KJEP 9:2 (2012), pp. 383-396

Estimating the university prestige effect in South Korea's labor market

Dongsook Han
Seoul National University, Korea

Kwangbin Bae
University of Texas, Dallas, U.S.A

Hosung Sohn
University of California, Berkeley, U.S.A

Abstract

This study investigates whether there exists a "University Prestige" effect in South Korea's labor market by using the Korean Labor and Income Panel Data. To estimate the degree of this effect, this study employed the unique empirical strategy, the residual analysis. The findings indicate that a university prestige effect exists on earnings, with the wage premium for the "name" of Seoul National University worth more than twice those of Korea and Yonsei Universities. The prestige effect for Seoul National University results in wages that are, on average, 12% higher than that of other universities.

Keywords: university quality, university prestige effect, wage differentials, residual analysis, labor market

© Korean Educational Development Institute 2012, Electronic version: http://eng.kedi.re.kr

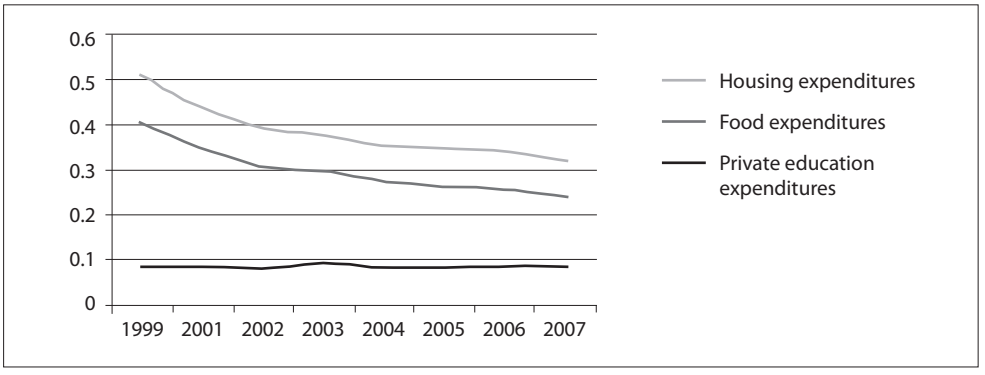
Introduction

Feeling social pressure for their children to enter the best universities for their higher education, parents in South Korea have been feverishly searching for educational advantages for their children. As a result, Korea is ranked first among OECD countries in terms of private educational expenditures as a percent of GDP (3.4%).

The current high expenditure levels in private secondary tutoring are considered a serious social problem. For example, "A Research on the Actual Condition of Wage Earners' Plan for One's Life after Retirement," a recent survey conducted by the Korea Chamber of Commerce and Industry found that 449 of 1,000 respondents were not adequately saving for retirement because they were spending their income on their children's education instead. Moreover, Korea's household loans are increasing, with the cause being private education expenditures (Harden, 2009).

Such over-investment in secondary school tutoring, in general, can be ascribed to parents' belief that the university prestige effect is extremely high in South Korea's labor market. Below shows some of the descriptive statistics, obtained from the Korean Labor and Income Panel (KLIP) data, which illustrate parents' inordinate investment as to children's private education expenditures.

Figure 1 shows the ratio of top three average monthly expenditures to total average monthly expenditures; private education expenditures, food expenditures, and housing expenditures. An interesting part of Figure 1 is that although the ratios of housing and food expenditures are decreasing, the ratio of private education expenditures stays at the same level.

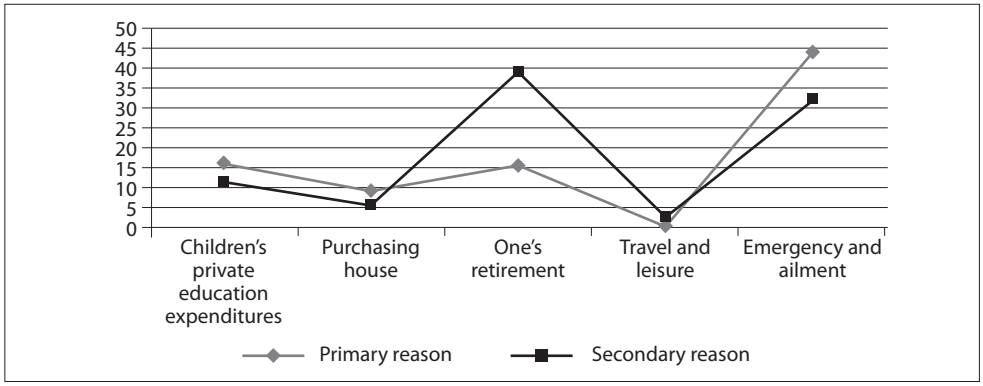


Note. From "Korean labor and income panel data," by Korea Labor Institute, 1998-2007.

Figure 1. Top three monthly expenditures as a proportion of total expenditures (1999-2007)

This implies that households do not decrease their investments in private education expenditures among their total expenditures. Respondents' primary and secondary reasons for saving are also shown in Figure 2. Using the full sample of

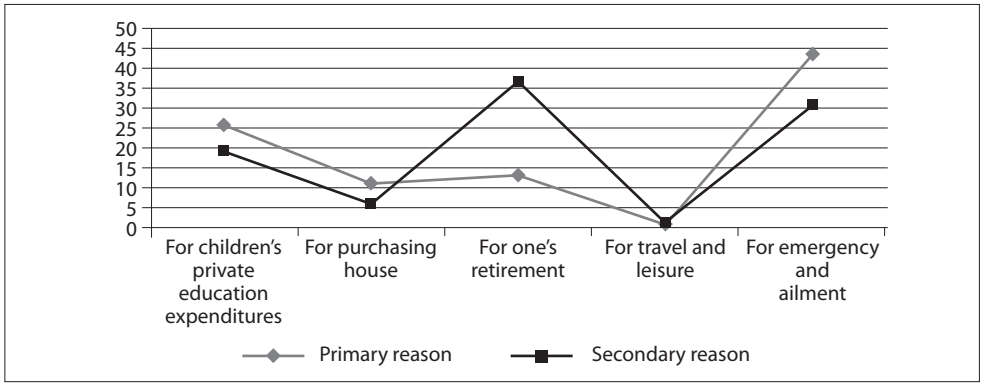
KLIP, 16.49 percentage of respondents indicated that their primary reason for saving is to prepare for their children's private education expenditures, and this portion accounts for the second highest.



Note. YR 2001 ~ YR 2007. From "Korean labor and income panel data," by Korea Labor Institute, 1998-2007.

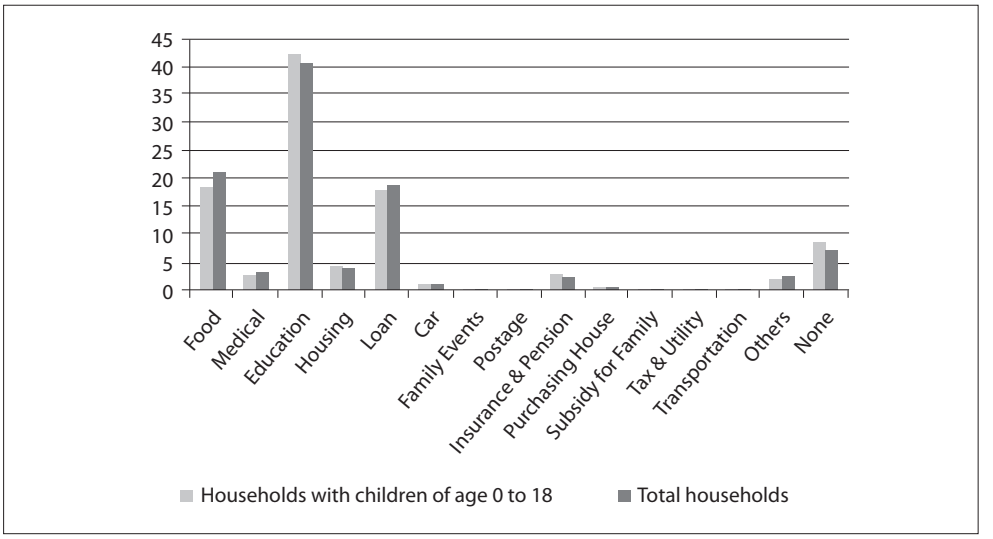
Figure 2. Reasons for saving, all respondents

On the other hand, as can be seen from Figure 3, if we restrict our samples to households who have children of age 0 to 18, the ratio increases to 25.37 percentage. Again, it is the second highest reason for saving. Figure 4 shows the ratio of households who reported various burdens on their households. For example, using a sample of households with children of age 0 to 18, more than 40 percentage answered that educational expenses are huge burden on their households. The portion is the highest of all possible categories. A similar result holds for total samples. Approximately 40 percentage responded that educational expenditures are burden on their households. Again, the ratio is highest among other burdens.



Note. From "Korean labor and income panel data," by Korea Labor Institute, 1998-2007.

Figure 3. Reasons for saving, having children of age 0 to 18



Note. From "Korean labor and income panel data," by Korea Labor Institute, 1998-2007.

Figure 4. Burdens on households, 1998~2007

All in all, above Figures imply that private education expenditures, especially with respect to their children, are serious problems in Korea. Reason for Korean parents' high level of investment in private education expenditures lies in a firm belief that returns to being a graduate of highly ranked university in Korea is significantly large. To put it differently, parents in South Korea believe that there exist huge wage differentials between the graduates of top-ranked universities and other universities regardless of one's labor productivity.

Hence in this paper, we use 1998 KLIP data to investigate whether there is substance to parent's belief in the effect of university prestige on wages. In particular, we estimate the wage differentials that are created solely by the prestige of one's alma mater.

Review of previous literatures

Empirical studies that seek to uncover an impact of college rankings on post-graduation earnings must address one fundamental identification problem: students admitted to higher-ranked universities are likely to be more academically-inclined students, and therefore may be more likely to earn higher salaries on the basis of their knowledge and skills. To the extent that such traits are valued in the labor market, failing to control for such heterogeneity (that will vary within groups defined by educational attainment) will lead to biased inferences. This problem continues to be

addressed in the literature.

Loury and German (1995) used the National Longitudinal Study (NLS) and contended that college performance and selectivity have considerable effects on earnings. Working with the same dataset, Long (2010) concluded that the effect of college quality on earnings increased over time.

Using various measures of school quality, Bedi and Edwards (2002) estimated the strong positive effects of school quality on the earnings of male students in Honduras. They found that school quality, measured in several different ways, significantly boosts wages. Likewise, using the data from U.K., Dearden, Ferri and Meghir (2002) used a pupil to teacher ratio and the type of university to measure the quality of university. They then tested whether the quality affected graduates' earnings and found that a premium exists for female but not for male graduates.

Note that the aforementioned studies focus on estimating the effect of college selectivity or quality on earnings. The aim of this study, however, is to extract the wage premium that has been solely induced by the prestige of a university, not its quality. Hence, controlling for the ability of individuals is essential in extracting the prestige effect.

We now turn to studies that have investigated this kind of wage premium. First, Black and Smith (2004) estimated the effects of college quality using propensity score matching methods and the National Longitudinal Survey of Youth 1979 cohort. When employing propensity score matching methods, they controlled for students of different abilities by using age-adjusted ASVAB (Armed Services Vocational Aptitude Battery) scores, which is measured by the first principal component of the 10 tests. They conclude that the estimates from their matching estimators differed substantially from the corresponding ordinary least squares (OLS) estimates. For men, the OLS estimates indicate a 13-17% increase in wages as the effect of moving from a college in the first quartile of the quality distribution to one in the fourth. In contrast, while the estimates are still close to the OLS estimates, the matching estimates range from 0.120 to 0.139, suggesting modestly smaller impacts. The estimates tell a similar story for women. The OLS estimates indicate a wage effect of 12-17% associated with attending a high-quality college. The full sample matching estimates range from 0.067 to 0.078. Hence, compare to the case where one's ability was not controlled, effects of the quality of college on labor market performance were smaller when one's ability has been controlled.

Behrman, Rosenzweig and Taubman (1996) assessed the impact of college quality on women's earnings using data from a survey of identical and non-identical twins born in Minnesota. Even controlling for ability by studying monozygotic twins, they found that some dimensions of college quality (including faculty salaries, the granting of Ph.D. degrees, and smaller sizes) have important positive effects on wages.

Brewer, Eide and Ehrenberg (1999) explicitly modeled high school students' choice of college type, based on individual and family characteristics (including ability and parental economic status), and estimated selection-corrected outcomes of attending an elite college. Even after controlling for selection effects, they found that a

large premium exists for attending an elite private institution and a smaller premium exists for a middle-rated private institution compared to a low-rated public college. They also found some evidence to suggest that this premium has increased over time.

Monks (2000) examined the economic benefit provided by college quality when controlling for individual ability measures and labor market experiences, including Armed Forces Qualifications Test (AFQT) scores, which he used as a measure of academic ability and preparation. He found that graduates from highly or the most selective colleges and universities earn significantly more than graduates from less selective institutions.

Using the College and Beyond data set and the National Longitudinal Survey of the High School Class of 1972, Dale and Krueger (2002) found that students who attended more selective colleges earned about the same as students of seemingly comparable ability who attended less selective schools. They tried to eliminate bias by matching students who applied to, and were accepted by, similar colleges. Therefore, they argued that graduating from a highly ranked university is insignificant for labor market performance.

In summary, scholars continue to debate whether an elite college effect exists. The results of the elite college effect in the literature vary depending on how researchers controlled for ability and which data sets they used. Therefore more research is needed in this area; a meta-analysis would be particularly beneficial in determining the existence of elite college effect, once enough studies are conducted to make this approach possible. Our study was intended to address the paucity of studies examining prestige, compared to quality.

Data & estimation methods

Data

In order to estimate the college prestige effect on wage earnings, this paper used KLIP data for year 1998. Table 1 lists variables used in analyzing wage differentials.

One thing to note from Table 1 is that we used an average college exam scores necessary for entering the university to account for the quality of universities. Furthermore, to provide a weight in estimating the effect, we created an indicator variable for all the universities, and used this variable as a weight in the weighted regression method.[1)]

To estimate the effect of university prestige properly, and to keep the homogeneity of the sample, we restricted our sample to college graduates with a bachelor's degree only. Finally, to focus only on wage earners, we also excluded self-employed people.

Table 1. Summary of variables

Variables	Definitions
Dependent variable	
hourly wage	Average hourly wage. In the model, a natural logarithm of the variable has been used.
Independent variables	
Sex	Male/female.
Age	Age of respondent.
Age squared	Square of age.
Work experience	Years of work experience.
Labor union Affiliation	Whether the respondent is affiliated in the labor union or not. 1 for those who are affiliated in the labor union, and 0 for those with no labor union affiliation.
Married	Whether the respondent is married or not. 1 for those who are married and 0 for the other.
Job status	1 for permanent jobs, and 0 for temporary jobs.
Firm size	Size of a firm in which the respondent is working for. 1 for firm size greater than 500, and 0 for firm size less or equal to 500.
College	A name of a college for each respondent (the unique identification code has been assigned for each college)
College exam score	Average expected exam scores required to enter the college.

Empirical strategy

In order to estimate the college prestige effect on wage earnings, following series of steps have been conducted in the estimation procedures;

Step 1: $$Y_i = \alpha + \beta_i X_i + \varepsilon_i \quad (1)$$

where Y_i corresponds to the log of hourly wage for respondent i, X_i is a vector for explanatory variables (Table 1), and ε_i is an error term. Equation (1) controls for the variables that determine wages. After netting out the effect of explanatory variables, we obtain the values for the residual for each observation, or the unexplained variations of wage, which we argue is the university prestige effect. After running the above regression, we save the predicted value of residuals, and use this as our second dependent variable for Equation (2):

Step 2: $$\hat{\varepsilon}_w = \gamma + \zeta_i Z_i + \delta_i \quad (2)$$

where the weighted regression uses the college indicator variable as a weight. In equation (2), Z_i is the required score on national entrance examinations for admission, and δ_i is the error term. This second step controls for university quality, which,

we contend, may control for the respondents' skills and knowledge acquired as an undergraduate. From Step 2, we obtain $\hat{\varepsilon}_w$, which is the predicted value of an error term ε_i in equation (1) by using the college ID as a weight.

Finally, after running the Step 2, we take the predicted value of δ_i

Step 3: $\hat{\delta}_i$ (3)

Hence, we interpret $\hat{\delta}_i$ in Equation (3), a predicted value of δ_i in Equation (2), as the university prestige effect on earnings.

Results

Based on wide public perception of university quality, we ranked universities as follows: (i) Seoul National University, (ii) Korea University & Yonsei University, (iii) Hanyang University, Sogang University, Ewha University, Sungkyunkwan University, (iv) Major public university outside of Seoul, (v) Other universities in Seoul. Although there is an annual university ranking reported by a national newspaper, it is generally not well trusted or in line with popular opinion. Additionally, since the ranking varies each year, our result will differ annually. Thus, we had used our social and professional knowledge to classify universities according to popular perception.

Following tables are the estimates for the predicted values of the residuals;

Table 2 shows an estimate for the residual, which we name it as an unadjusted mean of predicted residuals. The residual corresponds to the one in Equation (1). Before adjusting for the average college entrance exam scores, there exist large wage differentials between university categories. To be more concrete, the mean for Seoul National University is greatest among five categories. Compare to major public universities and other universities located at Seoul, the mean for Seoul National University is more than five times higher than that of the former category. To give an example, it is estimated that the university effect for Seoul National University is 27.36 percentage points whereas for Korea and Yonsei University, the estimate is 19.39 percentage points. Furthermore, the unadjusted means for major public university not located at Seoul is only 5.5 percentage points which is approximately 22 and 14 percentage points lower than that of above three universities.

An interesting result is that the minimum and maximum numbers are homogeneous across universities. Moreover, variances within the category are also similar. Standard deviations are around 0.35, except for Seoul National University, which is 0.58. Seoul National University may have greater variance in wages because many of its graduates work as public servants, judges, or public prosecutors—positions that carry relatively lower wages than the private sector.

Table 2. Descriptive statistics for unadjusted means ($\hat{\varepsilon}_i$)

University	No. of Obs.	Mean	Std. Dev.	Min	Max
Seoul National University	29	0.2736	0.5838	-0.7877	1.1329
Korea & Yonsei University	44	0.1939	0.3505	-0.7473	0.8845
Hanyang & Sogang, Ewha, & Sungkyunkwan University	52	0.1649	0.3684	-0.7263	1.0575
Major public universities outside of Seoul	89	0.0550	0.3220	-0.7756	1.0771
Other universities in Seoul	137	0.0514	0.3496	0.9366	1.2314

We then estimated the residual, deriving an adjusted mean (Table 3), which corresponds to the predicted value of the residual in Equation (2). Several changes can be observed from the unadjusted to the adjusted means. First, although the gap between university categories has shrunk, there is still a gap between Seoul National University and others. Second, the adjusted mean for Hanyang, Sogang, Ewha, and Sungkyunkwan Universities was higher than that for Korea and Yonsei Universities, which was not the case with the unadjusted means. Finally, the gap between the categories 2 and 3, and between 4 and 5 has also been reduced to half that of the unadjusted mean.

Table 3. Descriptive statistics for adjusted means ($\hat{\delta}_i$)

University	No. of Obs.	Mean	Std. Dev.	Min	Max
Seoul National University	30	0.1192	0.5835	-0.9428	0.9778
Korea & Yonsei University	44	0.0426	0.3513	-0.8969	0.7349
Hanyang & Sogang, Ewha, & Sungkyunkwan University	52	0.0494	0.3731	-0.8669	0.9121
Major public universities outside of Seoul	93	-0.0089	0.3028	-0.7997	0.9537
Other universities in Seoul	137	-0.0089	0.3028	-0.7997	0.9537

The implication from Table 3 is that when we control for the university quality, the magnitude of the university effect has significantly shrunk for all university classifications. The result is reasonable because after controlling for the university quality, it must be the case that the amount of variations that are not explained by Equation (2) should not be large. This was not the case in Table 2. Accordingly, we

believe that the estimate in Table 3 is compelling evidence of the "University Prestige" effect in one's wage earnings.

Discussion

The average university prestige effect and its whole distribution may be best shown by a the box plot (Figure 5). The boxes and the line that indicates the median all show downward trends over the university classifications. These downward trends imply that there are wage differentials among universities. From these data, however, one cannot conclude whether these differentials are solely generated by the "University Prestige" effect, because there has been no adjustment for the predetermined differences in academic performance of each university yet.

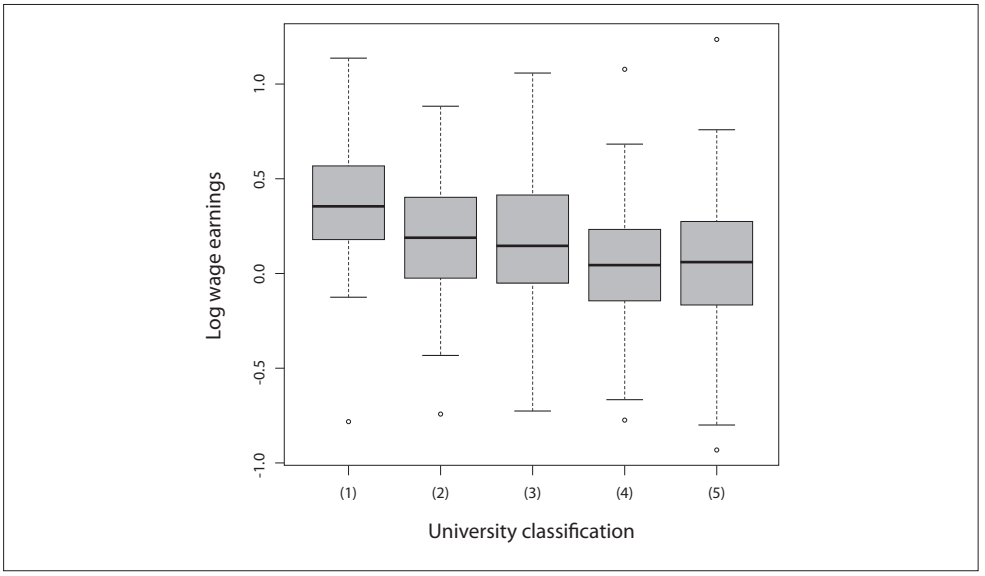


Figure 5. Box plots for unadjusted means for wage earnings

Figure 6 shows the box plot for adjusted means of wage earnings. As with unadjusted means, the box plot still shows the downward trend across university classifications. However, contrary to Figure 5, the level of wage earnings for category (3) turned out to be higher than that of category (2). Furthermore, it turned out that the prestige effect for public universities is higher compare to other universities located at Seoul. We believe this change is reasonable because most of the companies place higher value to these public universities compare to universities other than categories (1), (2), and (3).

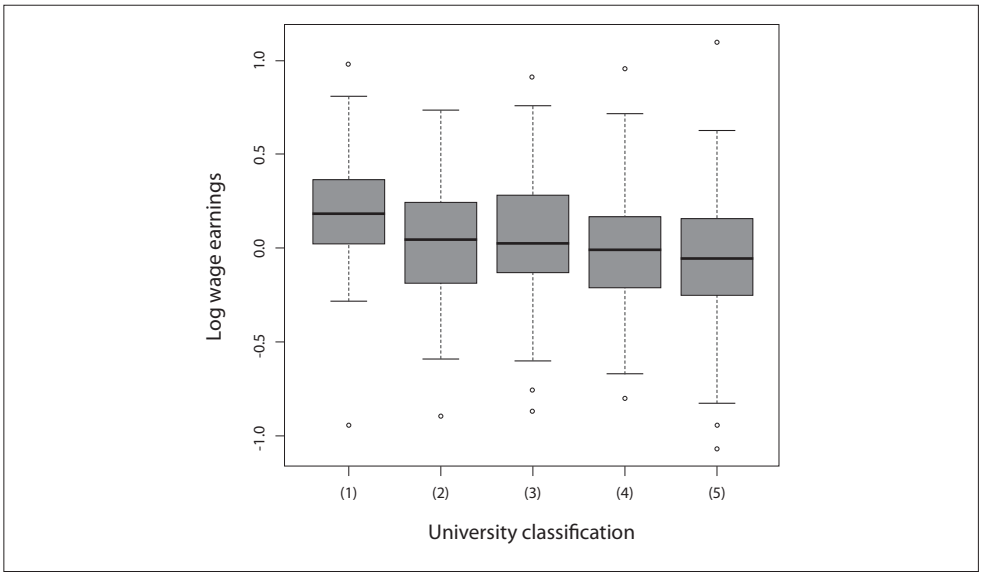


Figure 6. Box plots for adjusted means for wage earnings

Then the question is what would be the difference in the university prestige effect across universities. That is, how much more weight does the "name" of Seoul National University carries as to one's wage earnings. A simple calculation shows that the prestige effect for Seoul National University is 8 percentage points higher than that of Yonsei and Korea Universities. Furthermore, compare to major public universities not located at Seoul as well as other universities located at Seoul, the university prestige effect of Seoul National University is approximately 14 percentage points higher. These figures clearly show that there exists a wage premium as to being a graduate of Seoul National University in Korea regardless of one's labor productivity.

Finally, we show in Figure 7, the scatter plot of residuals and average entrance exam scores with a fitted regression line. From the regression of the average school level residual on average entrance exam scores, we find the R-Square of only 0.0005. The R-Square from this regression provide a summary gauge of the extent to which predetermined differences in academic performances explain the cross-institution earnings differentials. The estimate, 0.0005, implies that this predetermined difference in academic performances does not at all explain the cross-institution earnings, which in turn indicates the huge university prestige effect on wage earnings in Korea.

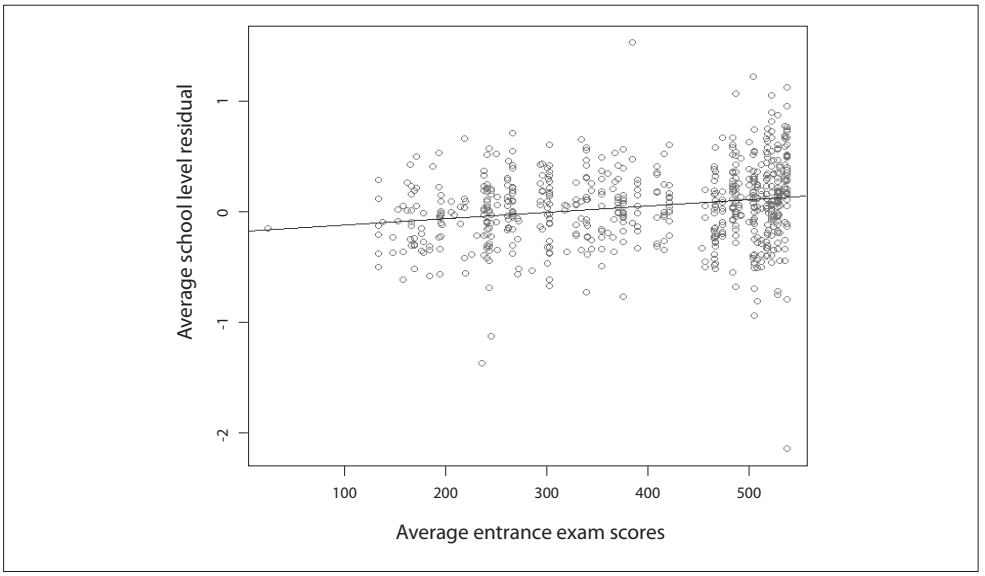


Figure 7. Scatter plots of the residual and exam scores

Conclusion

This study conducted an estimation of the "University Prestige" effect in South Korea's labor market, using KLIP data. To our knowledge, this paper is the first in the South Korean literature to do so. We found that there is a university prestige effect on earnings. The 7% additional earnings from graduates of Seoul National University compared to graduates from the next highest category, Hanyang & Sogang, Ewha, & Sungkyunkwan Universities, represents a premium that has been created by the prestigious name of the university, rather than by the productivity of the worker or their additional skills and knowledge acquired during their undergraduate education.

The higher returns to having an undergraduate degree from a prestigious university provide some explanation for Korean parents' high investment in education. To determine whether this investment provides a financial return requires data on the size of the investment, which is difficult to obtain. Further study is warranted to assess the return on investment and how long it takes for it to be realized, if at all.

If we had found wage differentials among universities to be negligible, we could have concluded that an over-investment in private education results from vague expectations regarding the education sector. We therefore would have suggested that government policy should be aimed at obviating society's biased expectations. However, the presence of a university prestige effect suggests that the government

cannot prevent people from investing in private education without correcting for the university prestige effect in South Korea's labor market. Since no evidence supports that the name of the university is associated with labor productivity, we believe that government should actively engage in working to dismantle the prestige wage effect.

On the other hand, although over-investment in private education may not be desirable for each household, it might be desirable for the country as a whole if productivity increases as a result. Therefore, if government cannot per se prevent people from believing in the prestige effect, government policy should focus on reducing the side effects of private education expenditures, such as inequality in private education opportunities.

Even though we have tried to account for the quality of university in estimating the "University Prestige" effect, there are limitations to this study that could be addressed by future research. First, by obtaining the data regarding expenditures on private education, it would be possible to calculate their net returns and determine whether parents' investment is rational. Second, this paper only uses the data accumulated by KLI. It would be beneficial to supplement this analysis with a wider sample and from more years. Lastly, to test the existence of the university prestige effect, it may be informative to use more advanced empirical strategies, such as matching and difference-in-difference methods. By complementing our analysis with these suggestions, we believe that future researchers will be able to refine our findings and provide further compelling evidence in support of the university prestige effect.

1) Data on exam scores were only available for 2010. While this study used data for 1998, we still believe that the validity of the estimate does not change since the yearly variance of exam scores remains more or less constant in Korea.

Address for correspondence

Dongsook Han
Graduate student
Graduate School of Public Administration
Seoul National University
Gwanakro 599, Gwanak-gu
Seoul, Korea
Tel: 82 10 6345 0922
Email: wissen@snu.ac.kr

References

Bedi, A. S., & Edwards, J. H. Y. (2002). The impact of school quality on earnings and educational returns: Evidence from a low-income country. *Journal of Development Economics, 68*(1), 157-185.

Behrman, J. R., Rosenzweig, M. R., & Taubman, P. (1996). College choice and wages: Estimates using data on female twins. *The Review of Economics and Statistics, 78*(4), 672-685.

Black, D. A., & Smith, J. A. (2004). How robust is the evidence on the effects of college quality? Evidence from matching. *Journal of Econometrics, 121*, 99-124.

Brewer, D. J., Eide, E. R., & Ehrenberg, R. D. (1999). Does it pay to attend an elite private college? Cross-cohort evidence on the effects of college type on earnings. *The Journal of Human Resources, 34*(1), 104-123.

Dale, S. B., & Krueger, A. B. (2002). Estimating the payoff to attending a more selective college: An application of selection on observables and unobservables. *The Quarterly Journal of Economics, 117*(4), 1491-1527.

Dearden, L., Ferri, J., & Meghir, C. (2002). The effect of school quality on educational attainment and wages. *The Review of Economics and Statistics, 84*(1), 1-20.

Harden, B. (July 30, 2009). Opening their wallets, emptying their savings. *The Washington Post*. Retrieved September 11, 2011, from http://www.washingtonpost.com/wp-dyn/content/article/2009/07/29/AR2009072903191.html

Korea Labor Institute. (1998-2007). Korean labor & income panel study. Retrieved September 11, 2011, from http://www.kli.re.kr/klips/en/about/introduce.jsp

Lee, J. (2010, February 17). Happy Birth Korea. *Maekyung Newspaper*. Retrieved September 16, 2011, from http://news.mk.co.kr/newsRead.php?year=2010&no=84600 (in Korean)

Long, M. C. (2010). Changes in the returns to education and college quality. *Economics of Education Review, 29*(3), 338-347.

Loury, L. D., & German, D. (1995). College selectivity and earnings. *Journal of Labor Economics, 13*(2), 289-308.

Monks, J. (2000). The Returns to individual and college characteristics: Evidence from the national longitudinal survey of youth. *Economics of Education Review, 19*(3), 279-289.

Reproduced with permission of the copyright owner. Further reproduction prohibited without permission.