.796	-0.080	-1.887	-0.074	-1.749	-0.080	-1.875
S	-0.101	-2.621	-0.110	-2.843	-0.099	-2.566	-0.098	-2.537	-0.026	-0.562	-0.034	-0.721	-0.029	-0.625	-0.028	-0.602
Sex	0.010	0.735	0.006	0.423	0.001	0.051	0.010	0.746	0.023	1.428	0.019	1.186	0.015	0.921	0.021	1.306
GPA1	0.031	2.992	0.033	3.149	0.035	3.370	0.029	2.839	0.020	1.627	0.022	1.756	0.024	1.939	0.020	1.634
GPA3	0.044	4.317	0.042	4.061	0.046	4.529	0.042	4.091	0.038	3.051	0.036	2.887	0.039	3.147	0.036	2.893
Career	0.033	6.758							0.029	4.812						
WIL			0.078	4.730			0.121	6.908			0.062	3.153			0.082	3.863
Induction					0.050	4.484	0.080	6.741					0.016	1.174	0.036	2.520
Adjusted R^2	0.037		0.032		0.032		0.041		0.019		0.016		0.015		0.017	
F-value	18.970		16.569		16.335		19.336		10.131		8.787		7.917		8.575	

Table II

Equation	9		10		11		12		13		14		15		16	
Dependent Variable: Full-time employment									Dependent Variable: Listed Company							
	Coefficient	t-value	Coefficient	t-value	Coefficient	t-value	Coefficient	t-value	Coefficient	t-value	Coefficient	t-value	Coefficient	t-value	Coefficient	t-value
Constant	0.644	35.809	0.664	37.014	0.635	34.269	0.630	34.156	0.154	7.077	0.169	7.812	0.158	7.042	0.155	6.915
Year2009	0.000	3.185	0.000	3.334	0.000	3.279	0.000	3.125	0.000	4.497	0.000	4.596	0.000	4.600	0.000	4.517
GPA1	0.036	3.548	0.038	3.770	0.040	3.973	0.034	3.386	0.023	1.843	0.024	1.998	0.026	2.167	0.023	1.855
GPA3	0.038	3.789	0.036	3.608	0.042	4.201	0.036	3.571	0.025	2.059	0.024	1.959	0.028	2.274	0.024	1.940
Career	0.033	6.780							0.025	4.369						
WIL			0.074	4.511			0.118	6.784			0.055	2.793			0.074	3.510
Induction					0.055	4.979	0.083	7.105					0.018	1.338	0.036	2.511
Adjusted R^2	0.030		0.024		0.025		0.035		0.014		0.011		0.010		0.012	
F-value	36.793		30.251		31.385		34.554		17.235		14.385		12.865		12.782	

Table III

Equation	16		17		18		19		20	
Dependent Variable: GPA3										
	Coefficient	t-value	Coefficient	t-value	Coefficient	t-value	Coefficient	t-value	Coefficient	t-value
Constant	0.734	31.333	0.724	30.526	0.737	31.605	0.747	30.648	0.734	30.118
GPA1	0.608	52.108	0.604	51.279	0.595	50.559	0.609	52.147	0.595	50.366
Career			0.019	2.728						
WIL					0.156	6.604			0.160	6.313
Induction							-0.032	-1.973	0.007	0.422
Adjusted R^2	0.367		0.368		0.372		0.367		0.372	
F-value	2715.210		1363.190		1391.754		1360.390		927.733	

(Note)
Sample size: 4688
Shaded: Significant at 95%

1 Introduction

The concept of Work-integrated Learning (better known as Career Education in Japan) started drawing attention of educators and industrialists approximately 10 years ago, when the Ministry of Education introduced it in the Report of Central Educational Council in 1999. Although being somewhat behind the rest of the industrial nations, its popularity grew steadily helped by two factors. One was the lack of financial resources to train employees by employers as a result of the long economic downturn after the collapse of bubble economy. And the other was the lowering ability standard of university graduates partly as a result of rising enrolment rates. It is probably safe to say that after the 10 years the concept is becoming an integral part of higher education as well as of workplace in Japan. And yet there is no hard fact to verify the effectiveness of the programmes.

At KSU we have started to gather individual data on each student since 2009, in which a student's attributes such as the pre-entry background, the academic performance during the university career, as well as the employment outcome after graduation are collected. These data if properly used can help construct an academic programme at KSU that responds to the need of Japanese society today.

The present paper makes use of some of the data in order to specifically verify the effectiveness of career education programme at KSU.

2 The career education programme at KSU

Since 1999, KSU has been offering to its students a range of career education courses based on domestic internships. But the significant step was taken when the government approved and funded our new project in 2004 and the Center of Research and development for Career Education was set up. Since then, the programme expanded and as of 2009 there are 20 courses, Of the 20 courses, 11 are WIL, in which students do have direct contact with industries, while 9 are inductive courses to nurture students towards working life.

3 Basic data

The data has been collected from all undergraduate students who graduated in 2008 and 2009, in which there were 2739 and 2734 respectively, and of which 3781 were male and 1692 were female over 7 faculties i.e. Economics, Business, Law, Foreign Languages, Culture, Science, and Engineering. Of the original panel data of each student, we use annual GPAs, whether or not he/she has taken career education courses, and the employment outcome. Their basic statistics and descriptions are briefly explained below.

(i) Annual GPAs over 4 years: The average annual GPAs for the 4 years are 1.90, 1.74, 1.90, and 1.53. The 1st year's GPA may be used to represent the student's academic ability before coming to university. This is because we can not trace detailed data on students' pre-university academic

performance. We assume that the 1st year GPA depends heavily on the pre-university achievement. And the 3rd year's GPA is used to identify the academic progress during the undergraduate years. The 3rd instead of the 4th year is used, due to a rather peculiar Japanese situation where many students manage to attain the necessary units to graduate by the end of 3rd year to spend almost an entire 4th year for job hunt.

(ii) Career education: the total number of registrations for these courses is 5132, with 1190 in WIL courses and 3942 in inductive courses. In terms of student number, 1789 took one career education course and 1275 took two or more, while 2409 took none.

(iii) Employment outcome: We look at this from four different angles. First, the students were asked whether they obtained full-time employment, part-time employment or are unemployed. Out of 5473 students, 4432 were in full-time employment, 462 were in part-time employment, 170 went to graduate school, and 409 others. Second, the companies were categorized as listed and unlisted. And 1423 students went to listed companies, while 2778 went to unlisted ones. We could not specify 1272 cases. Thirdly, by the capital stock size 1359 out of 4432 students went to extra large companies. And finally, by the number of employees, 2274 out of 4432 students went to extra large companies. Although it has no direct significance to our analysis, the main items in the breakdown of 4432 students' placements by industry are; finance and insurance 949, wholesale and retail 922, Manufacturing 782, Information 359, Services 339. Although these figures solely refer to the

students at KSU, it is not very far away from the general outlook of the Japanese students as a whole.

4 Hypotheses

The main theme of this paper is to determine the effects of career education on students' academic performance during undergraduate years as well as on their employment outcome after graduation. However, various factors contribute to one's outcome, whether it is academic or occupational. One way to systematically tackle this is to make use of the concepts of Human Capital Investment and Screening from Labour Economics literature. Human capital is a concept to explain one's decision whether or not to receive costly education in the expectation that it will pay off in future, just as in monetary investment. Some argue, however, that education is a credential rather than capital forming, and introduced it as Screening or Signalling. The fundamental assumption is that people are heterogeneous in productivity and we do not have perfect information about the difference among them, so that a job seeker needs an educational credential to "signal" his/her productive ability, or equivalently a recruiting firm needs to "screen" the applicant's productive ability. There is a large volume of research theoretical as well as empirical in Labour Economics. For example, see Becker (1964) for the original work on the concept of human capital and Spence (1973) for an intuitive and clear introduction of the concept of Signalling. Empirically, however, it is difficult to differentiate

the human capital effect and signalling effect of education, since the both raises one's employment outcome, i.e. one gets a good job based on receiving education because he/she became productive through human capital formation and/or because the prospective employer recognized his/her innate productivity. As for the practitioners, despite the popularity in Labour Economics, such concepts were not explicitly discussed in the WIL literature except for rare attempts such as Tanaka (2009).

We therefore construct 4 hypotheses based on the concepts of Human Capital and Signalling as follows;

Hypothesis 1: "Career education helps to obtain a good job."

Career education helps to obtain a good job, through forming practical human capital skills or signalling the prospective employer his/her innate practical skills.

Hypothesis 2: "Career education raises academic performance."

Career education helps to obtain high academic performance irrespective of the pre-university performance.

Hypothesis 3: "good students do well at university."

If this holds, higher education acts a signal rather than human capital

5 Variables

For estimation, we used following variables.

A. Dependent variables

(i) Employment outcome; measured by a binary choice variable in terms of a job status with 1 if full-time and 0 if otherwise, or a company status with 1 if the company is listed and 0 if otherwise.

(ii) Academic performance; measured by average GPA in the third year instead of the fourth and final year. This is because many students obtain the required number of units for graduation by the end of the third year, so that they can concentrate on job hunting in the final year.

B. Independent variables

(i) Faculty: a dummy variable for each faculty except for Engineering Faculty

One would naturally expect employment outcome to differ among students of different faculties due to the supply and demand interaction for labour markets with the special skills, although it is not easy to predict which faculty does better, i.e. the signs of the coefficients.

(ii) Sex: a dummy variable with 1 if male and 0 if female

Despite the Japan’s official declaration of equal opportunity for male and female in employment since 1985 and with several amendments, female graduates still face employment discrimination in a

form of what is known as ‘statistical discrimination’ in the Labour Economics literature. This is based on two idiosyncratic aspects of female labour force in Japan. First, many female employees quit the job for marriage, expecting a baby or nurturing a small child, and come back to labour market afterwards, which generates Japan’s peculiar “M-shaped” labour participation curve only shared by few countries such as Korea. Second, this induces employers to give the priority to male applicants especially if OJT is offered at large extent, since the female’s discontinuity at work could greatly reduce the effectiveness of OJT. So we would expect it to be positively significant.

(iii) Year of graduation: a dummy variable with 1 if 2009 and 0 if 2008

Employment prospects and outcomes are heavily influenced by the economic fluctuations. Particularly, one should be careful about the effect of the recent US subprime problem.

(iv) Academic performance at the first year and the third year with GPA1 and GPA3 respectively appears as dependent variables. The former may have effect on students outcomes such as the academic performance at KSU i.e. GPA3 and the employment outcome such as Full-time/Part-time and Listed/Unlisted. The latter also may affect the employment outcome.

(v) Career education

This is the main theme of this research and we look at this from three angles because of the way we organize Career Education programme at KSU. First, we see if the number of courses matter. We expect that the more courses a student takes the better they perform academically and at job hunt.

Second, we single out WIL courses to see if taking any WIL course is effective. And thirdly, the effect of Induction courses are examined again using a dummy variable. As we deal with Career education programmes, we hope the coefficient to be positive and significant.

6. Estimation and the results

Out of the total of 5473 students, we left out those who spent some year out and those who went to work in public sectors to end up with the sample of 4688 students. Linear Probability Models were estimated by using OLS, with the employment or academic performance as the dependent variable and the students attributes such as faculty and sex as well as the earlier academic performance and career education registration as independent variables, as explained above.

The results appear in Table I, II, and III. Table I shows the estimation results with variations in dependent variable i.e. Equations 1 to 4 with the employment status and Equations 5 to 8 with the company status. Also the variations in independent variables appear in Career education section i.e. Number of Career education courses, WIL, or Induction courses. Several observations are worth noting. First, Adjusted R ^2 are generally rather low, suggesting there are many other factors determining the employment outcome. Yet the F-values in all equations indicate that they are important factors. As for each variable, Faculty variables i.e. E, B, J, L, C, S are significant in some but not in others for Equations 1 to 4 but generally insignificant for Equations 5 to 8. Dummy

variable for sex is insignificant in all 8 equations, which is surprising considering the earlier argument of statistical discrimination. The academic performance is generally significant but more so for GPA 3 i.e. what the student achieves at university, than GPA 1 i.e. what the student achieved before university. Finally, Career education programmes seem to play important roles in raising academic performance and employment outcome.

Table II replaces Faculty variables and Sex variables by Year of graduation variable. This latter variable shows a significant effect on the dependent variables, with 2009 being the better year than 2008. The results for GPA's and Career education variables are similar to those of Table I.

Table III shows the estimation results of regression GPA 3 on GPA 1 and Career education. The adjusted R^2's and F-values are much higher in the 5 equations than in Table I and II, and seem to support the idea that the academic performance at university is determined by pre-university performance and by taking Career education courses. It is worth noting, however, that the coefficient for Induction courses is negative and significant, suggesting that those who take these courses still do not perform well academically.

7 Conclusion

Let us conclude the paper by using the empirical results to verity the three hypotheses.

Hypothesis 1: “Career education helps to obtain a good job.”

Career education by a number of courses taken and WIL were giving positive and significant effects on employment outcome, which was observed in most of the equations of Tables I and II. However, the effect of Induction courses was not clear. As mentioned earlier it is not possible to conclude here that Career education acts as human capital forming or signalling. But either way it helps.

Hypothesis 2: “Career education raises academic performance.”

The equations in Table III support this hypothesis except for Induction courses. This result is consistent with Matsutaka, Tanaka, and Churton (2009)’ finding that academically focused students do well in job hunting. Therefore, Career education courses and more academic courses are not conflicting or substitutes but compatible and complementary.

Hypothesis 3: “good students do well at university.”

Table III’s results support this view. Ideally, we would like education to offer equal opportunity to invest in human capital, so that GPA 1’s coefficient not to be significant --- a positively significant GPA 1 would imply the hypothesis 3. It seems it is, i.e. there is not a full but substantial element of signalling in education.

So are we doing the right thing with WIL? The answer seems to be yes with a little suspicion that we are gathering already able students to simply give them signature of approval.

In concluding the paper, it is important to mention that the data used for this estimation is of KSU students only, which may have certain selection bias. It would be advisable not to take the results for granted but to apply the same approach to your own data. As for our research, we are planning to merge these objective data with more subjective data such as those in Matsutaka, Tanaka, and Churton (2009) for future investigation.

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