

The effect of local labor demand on employment status and location with a focus on four-year-college graduates from non-capital regions

Chanyoung Lee

(Abstract)

This study investigates the effect of local labor demand on the employment status and the choice of work location (hometown, capital region, or elsewhere) of four-year-college graduates from non-capital regions by measuring local demand using the Bartik instrument and merging individual data. Based on the results of this study, firstly, the degree of a positive shock to local labor demand is higher in the capital region than in the non-capital regions. This suggests that local labor demand is favorable in the capital region. Secondly, as the local labor demand increases, the probability of hometown employment increases, whereas that in the capital region decreases. Specifically, a 10% positive local labor demand shock increases the probability of hometown employment by 0.1-0.2% and decreases the probability of capital region employment by 0.2-0.3%. Thirdly, compared to male graduates, female graduates are more sensitive to local labor demand conditions.

These results imply that current general policies related to national balanced development may contribute to regional human resource cultivation. Furthermore, strategic partnerships between local universities and public institutions transferred to non-capital regions should be constructed in order to create local labor demands.

Key words: local labor demand, non-capital region college graduates, migration into capital region, graduate occupational mobility survey, regional human resource

Assistant Professor, Department of Economics, Chonnam National University, Email: chanyounglee@jnu.ac.kr, Tel: +82-62-530-1557, Address: Youngbong-ro 77, Buk-Gu, Gwangju

I. Research Background

While unemployment is still problem among college graduates, the outflow of local human resources into the capital area (the so called local brain drain) is another problem in non-capital regions. Preference for entering university in the capital-region, transfer from local universities to those in the capital region and employment in the capital region after graduation from non-capital-region universities reflect this situation. Taking into account the important role of human resources in economic growth, brain drain in non-capital regions is a great concern in terms of the decline in vitality and decrease in growth potentiality of local economies. Under these circumstances, laws concerning the development of local universities and balanced local human resources were established in 2013 in order to raise the employment rate among local talents and to induce college graduated to remain in their hometowns.

To determine whether such policies related to the balanced cultivation of human resources will be effective, we need to investigate the determinants of employment of college graduates in non-capital regions and the choice of regions for employment. Up to now, a relative shortage of employment opportunities for local high-educated youths and poor working conditions in non-capital regions have been regarded as the main causes of local brain drain. However, little research has been done to measure local labor demand in concrete terms and to examine the migratory behavior of youths in response to local labor demands. Generally, many studies have examined employment probability and employment outcomes such as wage and employment type in terms of individual, household, and college characteristics. Some studies have also estimated the outflow of local human resources and its economic impact¹.

This study addresses the question of how local labor demand affects the probability of employment and the choice of employment location (i.e., hometown, capital region, or other regions). In general, since the number of employment observed includes information on labor supply and labor demand, it does not reflect the local labor market condition appropriately. Therefore, this study separates labor demand from labor supply by using the Bartik instrument to state the proper local labor market conditions. Lastly, this study analyzes the choice of employment and work location in a comprehensive and quantitative way by merging the indicators of local labor demand into individual data. The results of this study can assist in

¹ Detailed information is included in section II.

forecasting the expected effects of policies related to regional balanced development. Moreover, the results may also provide policy implications for achieving the expected effects.

This paper is organized as follows. Section II provides a review of previous literature on labor market outcomes for college graduates and on brain drain. And it also presents new attempts in this line of research. Section III outlines the basic model and empirical strategies, and it provides summary statistics and distribution of employment and work location. Section IV presents the empirical results of the main model and sensitivity analysis. Finally, section V summarizes the results and draws policy implications.

II. Literature review and new attempts of this study

1. Previous studies

1) Labor market outcome of college graduates

Studies of labor market outcomes for college graduates and employment probability have been conducted since the mid-2000s, the period in which youth unemployment began to intensify.² Most studies focused on the effect of individual, household, and college characteristics as well as school ranking and other factors related to preparations for finding a job. Although some conflicting views depending on the data and the method used exist, the studies show that the level of education of the youth's parent and household income are associated with the probability of employment. Furthermore, language-study abroad and higher English scores were moderately helpful in the transition from school to the labor market. In addition, school rank had significantly positive effects on getting a job.

More specifically, male students had a higher probability of being employed, compared to female students (Kim, A. G., 2003, Oh, S. G., 2003), and a higher level of education of the youth's parent and higher household income had a positive effect on labor market outcomes for youths (Hwang, Y. J. & Baek, B. B., 2008). Academic achievement as measured by GPA was insignificant to determining whether college graduates are being employed, but it did contribute to getting

² From that time, many data sets, such as the Korean Education & Employment Panel Survey and the Korean Labor & Income Panel Study began to be used for research.

decent jobs or positions in large companies (Jung, T. Y. & Lee, K. Y., 2005). English scores had a modest effect on wages earned, but they are not closely related to employment (Lee, S. H. & Yang, J. S., 2011; Kim, J. Y. & Choi, H. J., 2010). In addition, Chae, C. K. & Kim, T. G. (2009) found that labor market outcomes for youths depend heavily on university rank and area of study, Whereas, school financial aid and students' preparation for employment are weakly associated with chance of employment.

2) Local brain drain

Studies related to population migration or brain drain, from non-capital regions to the capital region began in earnest in the late-1990s, when an increase in the population concentration in the capital region occurred simultaneously with decline in population in non-capital regions. Previously, the labor force was regarded as one of the inputs of production. Thus, people took migration from less economically developed regions to more developed regions for granted in terms of income and job opportunity. However, with rising economic disproportion across regions and the advent of a knowledge-based economy, the importance of the role of local human resources provoked brain drain. Related studies can be divided into two groups. In one group, the main focus was to analyze the determinants of population movement. In the other group, the economic impact of local brain drain was analyzed.

The studies that investigated the causes of migration used macroeconomic indicators that reflect regional characteristics. Kim, H. A. (2008) showed that the benefits of public services (e.g., expected income, educational level, and enhanced transportation infrastructure) increased population movement. Hong, S. H. & Yu, S. Y. (2012) also found cultural opportunities to be associated with youth migration. Furthermore, Kim, K. S. and Jung, M. S. (2013) argued that the migration of youths to metropolitan areas is affected by future income rather than by employment possibilities (employment rate). Lastly, Kim, L. Y. and Yang, K. S. (2013) found that the main determinant of the population influx into a region was the change in the number of businesses in that region.

Next, research on the economic impact of local brain drain usually estimate the outflow scale of population in advance and calculate the consumption, production, and externality effects of brain drain. Park et al. (2011) applied this procedure to investigate the economic effect in Daegu and Kyung-buk provinces, using statistics for the location of school and of work. They found that total economic loss from brain drain reached 1-2% of GRDP as of 2008. Kim, Y. C. & Lee, M. H. (2003)

employed a similar method in order to estimate the economic loss arising from the migration of high school graduates. In addition, they estimated the loss caused by another migration for employment after college graduation.

2. New attempts of this research

This study may be distinguished from previous studies in the following ways. Firstly, labor demand related to employment and region of employment is measured and is used as a key variable for determining whether a person gets a job and where one will work. This strategy can overcome the limitation of previous works that used macroeconomic indicators reflecting both labor supply and labor demand. Secondly, this study analyzes the transition from school to work comprehensively by considering characteristics of local labor demand as well as individual characteristics. Thirdly, it focuses on 4-year-college graduates in non-capital regions because population migration occurs mainly from non-capital regions to the capital region and brain drain in young people is a current topic of interest.

III. Empirical strategies and data

1. Measurement of local labor demand

Labor market conditions faced by 4-year-college graduates entering the labor market are defined in terms of exogenous labor demand. As mentioned earlier, normal macroeconomic indicators include information on labor supply as well as labor demand. To determine pure shock or changes in the labor market, labor supply factors that are melted in that indicator should be removed. The Bartik instrument (BI), which was derived for this purpose, has been used in many studies (Blanchard & Katz, 1992; Bound & Holzer, 2000; Saks, 2008). The BI can be obtained via two steps. First, estimates for the subsequent period's number of employees in some regions are calculated with equation (1), where r , t , and j represent region, time, and industry, respectively. Implicitly, equation (1) shows that the expected number of employees is linked to the industry ratio of employees and the rate of increase in employees nationally, but it is unrelated to employee growth. Consequently, the BI can be expressed as a rate of increase in the expected number of employees. In turn, it indicates whether labor demand shock is positive (or labor demand increases) or negative.

$$\widehat{L}_{rt} = \sum_j \left[\left(\frac{\text{National Employment in Industry } j \text{ at time } t}{\text{National Employment in Industry } j \text{ at time } t-1} \right) \times \right. \\ \left. (\text{Area } r \text{ Employment in Industry } j \text{ at time } t-1) \right] \quad (1)$$

$$BI_{rt} = \frac{\widehat{L}_{rt} - L_{r,t-1}}{L_{r,t-1}} \quad (2)$$

Figure 1 shows regional labor demand for 2007~2008 (considering 2009 as the year of graduation), which was derived using the source material of economic activity census from Korean statistics. Note that all capital-regions (Seoul, Incheon, Gyeonggi) have positive labor demand shocks, whereas, a big difference exists among non-capital regions. The number of municipal government experiencing negative labor demand shock is larger than that of municipal government undergoing positive shock. In addition, negative shock is much bigger in size. This means non-capital regions lack labor demand or have negative labor demand shock compared to capital regions.

[Figure 1]

2. Methodologies

This study applies the multinomial probit model (hereafter, MNP) to estimate the effect of individual, household, school, and local labor demand characteristics on employment status and choice of work location. In general, the multinomial logit model has been used for related studies. However, since this model has a limitation in independence of irrelevant alternatives (IIA), using the MNP with a relaxed assumption of IIA is preferred. The MNP is based on individual i 's utility maximizing function, which chooses the best alternatives given the highest utility among j choices. Here, latent variable is defined as equation (3), where z_i is an observed variable that influence individual choice, and ξ_{ij} is distributed following iid.

$$\eta_{ij} = z_i \alpha_j + \xi_{ij} \quad (3)$$

If individual i chooses alternative k , then equation (4) should be satisfied. Therefore, equation (4) can be obtained from using the differences of individual utility.

$$\begin{aligned} v_{ijk} &= \eta_{ij} - \eta_{ik} \\ &= z_i(\alpha_j - \alpha_k) + \xi_{ij} - \xi_{ik} \\ &= z_i \gamma_j + \varepsilon_{ij} \end{aligned} \quad (4)$$

Finally, the probability of choosing k can be described as equation (5). Accordingly, maximum likelihood estimation based on multinomial normal distribution can be applied.

$$\begin{aligned} P(i \text{ choose } k) &= P(v_{i,1,k} \leq 0, \dots, v_{i,j-1,k} \leq 0) \\ &= P(\varepsilon_{i,1} \leq -z_i r_1, \dots, \varepsilon_{i,j-1} \leq -z_i r_{j-1}) \end{aligned} \quad (5)$$

In this case, the coefficient estimates are interpreted as the difference between base category and compared category. Moreover, marginal effects obtained from post-estimation can explain the effect of independent variables on each choice.

3. Data

The main samples used are 4-year-college graduates from non-capital regions, gathered from the 2010 Graduates Occupational Mobility Survey (2009 GOMS). This survey is very useful in that it includes information on individual and household characteristics as well as full details about the transition from college to the workforce. In particular, it is appropriate to investigate individual employment status and location based on information on high school location, the university that the individual attended, and place of work. More specifically, using this information, we can categorize individual employment status into 4 groups (unemployed, employed in one's hometown, employed in the capital region, and employed in other areas).

The main determinants of employment status and location are those used in previous studies, however, some additional methods were used in this study. Firstly, the level of the father's education is generated to continuous variable from categorical data in source data to interpret it conveniently. Secondly, college majors are simplified into two categories (humanities and social sciences, and science and engineering). Thirdly, a bivariate variable of setting a career path before graduation is included. Generally, one of the major factors determining labor market outcomes such as employment status or wage is an individual's inherent ability and attitude. However, related variable is rare. In this study, a bivariate variable of "setting a career path before graduation" is used as a proxy for unobserved individual ability.

4. Summary statistics and distribution of working places

Table 1 displays the summary statistics of 4-year-college graduates in the capital region as well as in non-capital regions for comparison. On the whole, these groups showed similar characteristics except in some areas.

Firstly, household income and father's level of education are lower in non-capital regions compared to capital regions. In terms of the type of college attended, 38% of the samples in non-capital regions attended public and national universities, whereas, only 7% of the samples in capital region did. More students from the capital region pursued double majors and language studies abroad compared to students in the non-capital regions. This suggests differences in educational environment between the two categories of regions. The third and fourth columns of Table 1 show the statistics for male and female samples in non-capital regions separately. The difference based on gender in the proportion of people who majored in the humanities or liberal arts to those in natural or engineering sciences (0.667 vs. 0.442) stands out conspicuously. Another obvious difference (0.177 vs. 0.112) is found in the proportion of people who graduated with double major to those who did not.

[Table 1]

Table 2 shows the employment status and location of 4-year-college graduates from non-capital regions 1.5 years (as of September ~ November 2010) after graduation. 28.8% of the sample was unemployed, and the proportion of people who had jobs in their hometowns or in the capital region is 30.7% and 22.7% respectively. This means that approximately 43% of employees are working in their hometowns and 32% in the capital regions.

Several features were found in specific regions. The proportion of hometown employment in Wolsan, and Jeju is higher than in any other area as a result of either geographic distance or the local presence of an industrial zone. The proportion of employment in capital regions is over 50% in Chungnam (67.0%), Gwangwon (64.4%) and Chungbuk (52.1%). These regions seem to have a relatively weak industrial foundation, although they are close to the capital region. Students from Daegu and Gyungbuk tend to work closer to home (i.e., the students from Daegu went to work in Gyungbuk).

[Table 2]

IV. Empirical results

1. Employment status and location of 4-year-college graduates from non-capital regions

Table 3 displays the marginal effect of local labor demand, individual, household, and school characteristics, and job preparation on employment status and location.

[Table 3]

In terms of household and individual characteristics, male youths have a higher probability of finding employment as well as being employed in non-hometown area including capital-regions, compared to female youths. Specifically, men had a 4% lower probability of either being unemployed or being employed in their home-town areas. However, the proportion of male youths who found jobs in the capital area or elsewhere is higher by 5.3% and 2.8%, respectively, compared to female youth. The level of the father's education seems to affect employment location, and not the probability of being employed. The higher the father's level of education is, the higher the probability the youth has of getting a job in the capital region.

In terms of school characteristics, college graduates from general high schools are less likely to find jobs and have a lower chance of being employed in their hometown areas. Namely, if students developed specialized skills or knowledge in production processes while in high school, they tend to work in their hometowns. Compared to people who graduated from private universities, people from national or public universities have a higher probability of being unemployed or getting a job in their hometowns. Graduates from private universities are more likely to find jobs in the capital region by 9%. Lastly, those who majored in the humanities or liberal arts are less likely to get a job in the capital region.

In terms of employment preparation, double majors and language-study abroad contribute to capital-region employment. In addition, college graduates who had outlined their career paths prior to graduation, have a 7% higher probability of finding employment and a 9% higher probability of working in the capital region. On the other hand, students who undefined career paths tend to work in their hometowns.

Lastly, local labor demand, which is the main concern of this study, affects the choice of employment location. Positive shock on local labor demand allows college graduates from non-capital regions to stay in their hometowns and to defer migration to the capital region for employment. Specifically, the effect (-.018) of favorable local labor demand on curbing movement into the capital region is relatively larger than its effect (.012) on inducing people to stay in their hometowns.

Overall, the main distinguishing characteristics between hometown employee and capital-region

employee can be summarized as Figure 2, which shows that the human resource ability of people who remain in their hometowns is relatively weak, compared to people who have found jobs in the capital region. It supports the inference that the decline of regional competitiveness occurs with the movement away of highly developed local human resources.

[Figure 2]

Table 4 shows the results of a replicated analysis by gender. Female college graduates are more sensitive to changes in local labor demand. If the condition of local labor demand improves, the probability of remaining in the hometown increases by 0.19. However, the probability of moving to the capital region decreases by -.022. For male college graduates, improved conditions in local labor demand lower the probability of capital region employment by -.014.

These differences may be due to the fact that moving costs for female graduates are much higher than those for male graduates. For example, housing expenses for female college graduates may be higher because they tend to live in areas that offer more security. In addition, from the perspective of parents', female graduates require more care and attention.

[Table 4]

In Table 5, a variable measuring distance from a provincial capital to Seoul City Hall is also included in order to consider moving costs by gender. College graduates farther from Seoul seem to prefer employment in their hometowns rather than in the capital region. Moreover, after controlling for distance from each region to Seoul, I found that the effect of local labor demand on employment location is magnified. Comparing these results with those in Table 4, we see that the effect of favorable local labor demand shock on remaining in one's hometown increased from 0.12 to 0.19. Simultaneously, the deterrent effect of local labor demand on moving into the capital region increased from -.018 to -.021 in absolute value. Similar results were obtained by gender analysis. For male college graduates, the insignificant effect of local labor demand on hometown employment without distance variable becomes a significant effect after controlling for distance. Furthermore, the deterrent effect of favorable local labor demand on the probability of getting a job in a capital region is magnified from -.014 to -.019. Moreover, for female graduates, the effect of local labor demand on employment location is heightened (e.g., hometown employment: .019 - > .024, capital region employment: -.022 -> -.025). Nevertheless, female graduates are more responsive to local labor market conditions after taking implicit moving cost into account.

[Table 5]

2. Sensitivity analysis

Until now, information on college location and workplace has been used for analyzing employment location. However, some college graduates moved from the capital region to non-capital regions when they entered university. Moreover, some college graduates in non-capital regions might move into nearby larger cities for college. These people may prefer to return to the capital region or their hometowns regardless of local labor market conditions. Under those circumstances, the results outlined in the preceding paragraph could be biased. To consider this possibility, an analysis targeting only samples whose high school locations is same as their college locations was conducted.

Based on the results presented in Table 6, local labor demand conditions have a greater effect on the choice to remain in the hometown but a smaller effect on employment in capital regions. In comparison with the results presented in Table 5, the effect of local labor demand on the probability of hometown employment increased by .023, whereas the deterrent effect of local labor market conditions on getting a job in the capital region decreased by -.015. The expectation that the effect of local labor market conditions on staying in the hometown will increase is matched. However, the deterrent effect related to migration to Seoul is not enlarged.

[Table 6]

V. Conclusions and policy implications

Up to now, migration from non-capital regions to the capital region has been attributed to a dearth of jobs and poor working conditions. However, no study has attempted to measure local labor demand and analyze its ripple effect on the choice of employment location. This study analyzed the effect of local labor demand in non-capital regions on the location of employment of 4-year-college graduates using the Bartik Instrument Method. The results of this study may contribute knowledge towards to policies that enhance the effect of laws on local universities and regional human resource development.

Firstly, based on the BI, the capital region is more likely to experience positive labor demand shock. That is, non-capital regions lack labor demand relatively. Secondly, local labor demand

influences the employment location of 4-year-college graduates. Favorable local labor demands induce more graduates to remain in their hometowns instead of moving to the capital region for employment. Quantitatively, 10% of positive local labor demand shock increases the probability of being employed in the hometown by 0.1-0.2% and decreases the probability of getting a job in the capital region by 0.2-0.3%. Thirdly, compared to male graduates, female graduates are more sensitive to local labor market conditions. Specifically, controlling for distance from each region to Seoul does not change the main results. It implies that for female graduates, the probability of staying in the hometown can increase significantly as local labor demand condition improves.

These results provide some implications for public policy. Firstly, construction of innovation city, moving of public institutions to non-capital regions, and legislations towards the development of local universities can contribute much to the balanced allocation of human resources across regions. For example, when the positive labor demand shock arising from the transferring of public institutions to non-capital regions is applied, some college graduates in non-capital regions prefer to stay in their hometowns rather than moving to the capital region. In particular, newly created jobs resulting from the relocation of public agencies seem to provide greater job security and better working conditions for job seekers. Secondly, strategic partnerships between regional universities and the transferred public institutions should be built to fulfill these anticipated effects. Therefore, the cooperation between industrial and educational organizations, as well as technical development and manpower training in regional universities must be prioritized. Thirdly, it is necessary to minimize career discontinuity among female college graduates who remain in their hometowns after graduation. Even though female graduates are more likely to remain in their hometown as labor market conditions improve, if they experience career gaps due to marriage or maternity, then local human capital capacity would decline. Therefore, the telecommuting system should be expanded in order to avoid career disruptions. Moreover, brokerage functions in labor demand and supply should be reinforced. For instance, the manpower bank called "Her (Higher Educated Human Resources) bank" can be established for this purpose.

This study can be well appreciated in that it tries to estimate the effect of local labor demand on the employment status and location of 4-year-college graduates in a comprehensive and quantitative way by merging information on local labor market into individual data. Nevertheless, this study has some limitations. Firstly, it focuses on 2008~2009, a period of global financial crisis. Therefore, the results may be biased. To overcome this problem, a multiple-period analysis or time

series approach that would require massive undertaking should be conducted. In that respect, this study may be considered a pilot study. Secondly, there is the counter argument concerning on movement into the capital region of college graduates in non-capital regions. These people may contribute their knowledge and skills to improving other regions, or, they may return to their hometowns after acquiring advanced knowledge or culture to support the regional economy. However, these considerations are beyond the scope of this study. Thirdly, post action reviews of the effects of change in local labor demand on migration behavior are required. Since the legislation on the development of local universities and local balanced human resources was passed in 2013 and construction of innovation city and transferring public institution to non-capital regions are now in progress, the practical effects of such related policies should soon be investigated.

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Table 1. Summary Statistics

Variable	Non-capital region (Total) (N=5,884)	Non-capital region (Female) (N=2,554)	Non-capital region (Male) (N=3,330)	Capital region (Total) (N=4,810)
Male	0.565(0.496)	NA	NA	0.551(0.497)
Level of father's education	12.6(2.9)	12.8(2.7)	12.3(3.0)	13.5(3.0)
HH income (2,000-3,000\$)	0.183(0.387)	0.170(0.376)	0.193(0.395)	0.177(0.382)
HH income (3,000-5,000\$)	0.299(0.457)	0.288(0.453)	0.307(0.461)	0.191(0.393)
HH income (5,000-10,000\$)	0.417(0.493)	0.434(0.495)	0.403(0.490)	0.411(0.492)
HH income (Above 10,000\$)	0.099(0.299)	0.106(0.308)	0.094(0.293)	0.218(0.413)
General high school graduates	0.926(0.260)	0.928(0.257)	0.925(0.262)	0.969(0.171)
National or public college graduates	0.377(0.484)	0.356(0.479)	0.392(0.488)	0.074(0.262)
Humanities or liberal arts college	0.540(0.498)	0.667(0.471)	0.442(0.496)	0.560(0.496)
College GPA (100)	84.8(9.6)	85.7(8.9)	84.1(10.1)	82.9(10.3)
Double major	0.140(0.347)	0.177(0.382)	0.112(0.316)	0.237(0.425)
Language study abroad	0.168(0.374)	0.166(0.372)	0.171(0.376)	0.280(0.449)
Setting career path before graduation	0.511(0.499)	0.508(0.500)	0.513(0.499)	0.559(0.496)
Being employed	0.708(0.454)	0.682(0.465)	0.727(0.445)	0.715(0.451)

Note: Figures in () represent standard deviation.

Table 2. Employment status and location of 4 year college graduates in non-capital region

Region	Unemployment	Hometown Employment	Capital region Employment	Employment Elsewhere
Busan	28.9	39.7(55.8)	12.0(16.8)	19.5(27.4)
Daegu	25.9	31.9(43.0)	14.5(19.6)	27.7(37.4)
Gwangju	28.7	43.4(60.8)	10.3(14.5)	17.6(24.7)
Daejeon	29.1	32.9(46.4)	19.2(27.1)	18.8(26.5)
Ulsan	32.2	44.0(64.9)	8.9(13.1)	14.9(22.0)
Gangwon	25.6	20.5(27.6)	47.9(64.4)	5.9(8.0)
Chungbuk	22.4	22.9(29.6)	40.4(52.1)	14.2(18.3)
Chungnam	28.4	11.9(16.6)	47.9(67.0)	11.7(16.4)
Gyeongbuk	27.4	20.6(28.3)	20.5(28.2)	31.6(43.5)
Gyeongnam	38.5	38.8(63.0)	9.1(14.8)	13.6(22.2)
Chonbuk	32.3	42.1(62.2)	15.0(22.1)	10.6(15.7)
Chonnam	26.6	38.9(52.9)	13.5(18.4)	21.1(28.7)
Jeju	35.0	45.6(70.2)	15.3(23.5)	4.1(6.3)
Total	28.8	30.7(43.1)	22.7(31.8)	17.9(25.1)

Note: Figures in () represents the proportions of employed

Source: Korea Employment Information Service, Graduates Occupational Mobility Survey.

Table 3. Determinants of employment status and location of 4 year college graduates in non-capital regions

Variables		Unemployment	Hometown Employ- ment	Capital region Employment	Elsewhere Employment
Household and Individual Characteristics	Male	-.040*** (.012)	-.041*** (.012)	.053*** (.011)	.028*** (.010)
	Level of father's education	.002 (.002)	-.006*** (.002)	.003* (.001)	<.001 (.001)
	HH income (2,000-3,000\$)	-.003 (.017)	.038** (.018)	-.051*** (.015)	.016 (.015)
	HH income (3,000-5,000\$)	.036** (.017)	-.003 (.017)	-.037** (.015)	.004 (.014)
	HH income (Above 5,000\$)	-.022 (.024)	.018 (.025)	.036 (.023)	-.033* (.019)
School Characteristics	General high school graduates	.063*** (.021)	-.061** (.024)	-.003 (.021)	.001 (.019)
	National(public) college graduates	.034*** (.012)	.069*** (.012)	-.093*** (.011)	-.010 (.010)
	Humanities or liberal arts college	.017 (.012)	.014 (.012)	-.022** (.011)	-.009 (.010)
Employment	College GPA (100)	<-.001 (<.001)	<-.001 (<.001)	<.001 (<.001)	<.001 (<.001)

	Double major	-0.004 (.017)	-.017 (.017)	.038** (.016)	-.016 (.014)
	Language study abroad	-.029* (.015)	-.023 (.012)	.053*** (.015)	<.001 (.013)
	Setting a career path before graduation	-.072*** (.012)	-.023** (.012)	.088*** (.011)	.007 (.010)
Region	Local labor demand	-.002 (.004)	.012*** (.004)	-.018*** (.003)	.003 (.003)
-2log likelihood		15626			
Wald Chi2(Prob>Chi2)		317(.000)			
Number of Samples		5,884			

Note: 1) Marginal effect of multinomial probit model.

2) Base category of household income is below \$2,000.

3) Figures in () represent standard deviations.

4) ***, **, * represent 1%, 5%, 10% statistical significant level, respectively.

Table 4. Effects of local labor demand on employment status and location of 4 year college graduates in non-capital region (gender comparison)

Category	Unemployment	Hometown Employment	Capital region Employment	Employment Elsewhere
Total (N=5,884)	-.002 (.004)	.012*** (.004)	-.018*** (.003)	.003 (.003)
Female (N=2,554)	<-.001 (.006)	.019*** (.006)	-.022*** (.005)	.004 (.005)
Male (N=3,330)	.004 (.005)	.006 (.005)	-.014*** (.005)	.002 (.004)

Note: 1) Marginal effect of multinomial probit model.

2) Other variables in Table 3 are included for regression.

3) Figures in () represent standard deviations.

4) ***, **, * represent 1%, 5%, 10% statistical significant level, respectively.

Table 5. Effects of local labor demand and distance from region to Seoul on employment status and location of 4-year-college graduates in non-capital regions

Category		Unemployment	Hometown Employment	Capital region Employment	Employment Elsewhere
Total (N=5,884)	Local labor demand	-.001 (.004)	.019*** (.004)	-.021*** (.003)	.003 (.003)
	Distance from region to Seoul	.004 (.006)	.080*** (.006)	-.115*** (.005)	.029*** (.005)
Female (N=2,554)	Local labor demand	-.003 (.006)	.024*** (.006)	-.025*** (.005)	.004 (.005)
	Distance from region to Seoul	.011 (.009)	.068*** (.010)	-.103*** (.007)	.023*** (.007)
Male (N=3,330)	Local labor demand	<.001 (.005)	.015** (.006)	-.019*** (.005)	.003 (.005)
	Distance from region to Seoul	<-.001 (.007)	.090*** (.008)	-.124*** (.007)	.033*** (.006)

Table 6. Effects of local labor demand and distance from region to Seoul on employment: including samples whose high school region is the same as their college locations

Category		Unemployment	Hometown Employment	Capital region Employment	Employment Elsewhere
Total (N=3,041)	Local labor demand	-.008 (.006)	.023*** (.007)	-.015*** (.004)	-.015*** (.004)
	Distance from region to Seoul	.017** (.009)	.036*** (.009)	-.056*** (.006)	.002 (.006)
Female (N=1,309)	Local labor demand	.008 (.010)	.024** (.011)	-.013** (.006)	-.020*** (.006)
	Distance from region to Seoul	.031** (.014)	.010 (.015)	-.038*** (.008)	-.002 (.008)
Male (N=1,732)	Local labor demand	.008 (.009)	.022** (.010)	-.017** (.007)	-.012* (.006)
	Distance from region to Seoul	.007 (.011)	.055*** (.012)	-.070*** (.008)	.007 (.008)

Figure 1. Local labor demand (2007-2008 average)

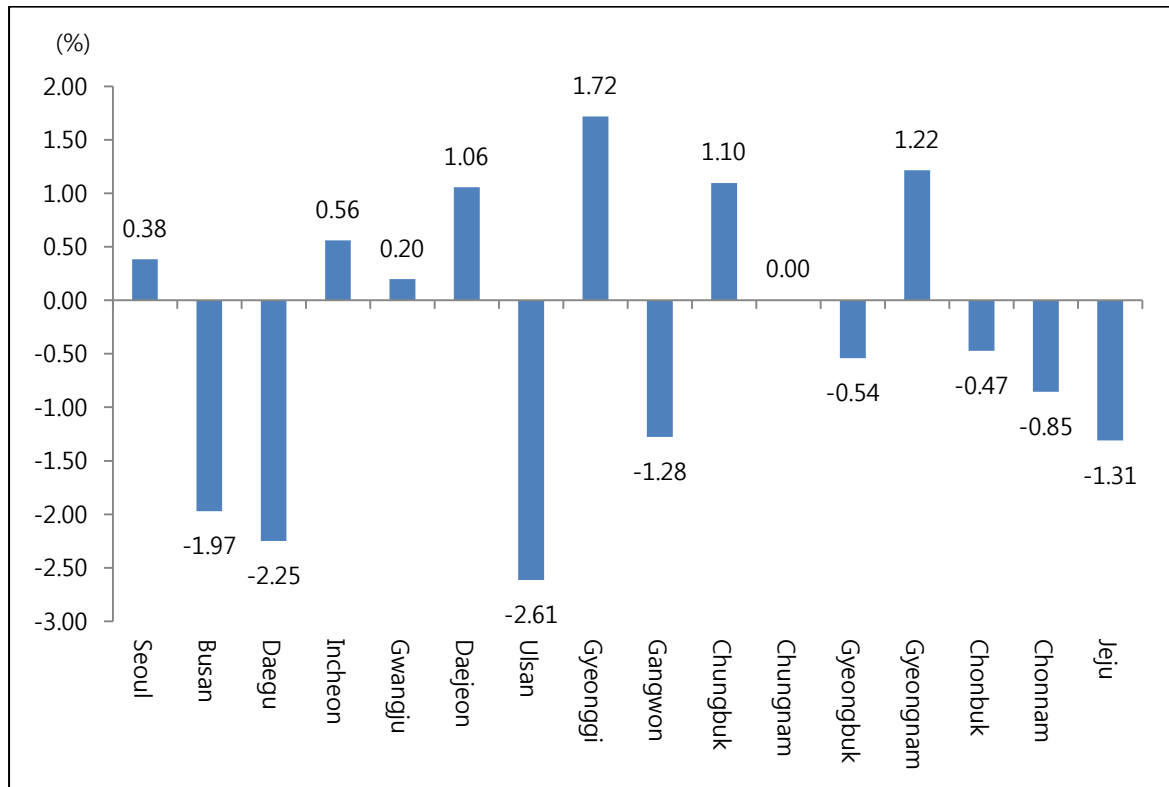


Figure 2. Comparison of human resource capacity between hometown employment and capital region employment

