Summary

EXPLORING THE RELATIONSHIP BETWEEN CERTIFICATIONS AND WAGES AMONG UNIVERSITY GRADUATE STUDENTS: A PROPENSITY SCORE-MATCHED ANALYSIS

INTRODUCTION

With the increasing popularity of higher education, it is difficult for employers to promptly identify qualified candidates by their educational backgrounds only.　Thus, certifications have become an objective measurement of a candidate's ability.　Extant studies have explored the influence of certifications on wages by using the regression analysis method. However, these studies have the following limitations: (1) The studies do not accurately estimate the influence of certifications on wages.　For example, the certifications acquired are not randomly selected; thus, it would contradict the assumption of linear regression, which results in estimated bias by using the regression model.　(2) These studies understand that there is a significant positive relationship between certifications and wages but cannot precisely compute the average effect on wages for individuals with or without certifications.　(3) Individual baseline differences may exist between people with and without certifications and consequently cause self-selection bias.

Therefore, more precise methods are needed to evaluate the effect of certifications on obtaining higher wage levels.　By measuring a sample with or without certifications, other variables should be equal or similar to each other, in order to reduce or avoid selection bias for the samples.　Thus, the present study applied Propensity Score Matching (PSM) to estimate the Average Treatment Effect on the Treated (ATT), and analyzed the effects of obtaining certifications on wages for Taiwanese university graduates. Specifically, we seek to address the following research questions: (1) Do certifications have a positive influence on wages? (2) Does the number of certifications have a cumulative effect on wages?

METHOD

The relevant data were collected from the 2004 Taiwan Higher Education Database with an effective sample size of 4,979 participants and they graduated from university in 2002.

The following data analysis procedures were used in this study: (1) logit model analysis to compute the propensity score, (2) five matching methods to compute the ATT, (3) the *t*-test and standardized bias to assess the quality of the matching, and (4) the sensitivity test. We examined five matching algorithms: Gaussian kernel matching, Epanechnikov kernel matching, local linear with Epanechnikov kernel matching, five nearest neighbor with caliper 0.001, and radius matching with caliper 0.001.

RESULTS

Table 1 shows the estimated results for the five matching methods. Within the comparison between those with or without certifications and the number of certifications, certifications have a small impact on average wages, around NT$0–714. Within the comparison of effect for those with one and two certifications on wages, the difference is only around NT$0–157; however, comparison between people without certifications and people with one or two certifications, the difference is around NT$438 (NT$714 minus NT$276); as a result, the number of certifications has a small accumulative effect on wages.

The kernel matching results showed the maximum ATT of certifications on wages in the group of people with two certifications and those without any certifications. In terms of work characteristics, people with two certifications probably have more multi-directed professionalism and acquire more professional computer skills; however, certifications have less of a cumulative effect on wages. Thus, these results showed that after controlling the difference in the effects of individual baselines on wages, certifications have only a small impact on wages.

Table 1

Estimate results of the five matching methods

Matching method	One vs. no certification (*N* = 4416)		Two vs. no certification (*N* = 2490)		Two vs. one certification (*N* = 3052)	
	ATT	SE	ATT	SE	ATT	SE
Kernel with Gaussian kernel	−216.66	315.99	129.15*	519.52	−106.96	481.96
Kernel with Epanechnikov kernel	−74.52*	324.80	397.30*	547.42	12.00	496.23
5 nearest neighbors with caliper .001	−276.37	354.18	714.45	627.09	−157.21	555.51
Radius matching with caliper .001	−248.91	350.08	609.17	635.96	−118.01	543.38
Local linear with Epanechnikov kernel	32.46*	335.09	411.45	527.93	−19.69	490.76

Note. Bootstrap with 100 replications was used to estimate standard errors for the propensity score matching; *$p < .05$; ATT: Average treatment effect on the treated; SE: Standard errors.

CONCLUSION AND SUGGESTIONS

1. Conclusion

(1) Influence of Certifications on Wages

For university graduates with and without certifications, a difference existed in the individual wage baseline; however, after controlling for the difference in the effects of individual baselines on wages and then performing matching by comparing individuals with certifications and those without certifications, the maximum effect was on wages for people with two certifications.

(2) Cumulative Effects of the Number of Certifications on Wages

The results showed that whether people had one or two certifications, the difference between their wages is small. Thus, the number of certificates also has a small accumulative effect on wages.

2. Suggestions

(1) Practical Suggestion

1. This study suggested that schools should focus on the industry requirements for the actual work market, understand the current

supply and demand for certifications and employment power, and thus provide students with references to select and take exams for certifications to improve their practical effect.

2. When selecting and taking exams for certifications, university students should consider the professionalism and rarity of the certification rather than pursue numerous certifications without considering quality to improve the practical influence on certifications.

(2) Suggestions for Future Research

1. Future research could match the qualitative research method to interview employers, and use their requirements to analyze the effect of certifications on wages.

2. Future research could perform group comparisons between general universities and technical universities.

Future research could explore the effect of certification quality and classification on wages in depth.