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Inter-university competition in different competitive environments

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Abstract. This study examines the policy effects adopted by the Ministry of Education, Culture, Sports, Science and Technology (MEXT), the regulatory authority, on Japanese higher education, the university. It analyze using data to analyse the effects of both regional development and the improvement of the quality of education. Three hypotheses were tested regarding the MEXT's policies on quality assurance, such as increasing the number of universities, diversification of education, regional development, accreditation systems and subsidies for private education, which the MEXT has been working on since the 2000s following the relaxation of the criteria for establishing universities. The results of analysis shows that the number of students choosing regional universities did not increase, only the number of regional universities increased. In addition, small regional universities have not been able to differentiate themselves. It was confirmed that small universities are fully competitive and that the improvement in the quality of education has not been a factor in increasing the number of students at regional universities.
Keywords. Competition; University; Policy effect; Differentiation.
JEL. M10; I21; I23; I26.

1. Introduction

Following the relaxation of standards for the establishment of universities in the 1990s, the number of universities has increased rapidly since 2000, and changes have been made to the rules for allocating private education subsidies (hereinafter referred to as 'subsidies'), including the establishment of professional graduate schools and professional universities to train professionals, the conversion of vocational schools into universities or professional universities, the introduction of an accreditation system and changes to the rules for allocating subsidies, which emphasise initiatives aimed at improving educational quality and regional development.

This study examines the competitive environment of private universities. While the number of universities has increased significantly, the average number of students per institution has decreased significantly due to the declining birth rate. The decline in the average number of students has resulted in financial difficulties for universities, while the policies of the Ministry of Education, Culture, Sports, Science and Technology have created a situation where expenditure is required to improve the quality of

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education. It is important not only for the local economy but also for the Japanese economy as a whole to know how local universities are faring, as it affects local consumption, employment, etc. If local universities are in full competition, this means that they are not differentiated. Even if the MEXT asks universities to invest in developing global and innovative human resources that can respond to changes in society, if the financial situation and competitive environment are unattainable, the human resources envisaged by the MEXT will not be developed and the MEXT's policies will not succeed. The criteria for small, medium and large universities in this study follow the Standards for the Establishment of Universities. The definitions of rural and urban areas are.

The hypotheses are as follows: first, have the number of universities and students moved to rural areas?. The scale of consumption by university students is large, as students often live in the vicinity of their university during their studies. They also often seek employment after graduation in the vicinity of their university, so universities play a significant role in both consumption and employment. Second, are universities differentiated from one another? While the number of universities is expected to increase, the population of 18-year-olds is expected to decline, leading to increased competition for enrolments. On the other hand, there may be a polarisation between universities that maintain high applicant ratios and those that fall below capacity. The competitive environment is divided into three levels based on the number of enrolments: small, medium and large, and the competitive environment of each is identified. Check monopoly, monopolistic and perfect competition to see whether the market is aware of the diversification of universities. If the number of universities has increased but is not in perfect competition, we consider that differentiation and diversification have been achieved. By testing the above two hypotheses, it is possible to consider whether the policy of the Ministry of Education has led to the diversification of universities and whether the expansion of educational diversity has led to the agglomeration or dispersion of universities. Third, what are the factors that contribute to universities surviving?. By examining the impact on enrolment factors such as the ratio of applicants to enrolments and the number of enrolments by university size, as well as factors affecting management issues such as declining capacity and indicators of educational quality such as drop-out rates, it is possible to identify the characteristics of universities with high enrolment and applicant ratios, universities that experience declining capacity and universities with low applicant ratios. To. Focus specifically on the quality of education at regional universities. As financial difficulties become more severe, university faculties across the country become more uniform, as only those faculties that are popular with prospective students remain, rather than differentiating universities in terms of education, such as curriculum and teaching methods, the ratio of teaching content and practical subjects, and the number of subjects. The uniformity of faculties leads to uniformity in educational content and does not require a diverse faculty, which is

necessary to realise diverse educational content. Uniform education may also lead to uniform students. In addition, if the financial situation is difficult and the employment rate is an important factor for increasing subsidies, it is more efficient for the survival of universities to reduce the number of general-purpose subjects that can be adapted to future social changes and to bring them closer to the educational content of qualification exam preparation schools and vocational schools. A reduction in the number of subjects limits the range of subject choices for students, thus depriving them of educational opportunities. In short, the traditional policy of the Ministry of Education may enhance the quality of education if it is well funded, but it has the potential to reduce the quality of education if a university is in financial difficulty. It is also based on the assumption that faculties and educational content that are popular with prospective students are those that benefit Japan's economic growth. It is therefore important to check the relationship between indicators of educational quality and financial conditions, such as the ratio of applicants to enrolments.

By considering the above hypotheses, the challenges faced by each university are clarified from two aspects: rural-urban and small - large universities.

This study is unique in that it examines policy effectiveness by identifying differences and diversity in the competitive environment by university size. It is also novel in that it deals with a multi-level model that takes into account the four-tier structure of department, university, province and area to test the third hypothesis, and quantitatively deals with the fact that small universities are affected by the competitive environment in the province and medium-sized universities are affected by the competitive environment in the area.

2. Japanese higher education policy

The number of universities in Japan has more than doubled since the 2000s, despite the declining birthrate and aging population of 18-year-olds. The increase in the number of universities was triggered by the 1991 overhaul of the Standards for the Establishment of Universities. Before the introduction of the Outline Standards for the Establishment of Universities, the university system was based on the names of faculties, bachelor's degrees and curricula of the old universities, and the former Ministry of Education had adopted a policy of curbing the increase in the number of universities. The 1991 amendments significantly eased restrictions on universities, allowing each university to set subject divisions and the number of credits freely, as well as the names of faculties, as was the case in 1979. The number of degree types has increased from 69 to more than 500 today, with a corresponding diversification of degree titles to more than 700. In response to the prolonged slow growth of the economy, the Government of Japan announced a policy in its 2003 Special Basic Policy for Structural Reform not to require the establishment of school buildings to realise a diverse education, and the Ministry of Education, Culture, Sports, Science and

Technology (MEXT) has established professional graduate schools in 2005 (and professional graduate schools in 2020) to realise practical education that can play an active role in the global environment. (universities and professional junior colleges) were approved for establishment. As a condition for establishment, professional graduate schools are required to have at least 30 percent of all full-time faculty members who are practitioners with at least five years of business experience (40 percent or more for professional universities).

The deregulation of the establishment of universities led to a diversification of universities and an increase in the number of universities, which in turn led to a demand for quality assurance in education and the start of the accreditation system in 2004. The percentage of students going on to university increased from 17.1% in 1970 to 25.5% in 1991 and 58.1% in 2019. The number of universities increased from 405 in 1974, 499 in 1989 and 804 in 2019. University diversification has progressed as the university enrolment rate has increased, but in recent years the university enrolment rate has reached a plateau and by 2040 the estimated number of university students will decline to approximately 510 000 (74% of the number in 2021). With the increase in the number of universities and the decline in university enrolment due to falling birthrates, the number of universities with insufficient capacity has increased, more students are enrolled without departmental examinations, and the quality of education is said to have declined. Amid a parallel succession of university mergers and the establishment of new universities, the Ministry of Education, Culture, Sports, Science and Technology (MEXT) has announced a policy to allocate subsidies to universities that focus on training global human resources and regional development leaders through the 2012 University Reform Action Plan, and to deal strictly with private universities that have problems with their management conditions or educational environment. 2019 will see the introduction of the problem The decision was taken to implement free higher education only for universities that do not have it. Furthermore, the tight control of enrolment capacities and the urban infection of COVID-19 have reduced enrolments, especially in large universities and urban universities, while the policy of relaxed capacity management in regional state universities has not led to a sufficient increase in student numbers in regional private universities The number of universities with less than capacity in 2021 is considered to be the total number of More than 40% of the population and rising. In addition, despite a decline in the number of teaching staff at universities with falling capacity, the employment rate is included as a criterion for grants, which means that many teaching staff are focusing on career education and job placement support.

In line with the changes to the criteria for allocating grants, the A grand design for higher education for the year 2040 and teaching and learning management guidelines for the year 2020 was developed.

Theoretical models have so far focused on the demand for university education, but models that reflect the changes in the supply side described

above are needed. Becker (1964), a leading study of human capital theory, Hanushek & Welch (2006), Hanushek *et al.* (2011), Hanushek *et al.* (2016) in review papers, Epple and Romano (1998) on education vouchers There are, however, few studies on inter-university competition. This study applies a model of monopolistic competition to universities and uses data to examine the impact of inter-university competition on the geographical distribution of universities and university students as well as the potential for a decline in the quality of education.

3. Changes in the geographical distribution of university and college students

This section confirms whether regional development has been promoted since 2004 by checking changes in the number of universities and students by prefecture on a map mapping the number of universities and students by prefecture. To check university and student migration, university portraits, university websites and published university application guides are used to compare 2004 and 2019.

Figure 1 is plotted based on GIS information for university headquarters in 2019. It can be seen that most universities are concentrated in the Kanto region (mainly Tokyo), Aichi and the Kansai region (Kyoto, Osaka & Hyogo).

Figure 2 plots only universities that were newly established after 2000. As in Figure 1, new universities are concentrated in urban areas.

Figure 3 compares the number of universities by prefecture between 2004 and 2019 and plots the 2004 minus 2019 figures. No prefectures saw a decrease in the number of universities, with 17 prefectures showing no change and the other 30 prefectures showing an increase. Tokyo and Osaka in particular saw increases of 14 and 11 universities respectively.

Figure 4 shows the change in enrolment by province. It uses the national enrolment figures as the denominator to produce enrolment ratios by province. Black means a decrease in students and white means an increase: 24 prefectures have decreased and 23 have increased. The number of universities increased in all prefectures, but there are about half a dozen prefectures where the enrolment ratio decreased and half a dozen where it increased, showing differences between prefectures. Tokyo and Osaka saw a decrease, while the neighbouring prefectures of Kanagawa, Kyoto and Hyogo saw an increase, confirming the possibility of migration from the big cities to the cities. A comparison of the number of students in 2004 and 2019 shows a decrease in nine prefectures and an increase in 38 prefectures.

Figure 5 shows the change in enrolment by county for small and medium-sized universities. Even if enrolments have moved between urban and rural areas, many of the universities that have seen rapid growth in recent years are small universities. It is possible that the increase in small universities does not lead to an increase in enrolment in small universities, but an increase in university enrolment in large and larger universities. In this case,

the policy of the Ministry of Education to increase the number of universities may merely increase the number of universities and not lead to diversification and decentralisation of education, resulting in a concentration of universities in cities. Black indicates prefectures where in-prefecture enrolments decreased, while the closer to white, the greater the increase; in 10 prefectures, enrolments at small universities decreased, while in 37 prefectures, the increase in small universities was confirmed to have led to an increase in small university enrolments, while in other prefectures, mainly in rural areas such as Niigata, Toyama and Nagasaki, small regional universities It was observed that enrolments decreased despite an increase in the number of students.

Figure 6 shows the change in the average number of students per small university. Even if the number of small regional universities increases and the number of students increases, if the number of universities increases more than the number of students, small regional universities are likely to find it tougher to operate and are more likely to be weeded out of the market. Black are the provinces where the number of students per small university decreased. Twenty-seven prefectures have seen a decrease and 20 have seen an increase. Tochigi, Chiba, Niigata, Fukui, Yamaguchi, Kagawa and Fukuoka are regions where competition between universities has intensified, especially as the number of students per small university has decreased significantly.

The above shows that universities have expanded into rural areas, but student mobility varies from region to region and the role they have played in rural development is limited. It was also observed that in some regions the number of students per university decreased significantly as the number of small universities increased, even though there was no increase in enrolment.

4. Competitive environment by the size of the university

4.1. Measurement of market competitiveness and methods

In this section, the degree of market competition in the university industry is classified into perfect, monopolistic and monopolistic competition by size using the Panzar-Rosse H statistic.

By transforming the firm's profit function, it is possible to derive a theorem that the sum of the factor price elasticities in the monopolist's income function is less than or equal to zero. If it is greater than zero, in particular 1, Panzar & Rosse (1987) show that this is the long-run equilibrium in a perfectly competitive industry. They further considered the possible range of the sum of factor price elasticities in the monopolistic competitive equilibrium of Chamberlin (1933), which Chamberlin (1933) indicates has three market characteristics of monopolistic competition: the existence of many sellers, product differentiation and no entry restrictions. He further stated that if the assumption that the price elasticity of demand faced by each firm increases with the number of competing firms is met, the sum of the

factor price elasticities will be less than one. In other words, Chamberlin's (1933) proposition that the sum of the elemental price elasticities of the revenue functions of firms in monopolistic competitive equilibrium is less than one holds.

In this study, the following income functions are estimated using the financial data for each university in the previous section.

$$LP = \alpha + \beta_1 LR + \beta_2 LW + cLF$$

The income from business activities in the statement of income and expenditure is income R. As the elemental price, cost of capital, the logarithmic value of interest expenditure on borrowings divided by borrowing income in the fund balance sheet is LR, and as the elemental price, wage rate, the logarithmic value of expenditure on personnel costs divided by the number of teachers plus staff in the fund balance sheet is LW. Fixed assets in the balance sheet as the variable that shifts the cost function is LF.

$$LP = \alpha + \beta_1 LR + \beta_2 LW + c\mathrm{LF}$$

From the estimation results of the above equation、$\beta_1 + \beta_2$as the sum of factor price elasticities to test the hypothesis.

$\beta_1 + \beta_2 \leq 0$ If so, a monopoly or monopolistic competition model is established.

$0 < \beta_1 + \beta_2 < 1$If so, a monopolistic competition model is established.

$\beta_1 + \beta_2 = 1$ If so, a monopolistic or perfect competition model is established.

$\beta_1 + \beta_2 > 1$If so, we consider that the model has failed to be specified.

Tsutsui (2000) discusses the interpretation of cases where the validation result is greater than one, and whether it should be regarded as a failure of estimation or whether a theoretical model greater than one has not been presented.

4.2. Results of market competitiveness analysis

The results of the analysis are presented in Table 1. The left column shows the Random Effect and the right column shows the Fixed Effect, for large, medium and small universities and universities with enrolments of 800 students or less, respectively The 2016 report of the Association of Private Universities shows that universities with enrolments of 800 students or less are particularly in a situation of declining capacity. Based on the Wu-Hasuman results, the Fixed Effect model was adopted for all models: both are significant from the p-values of the two factor prices, and the sum of their coefficients shows that small universities are perfectly competitive, large universities are monopolistically competitive or monopolistic, and medium-sized universities are monopolistic. The competition was confirmed to be

perfect; universities with enrolments of 800 or less were also confirmed to be perfectly competitive. The simulation results in the previous section indicate that small universities cannot improve their enrolments much even if the change in the elasticity of substitution falls and they diversify, which is consistent with the result of small universities being fully competitive in this section.

The above results confirm that universities compete according to size, and the degree of market competition varies according to university size. This is consistent with the results of the simulations in the previous section. Universities of smaller sizes are close to perfect competition.

5. Factors contributing to variation in key indicators of education quality

5.1. Analytical method

As before, in this section, a five-year database for 2004, 2009, 2014 and 2019 was created using data from university portraits, university websites and university examination guides.

To examine the factors that contribute to the survival of universities, the impact on enrolment factors such as applicant-to-faculty ratios and enrolment numbers by university size, business management issues such as declining capacity and indicators of educational quality such as drop-out rates are used as dependent variables, while influencing factors are analysed as explanatory variables. The characteristics of universities with high enrolment and applicant-to-faculty ratios and those that experience declining capacity or low applicant-to-faculty ratios are identified. Particular focus will be given to the quality of education at regional universities. In previous studies on the quality of education, Hanushek (2011) and Hanushek (2016)

Eide & Showalter (1998), among others. There are also a wealth of examples of multilevel analysis applied to the education sector, e.g. Hill & Rowe (1996), Duyar *et al.* (2013).

The estimated models in this section are: y is a key indicator of education affecting the overall educational effectiveness of the university, such as drop-out rate, enrolment and applicant multipliers; γ is an educational indicator such as ST ratio, enrolment and deviation score; δ is other indicators such as new school dummy, urban area dummy, medical and pharmacy school dummy, year dummy etc.

$$y = \alpha + \beta_1\gamma + \beta_2\delta + \varepsilon$$

As dependent variables, the applicant multiplier, drop-out rate, enrolment and capacity change rate are used, while the explanatory variables are deviation, S-T ratio (faculty-student ratio), medical and pharmacy school dummies, single-department dummies, enrolment, new school dummies and urban area dummies. Cross-sectional and multilevel

models are used as analytical methods. The multilevel analysis uses several faculties, provinces and areas. The number of faculties exists as a sub-organisation of universities, while areas such as the Kanto and Kansai regions are located as an upper group of individual universities. Due to sample size issues, they could not be used simultaneously.

5.2. Differences by university size

Of the 598 universities in total, 143 had enrolments of 4,000 or more and 455 had enrolments of less than 4,000 as of 2019. Small schools account for about half of all colleges, while only 7% of colleges are medium-sized or larger. The average number of faculties of small and medium-sized universities is 1.9 and 6.1 respectively, indicating that the difference in enrolment is due to the number of faculties; the ST ratios are 5.1 and 7.4, indicating that small universities can be regarded as having a higher quality of education. Only 4% of those above this level. The proportion of university headquarters in urban areas is 41% for small universities and 78% for large universities, confirming that larger universities are more likely to be based in urban areas.

5.2.1. Has it made a difference to small universities?

In 2019, the total number of students in 143 large universities was 1,487,000, or an average of 10,403 students per university. In contrast, the total number of students in the 455 small universities was 643,000, or an average of 1,414 students per university.

Approximately 70% of all students in the country are enrolled in medium-sized or larger universities.

In contrast, the total number of students in 131 large universities in 2004 was 1,337,000, or an average of 10,205 students per university. The total number of students in the 367 small universities was 544,000, or an average of 1,483 students per university.

A comparison between 2004 and 2019 shows that, as in 2004, approximately 70% of the country's students are enrolled in medium-sized or larger universities. The number of small universities has increased by 100,000 over the past 15 years, while the average number of students has remained largely unchanged.

5.2.2. Has the number of students in rural areas increased?

Assuming the five largest metropolitan areas as urban areas, in 2004 there were 297 universities in urban areas with 1,474,000 urban students and an average of 4,965 students per university. There are 201 universities in rural areas, with 406,000 rural students and an average of 2,023 students per university, a 2.5-fold difference in the average number of students per university between urban and rural areas; in 2019, there are 355 universities in urban areas, with 1,667,000 urban students and an average of 4,697 students per university. There are 243 universities in rural areas, with 463,000 rural students and an average of 1,909 students per university, a 3.6-fold gap between the average number of students per university in rural and urban areas. Both urban student numbers represent 78% of the total student

population, confirming that, as a percentage, no migration of students to the regions has occurred since 2004, and that no university-initiated regional development has occurred.

5.2.3. Will new schools bring rural development?

It is known that the policy of relaxing standards for the establishment of universities has led to a rapid increase in the number of new schools. To see how many new schools were established in rural areas as a result of the relaxation policy, of the 99 new universities established since 2000, 59 were established in urban areas and 40 were headquartered in rural areas. (Of the 499 pre-2000 universities, 296 were established in urban areas.) 59% were established in urban areas before 2000 and 59% again after 2000, which means that progress has not been made in terms of regional development from the perspective of newly established university centres. Of these, 107 universities were headquartered in Tokyo in 2004, with an average of 6,984 students and a total student population of 747,000, while in 2019, 121 universities were headquartered in Tokyo, with an average of 6,939 students and a total student population of 840,000, indicating that the number of universities and students is concentrated in Tokyo and the trend of concentration is accelerating. Osaka, Hyogo and Kyoto had 83 universities, 4,621 students and 383,000 students in 2004 (Osaka only had 39 universities, 4,603 students and 180,000 students on average), while in 2019 there were 104 universities, 4,337 students and 451,000 students on average, indicating that the number of universities and students in the Kansai region has been increasing since 2000. This shows no change in the urban/rural ratio, but a polarisation of urban areas, with the concentration of universities and students in Tokyo and Kyoto, Osaka and Hyogo, among other urban areas.

Although progress has been made in establishing universities since 2000, and emphasis has been placed on the quality of education through accreditation, the number of students and universities still has not resulted in a migration of students from urban to rural areas.

5.2.4. Report by the Private School Business Association, 2016

The Standards for the Establishment of Universities classify universities into three categories according to their capacity. Large universities are those with more than 8,000 students, medium-sized universities are those with less than 8,000 students and small universities are those with less than 4,000 students. Meanwhile, enrolment trends by size of private universities compiled by the Japan Association for Private Education in 2016 show that, over the past few years, both enrolment capacity filling rates and application multipliers have been below capacity and at low multipliers for small universities with an enrolment capacity of fewer than 800 students.

On the other hand, large universities with an enrolment capacity of more than 3,000 students account for about 29% of the total enrolment capacity and about 1.57 million applicants, or 44.7% of the total number of applicants. The number of enrolments is 146,000, accounting for 30.1% of total enrolments.

5.3. Relationship between enrolments and various indicators by university size and various indicators

The graphs in this section are based on 2019 information. Figures 7 to 9 plot the relationship between enrolment and university size, years of establishment and population by county.

Figure 7 shows the relationship between university size and enrolment by showing enrolment on the horizontal axis and enrolment on the vertical axis. A positive relationship is observed, with the number of universities concentrated in small universities with low numbers of both enrolments and enrolments, with different groups at around 4 000 to 9 000 enrolments and another group at over 9 000 enrolments.

Figure 8 shows the year of establishment on the vertical axis. Many universities list their predecessors in their university application guides, and the year of establishment of the predecessor school, if any. Although many universities have been established since the Meiji era, most universities with high enrolments are those with a long history, and several universities established in the early Meiji and Taisho eras have high enrolments. Many universities were established after the war, but today most are small universities, although some medium-sized universities also exist. After the collapse of the bubble economy, universities were re-established in line with the generalisation and relaxation of the standards for the establishment of universities, but most are small universities with enrolments of less than 2000 students.

Figure 9 shows population and enrolments by province. At the top of the vertical axis is Tokyo, with a population of approximately 15 million, where small, medium and large universities exist, with the smaller the population in a prefecture, the smaller the size of the university. Universities with enrolments of between 4000 and 10000 are not necessarily present in the more populous prefectures, but small universities are overrepresented in all prefectures, with a particularly high proportion of small universities in the less populated prefectures.

Figures 10 to 12 show enrolments, applicant multipliers, drop-out rates and S-T ratios by university size. The enrolment numbers on the horizontal axis in Figure 10 are concentrated in smaller universities, with a slight spread in enrolment numbers for medium-sized universities and a further spread in enrolment numbers for large universities. Universities have a standard length of study of four years, but four times the number of students enrolled is not necessarily four times the number of enrolments. Through retention, transfers, leaves of absence and expulsions, enrolments can be more or less than four times the number of students enrolled. The size of universities in this paper is classified by enrolment based on the criteria for the establishment of universities, and if a university is classified as a medium-sized university in terms of enrolment but has a small number of enrolments, this suggests that many students are retained, transferred or on leave. It is confirmed that a certain number of medium-sized and some large

universities have a high number of students who stay, transfer or take a leave of absence.

The top left-hand corner of Figure 11 shows that smaller universities have particularly low applicant multipliers. Medium and large universities tend to have higher applicant multipliers. The majority of large universities have an applicant ratio of 20 or more. Medium-sized universities are widely distributed irrespective of their applicant multipliers, but many have multipliers of between 20 and 40.

The drop-out rate in Figure 12, which is the percentage of students who stay on or take a leave of absence from school without graduating in the standard years of study, is relatively low for large universities, but many small and medium-sized universities have drop-out rates of 30% or more, with many medium-sized universities having drop-out rates of 10% to 20%. Although the figure does not show more than 30 percent, some small universities have drop-out rates of 50 percent. The drop-out rate is sometimes used as an indicator of the quality of post-enrolment education, and it was observed that the drop-out rate is characteristic of different university sizes.

Figure 13 shows the S-T ratio, which is the number of students divided by the number of full-time teachers. Smaller universities have the lowest S-T ratio mode, indicating an environment in which small-group education is feasible. The S-T ratio is also used as an indicator of the quality of education and is characteristic of different university sizes.

5.4. Analysis results

5.4.1. Cross-sectional analysis

To explore the factors affecting university survival and quality of education, cross-sectional analysis is used in this section and multi-level analysis in the next section.

Table 3-1 shows the model with applicant multipliers as the dependent variable, with the first three columns (equations (1)-(3)) not including urban area dummies and the latter three columns including urban area dummies; the first column is analysed using data from small universities only, the second column from medium-sized universities and the third from large universities.3 and 6 show a positive correlation between the ratio of applicants to enrolments for large universities, while a negative correlation is observed for medium-size universities, as shown in Equation 5. The higher the ratio of applicants to enrolments, the lower the number of enrolments, which confirms that the universities impose strict entrance examinations. The deviation is significantly positive for all universities. The higher the deviation, the higher the applicant-to-faculty ratio, indicating that the higher the deviation, the higher the applicant-to-faculty ratio. The ST ratio is positive and significant for the larger universities. Larger universities with lower ST ratios tend to have lower applicant multipliers; the lower the quality of education, the lower the applicant multiplier. For small universities, equation 1 was not significant, but equation 4 was negative and

significant, indicating that higher quality of education increases applicant multipliers. Dropout rates were not significant in all models. The medical and pharmacy school dummies are dummy variables as medical and pharmacy schools can have very high applicant multipliers despite being small universities. It is only negatively significant in equation 5 for medium-sized universities. The single-department dummy is a variable that takes 1 if the university has a single department. It is more common in small universities and is positively significant in equations 1 and 4, suggesting that the applicant multiplier is higher if the university has a single college. It is insignificant for medium-sized universities, while it is negatively significant for large universities, with the sign opposite to that of small universities. Equations 1 to 5 show that universities with larger enrolments have higher applicant multipliers. The new school dummy is a variable that takes 1 for universities established after 2000. It confirms that new schools tend to have lower applicant multipliers for small and medium-sized universities. The year dummies use 2004, 2009 and 2014, with 2004 and 2009 being positively significant for small universities in equation 4, meaning that the applicant multiplier is higher in 2004 and 2009.

The urban area dummy is an important variable related to the theme of this study, which is whether rural development has been achieved. It has been observed that regardless of the size of the university, the higher the applicant ratio, the more the university is headquartered in an urban area. The low applicant multiplier for new schools and the resultant increase in the applicant multiplier in urban areas can be seen to be detrimental to new schools in rural areas.

Table 3-2 shows a model where the dependent variable is the drop-out rate (drop-out rate) and Table 3-1 shows the applicant multiplier as an explanatory variable. The drop-out rate is used as an indicator of the quality of education, and the impact on the drop-out rate is considered. As the number of enrolments is positively significant in all models, the dropout rate increases with the number of enrolments. The increase in the proportion of drop-outs, rather than the number of drop-outs, confirms that the lower the enrolment, the more students graduate in the standard years of study. The deviation is significantly negative for small universities, and the higher the deviation, the lower the drop-out rate. Since this is not significant for medium and large universities, one way to reduce the drop-out rate at small universities is to increase the deviation value of the entrance examinations. The medical and pharmacy school dummies are positive and significant for small universities, suggesting that medical and pharmacy schools are effective in reducing drop-out. The number of enrolments is positively significant only in large universities, so larger enrolments are associated with higher drop-outs in large universities. The aforementioned increase in enrolment and enrollment increases the dropout rate at large universities. The implementation of small-group education, such as seminars, may be effective in reducing student drop-out rates. The fact that the new school dummy is negative for small universities and positively significant for large

universities indicates that the newer the school, the lower the drop-out rate for small universities and the higher the drop-out rate for large universities. This implies that differences in size have an impact on dropout.

The urban area dummy is positively significant for small and medium-sized universities, indicating that drop-out rates are higher in urban areas. As the drop-out rate is high for small urban universities, efforts to reduce the drop-out rate to the level of small rural universities should be effective in curbing the drop-out rate. The year dummies show that 2004 is negatively significant for small and medium-sized universities and positively significant for large universities, indicating that small and medium-sized universities had low drop-out rates in 2004, while large universities had high drop-out rates. In other words, this indicates that the systems for improving the quality of education, such as the accreditation system and other systems since 2004, have had an effect on reducing the knowledge drop-out rate for large universities, but not for small and medium-sized universities.

Table 3-3 shows that the dependent variable is the number of students enrolled. The impact on enrolment numbers is discussed. The applicant multiplier is negatively significant in equations 15 and 18, indicating that the larger the university, the lower the multiplier, the higher the number of enrolments at large universities. The larger the number of enrolments, the more popular the university. The deviation is positively significant for medium and large universities, and the higher the deviation, the higher the number of enrolments. Smaller universities with lower ST ratios and higher quality education have lower enrolments. Universities with lower drop-out rates have higher enrolments. It is possible that a low drop-out rate may increase enrolments. Urban area dummies are negatively significant at medium and large sizes, indicating that urban universities have lower enrolments.

Table 3-4 shows the rate of change in the capacity as the dependent variable. As capacity is not a regularly changing indicator, the analysis is based on the rate of change in capacity in 2004 and 2019, as the rate of change in each period is small. A reduction in capacity does not necessarily mean a deterioration of the university's management, but flexible capacity changes are necessary for the management of the university, as the management of the capacity-filling rate in recent years has had an impact on subsidies. It is desirable to change capacity appropriately in response to annual changes in enrolment, and universities that do not change capacity do not need to do so because their applicant-to-faculty ratio is high enough to ensure stable enrolment, or they have a source of revenue other than tuition fees, or the university marketing department can ensure sufficient enrolments in line with capacity, or otherwise Otherwise, it means that the university executive is not taking a flexible approach.

The dependent variable, the rate of change in capacity, is positive if there is a decrease from the 2004 capacity, and negative if there is an increase. The positive and significant drop-out rate for medium and large universities indicates that universities with large drop-out rates have reduced their

capacity. The lower the applicant-to-faculty ratio, the more likely it is that small and large universities have not reduced their capacity, and are more likely to be cautious about reducing their capacity. The larger the university and the higher the enrolment, the more it reduces its capacity, suggesting that the policy of capacity management in large universities has had some effect, while it is not significant in small and medium-sized universities, which means that the effect of the policy on universities other than large universities is limited. The negatively significant sign of the ST ratio for large universities also indicates that the more the number of students, which is the denominator, increases, the more the capacity is reduced. The fact that universities with lower drop-out rates reduce their capacity suggests that they are flexible in their capacity changes and that declining enrolments are not the only factor leading to capacity reductions. The urban dummy is negatively significant for small and large universities and positively significant for medium-sized universities, suggesting that the more urban the university, the more it reduces its capacity. Rural universities reduce their capacity more than urban universities. From the perspective of regional development, we consider that the fact that permission from the Ministry of Education is now required to increase capacity in Tokyo is the reason why small and large universities have not reduced their capacity as much as their urban counterparts. This is considered to be a negatively significant cause. Given the above results, the current policy emphasis on capacity management policies is only effective in large universities. In addition, universities in rural areas have reduced their capacity. Although this is an effective indicator for achieving management with less fluctuation from an external perspective, we believe that more emphasis should be placed on quality indicators such as the ratio of applicants to enrolments, as the capacity-filling rate is not a direct indicator of educational quality and no significant relationship could be found between the capacity change rate and the number of enrolments.

5.4.2. Multilevel analysis

This section conducts a panel analysis, including a time element to the cross-section analysis in the previous section. In addition, multilevel analysis is carried out. In this paper, which examines the competitive environment, individual universities have a hierarchical structure between the prefecture and the area, with small universities easily influenced by the situation in the prefecture and medium-sized universities influenced by the area. The lower tiers of universities are also influenced by their faculties. They may be in a competitive environment with the faculties or number of faculties of neighbouring universities. The study, therefore, uses a multi-level analysis with four levels of hierarchy - number of faculties, university, province and area - to control for initial conditions and to examine the factors that influence important indicators of university survival, such as enrolment, applicant multipliers and drop-out rates. Estimate the impact of the area and the number of faculties on the main university variables, controlling for the number of faculties. There are no previous studies in the field of universities

with a four-tier structure, taking into account the region of the university size enrolment.

Table 4-1 uses the applicant-to-faculty ratio as the dependent variable, which is negative and significant regardless of enrolment size, suggesting that universities with low enrolment have a high applicant-to-faculty ratio. The deviation and ST ratio are positive and significant, suggesting that the higher the deviation and the smaller the number of teachers, the higher the multiplier. The applicant multiplier is also higher if the drop-out rate is low, enrolment is low and the school is not newly established. However, these do not apply to large universities. To characterise rural areas, rural dummies are included in this section instead of urban dummies. The rural dummies are negative, which means that rural areas have lower applicant multipliers, but these do not apply to large universities.

Table 4-2 considers the impact on drop-out rates. Applicant multipliers have different signs for small and large universities. For small universities, the drop-out rate is higher the lower the applicant-to-faculty ratio. For large universities, the higher the applicant ratio, the higher the drop-out rate. Students at large universities may have higher expectations due to high applicant multipliers. The number of students enrolled is negatively significant regardless of size and positively significant for the number of students enrolled, so the lower the number of students enrolled, the greater the dropout rate; the ST ratio is negative and significant only for medium-sized universities, so an increase in the number of teachers increases the dropout rate, confirming that the ST ratio is not effective in deterring dropout rates. Newly established schools have lower drop-out rates in small universities, but higher drop-out rates in medium and large universities, with the effect differing according to university size. Rural/urban differences do not affect drop-out rates, as suggested by the fact that all rural dummies are not significant.

Table 4-3 shows enrolment as the dependent variable. The lower the applicant multiplier, the higher the deviation, the higher the number of enrolments, but this does not apply to large universities. The ST ratio is positive and significant only for small universities. Increasing the number of teachers decreases enrolment, confirming that the ST ratio has no effect on enrolment at small universities, while the ST ratio has no effect at medium and large universities. The drop-out rate is an important indicator, as lower drop-out rates increase enrolments. Also, small new schools have a negative impact on enrolment, while medium and large universities have a positive impact. As many of the new schools are small, it can be said that many of the universities established as a result of relaxed criteria for establishing universities have low enrolments. The rural dummy is negative and significant only for medium-sized universities. This means that enrolments in rural areas are lower than in urban areas.

6. Discussion and consideration

This study categorised universities in Japan by size and tested three hypotheses about the MEXT's quality assurance policies since the 2000s, including the increase in the number of universities, diversification of education, regional development, accreditation systems and subsidies. A particular focus was placed on small regional universities.

The first, in terms of the number of universities and regional development, used GIS information to check whether the number of universities and students had moved to the regions. The number of universities increased in all provinces, while the number of students increased in half of the provinces in the country and decreased in half. The number of students per small university also decreased, and the number of students at small universities in ten provinces decreased. The policy outcome is that universities are dispersed but students are not well-dispersed and the dispersion of universities is likely to be only temporary. The number of new schools has increased, but students are moving to medium and large schools outside the province. Local development has only been achieved in about half of the prefectures, leaving 10 prefectures in a very difficult situation.

Second, we checked the competitive environment by university size in terms of whether diversification and quality assurance in education have been achieved and differentiation between universities has been achieved. Small universities were found to be in perfect competition, large universities in monopolistic or monopolistic competition and medium-sized universities in monopolistic competition. The quality of education in small universities can be regarded as highly standardised when compared to other universities in the county, while large universities can be regarded as highly diversified when compared to universities nationwide. Efforts to improve the quality of education have been effective in large universities, but differentiation has not been achieved in small universities, which face full competition.

Third, analysis was conducted to explore the relationship between university survival and educational quality, and the factors influencing drop-out rate control differ by university size. Higher applicant-to-faculty ratios and higher enrolments are important for small universities, while educational quality indicators such as ST ratios have no impact. For enrolment, higher deviation and lower drop-out rates tend to increase enrolment in small universities, while similar results are not obtained for medium and large universities. ST ratio and drop-out rate are education quality indicators, but considering the size of the universities, no indicator that can be called a special remedy, and the ST ratio was confirmed not to be an effective indicator. In addition, although the capacity-filling ratio is emphasised in university management, it cannot be said to be an indicator for measuring the quality of education, and it cannot be denied that university management may change the capacity as frequently as they consider the capacity-filling ratio important for obtaining grants. It was confirmed that the capacity-filling rate is not a sufficient indicator for business management.

Unlike other industries, the output of university education often uses employment rates, as it is difficult to create university rankings based on the employment destinations of graduates, but while employment rates may be an appropriate indicator in times of low employment rates, they are hardly an appropriate output indicator for universities today. It is difficult for prospective students to judge before enrolment whether a university is suitable for them in terms of whether they will be able to get the job they want after graduation. It is necessary to urgently develop appropriate output indicators and discover KPIs that influence output indicators. It is also necessary to devise ways to make the quality of students' education transparent through the sharing of graduation theses online, etc. Universities are increasing the proportion of business studies universities, which tend to have high employment rates and relatively high numbers of applicants for admission, to increase grant funding. This may be promoting further uniformity among small universities. From the perspective of nurturing students with individuality and diverse backgrounds, universities shouldn't be biased towards a few disciplines. In addition, given the uncertainties of the future, it is also important for universities to develop the ability to overcome areas of weakness. Popular disciplines for students are often those in which students have an inherently high level of interest and not those in which they are weak. In recent years, increasing employment needs for digital personnel have increased the need for companies by engineering students. This has led to an increase in the number of engineering schools and an increasing number of universities offering engineering content in their humanities departments. While it is important for the nation's small universities, especially single colleges, to deal with disciplines with high employment rates, not only to secure student numbers but also to receive subsidies, we believe that this leads to uniformity in the universities. In order to improve the quality of education, we believe that it is necessary to realise a policy of sustaining universities that enrol so many students that they can have more than one faculty. In other words, it is necessary to educate universities to utilise the diversity of their faculty and to take advantage of economies of scale. This may require merging single colleges and providing diverse educational opportunities through inter-university agreements. In addition, the quality of education is likely to deteriorate in the future at universities in financial difficulty, and if policies are not introduced to exit the market as soon as possible, the productivity of graduates from financially distressed universities is likely to decline further in the future. An increasing number of universities are teaching almost all of their subjects according to the legally prescribed minimum number of teachers. In such universities, mechanisms are at work to keep the university alive by reducing the quality of education through a decrease in the number of subjects, an increase in the number of subjects per teacher and a decrease in motivation due to lower remuneration for teachers.

Concernin regional development, it is important to aim for regional development from a medium- to long-term perspective, rather than simple

regional development through the establishment of regional universities, by not being concerned with regional university graduates finding employment in the regions, but by setting the two stages as one of outflow from regional universities to urban areas and return from urban workers to the regions a few years later. When assuming a return to rural areas, it is essential to create places in rural areas where the skills acquired as urban workers can be utilised, as well as to implement and support such education. In addition, a policy framework other than market competition is needed, such as the construction of university curricula in line with the local employment environment and the aspirations of local businesses.

Challenges with this study include the fact that the analysis does not use an annual database and does not take into account national universities and correspondence universities.

Appendix

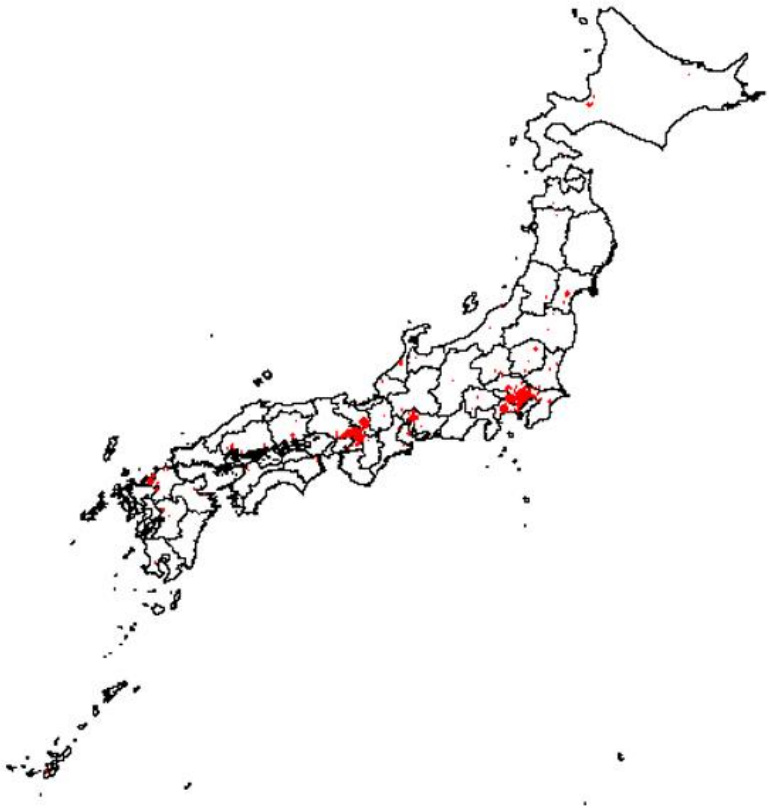


Figure 1. *Distribution of university in Japan*

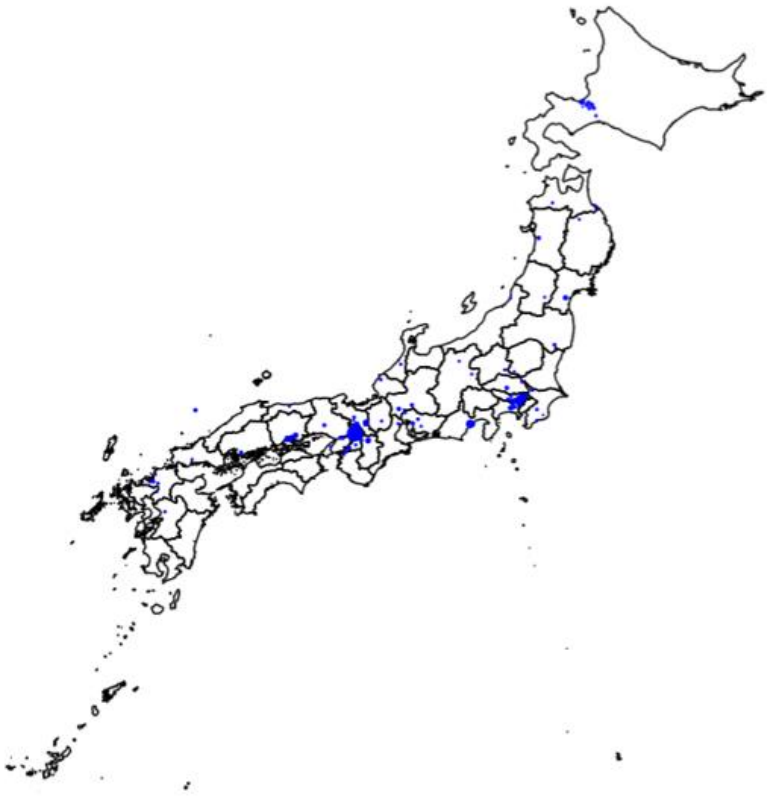
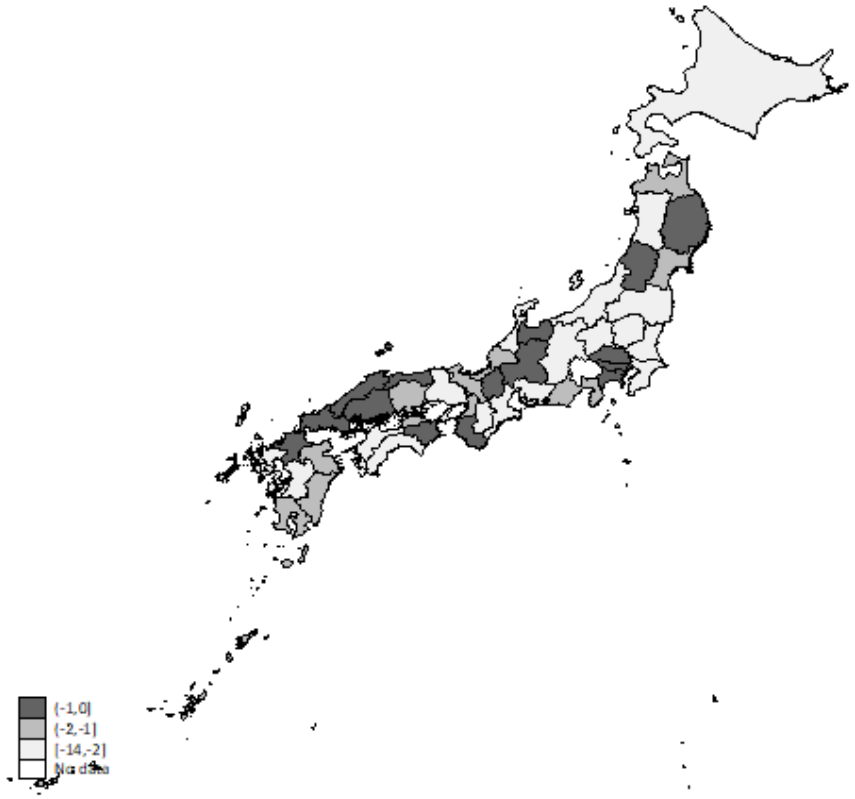
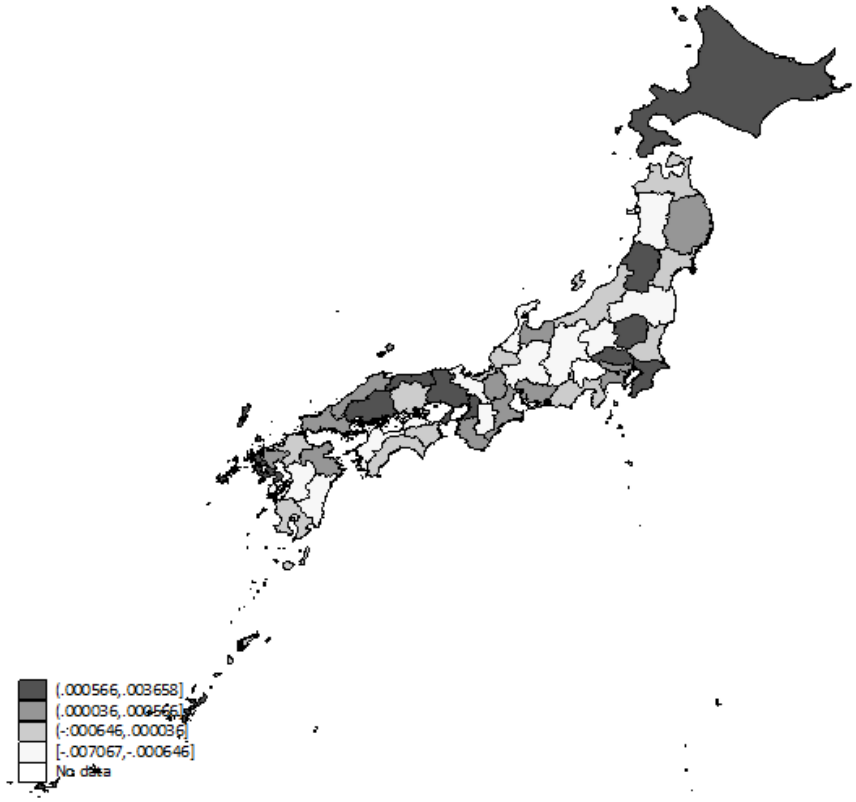


Figure 2. *Distribution of new university since 2000*



*Black means no change in the num. of universities since 2004, white means big decrease.

Figure 3. *Change in the num. of university by prefecture since 2004*



*Black means outflow from prefecture after 2004, white means inflow into the prefecture.

Figure 4. *Num. of University students inflows and outflows by prefecture*

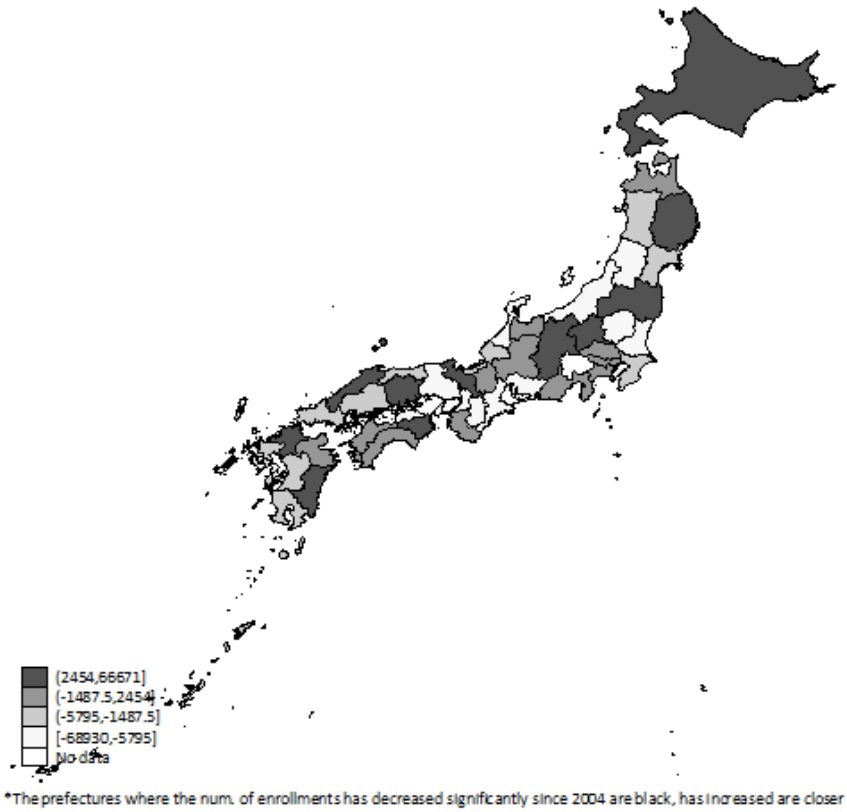


Figure 5. *Change in the num. of enrollment by prefecture since 2004 (only small-medium sized)*

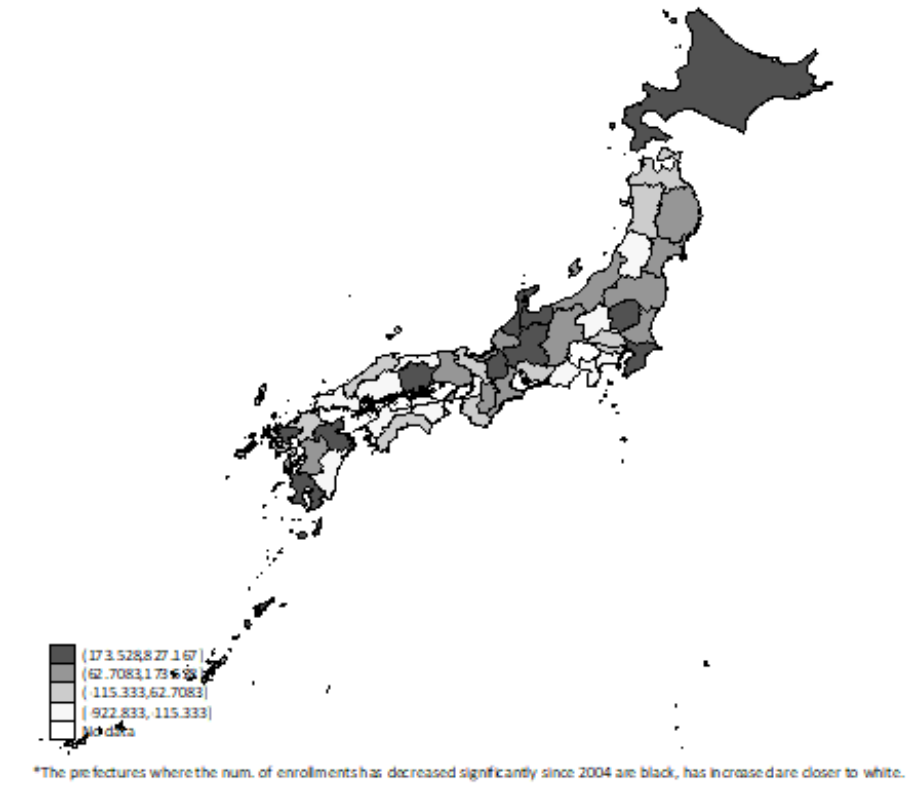


Figure 6. *Change in the num. of students per one university by prefecture since 2004 (only small-medium sized)*

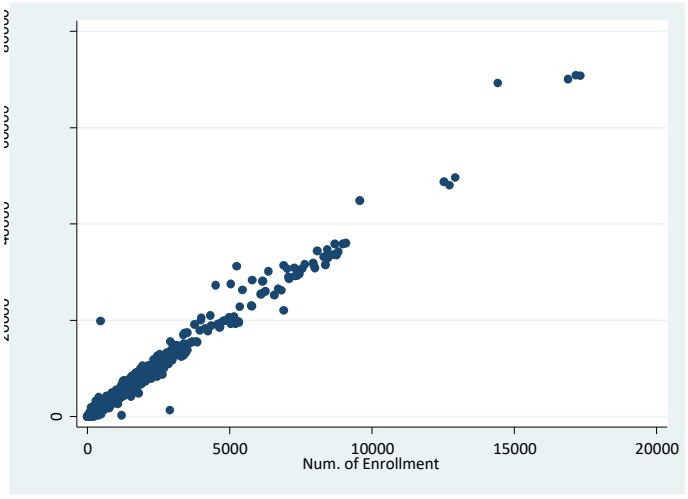


Figure 7. *Num. of Enrollment and Num. of Registered Student*

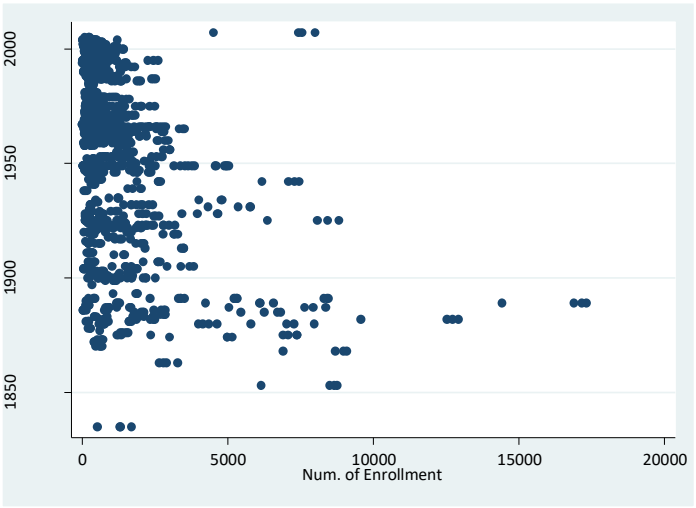


Figure 8. *Established Year and Num. of Enrollment*

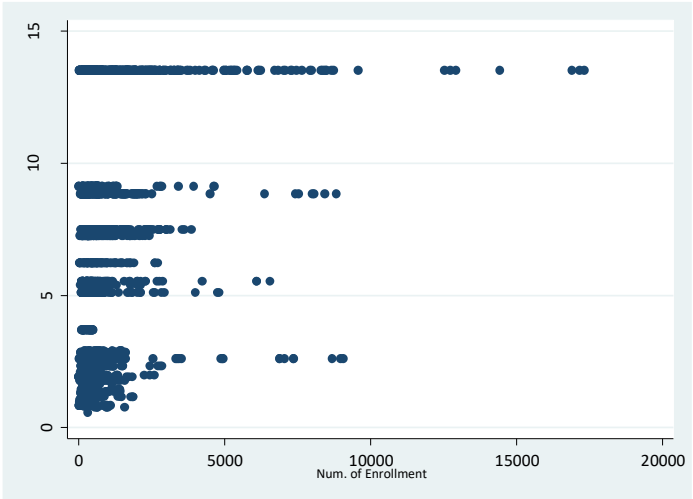


Figure 9. *Population by Prefecture and Num. of Enrollment*

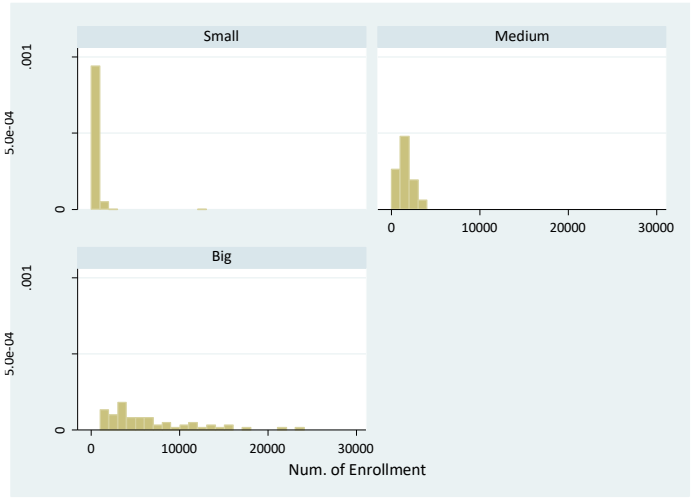


Figure 10. *Num. of Enrollment by University Size*

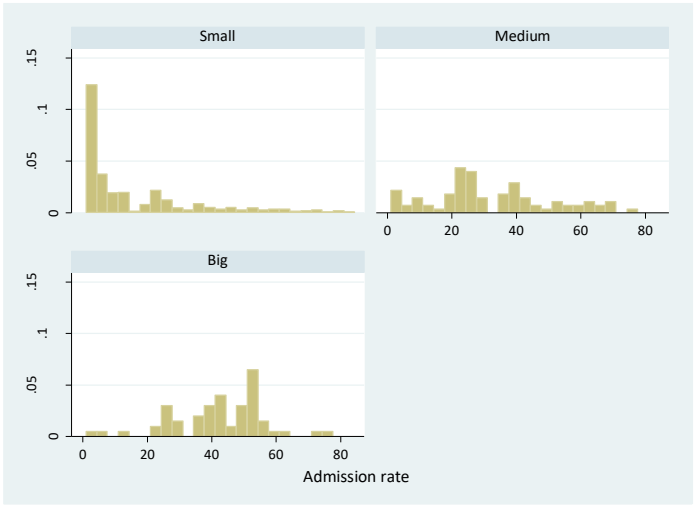


Figure 11. *Admission rate by University Size*

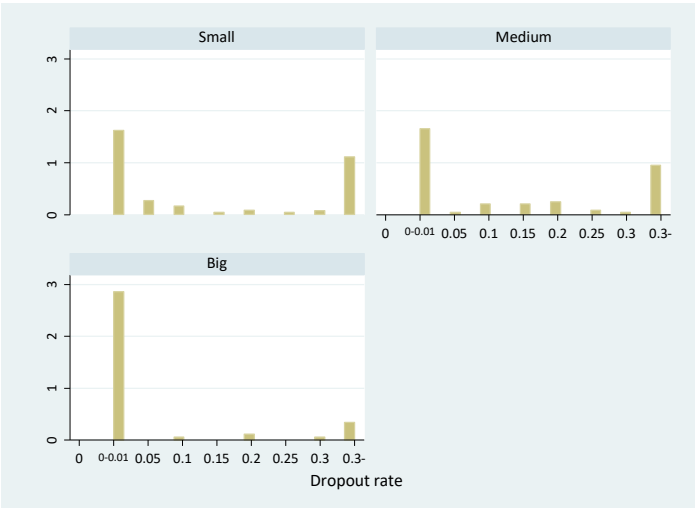


Figure 12. *Dropout rate by University Size*

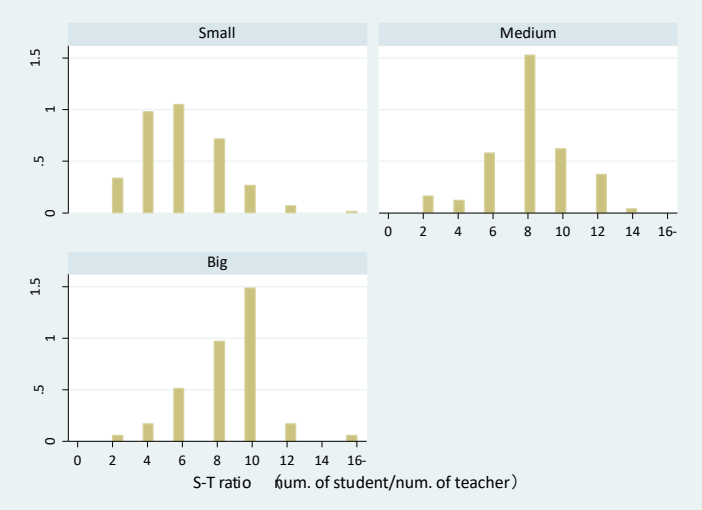


Figure 13. *Student-Teacher rate by University Size*

Table 1. *Log Income (Panel Analysis)*

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Large	Large	Medium	Medium	Small	Small	Ent<800	Ent<800
LR	-1.528**	-1.243***	-0.105	-0.421***	-0.442***	-0.843**	-0.411**	-0.812**
	(0.0360)	(0.0009)	(0.1940)	(0.0001)	(0.0100)	(0.0327)	(0.0399)	(0.0411)
LW	1.43**	1.06***	3.146***	1.132***	1.942***	1.795**	2.47***	1.977***
	(0.0490)	(0.0030)	(0.0010)	(0.0014)	(0.0060)	(0.0402)	(0.0010)	(0.0004)
LF	3.15***	1.216***	1.583**	2.11***	3.331**	1.884***	1.711***	1.449***
	0.0000	(0.0002)	(0.0210)	(0.0010)	(0.0406)	(0.0100)	(0.0073)	(0.0091)
Constant	4.509**	8.349**	3.586***	7.39***	10.541***	10.553***	5.246***	4.264***
	(0.0140)	(0.0110)	0.0000	0.0000	0.0000	0.0000	(0.0002)	(0.0030)
Modified R Square	0.28	0.45	0.39	0.41	0.4	0.44	0.39	0.52
Observations	180	180	249	249	1365	1365	1185	1185
Method	FE	RE	FE	RE	FE	RE	FE	RE
Wu-Hausman Test		9.14		11.42		25.25		22.43

p values in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 2. *Descriptive Statistics*

	Num. of Sample	Average	Standard Dev.	Min	Max
Dropout rate	2,267	0.535	2.999	0	55.583
Registered Student	2,288	3593.907	6068.250	180	70825
Num of Enrollment	2,274	1105.887	2343.034	50	24084
Student-Teacher Ratio	2,289	5.913	5.803	0.8	158
Admissions rate	2,388	19.338	19.732	0.9	81
Medicine-Pharmaceutical	2,388	0.064	0.244	0	1
Newly Established	2,388	0.166	0.372	0	1
Established Year	996	1960.637	36.816	1835	2007
Prefecture	2,388	20.057	11.179	1	47
Block	2,388	4.503	1.957	1	8
Rate of Change in Student Capacity	2,264	0.033	0.186	-0.296	2
2004	2,388	0.250	0.433	0	1
2009	2,388	0.250	0.433	0	1
2014	2,388	0.250	0.433	0	1
Deviation Value	2,388	47.414	6.710	38.5	69.3
Num. of Department	2,388	2.935	2.683	1	19
College	2,388	0.190	0.488	0	1
Urban	2,388	0.497	0.500	0	1

Table 3-1. *Impact on Admission rate: Cross-Section*

	(1)	(2)	(3)	(4)	(5)	(6)
	Small	Medium	Big	Small	Medium	Big
Num of Enrollment	-0.000102	-0.00203	-0.000910**	-0.000235	-0.00298**	-0.000820**
	(0.000675)	(0.00143)	(0.000424)	(0.000645)	(0.00132)	(0.000401)
Deviation Value	1.475***	1.569***	1.047***	1.363***	1.276***	0.914***
	(0.0815)	(0.213)	(0.179)	(0.0788)	(0.200)	(0.172)
Student-Teacher Ratio	-0.111	0.678	0.720*	-0.122*	0.201	0.763**
	(0.0727)	(0.414)	(0.407)	(0.0695)	(0.388)	(0.386)
Dropout Rate	0.0159	-0.111	9.804	-0.0109	-0.209	8.040
	(0.137)	(0.175)	(6.848)	(0.131)	(0.161)	(6.491)
Medicine-Pharmaceutical	2.564	-9.090	-4.411	2.374	-11.45*	-1.344
	(1.728)	(6.859)	(4.870)	(1.651)	(6.301)	(4.724)
College	3.450***	3.313	-7.298**	2.986***	3.122	-8.158**
	(0.787)	(3.193)	(3.566)	(0.755)	(2.924)	(3.396)
Registered Student	0.00389***	0.00431***	0.000272*	0.00356***	0.00399***	0.000213
	(0.000476)	(0.000882)	(0.000155)	(0.000456)	(0.000808)	(0.000147)
Newly Established	-8.636***	-22.39***	1.654	-8.603***	-19.36***	1.188
	(1.070)	(4.857)	(6.848)	(1.032)	(4.454)	(6.471)
Urban				2.987***	9.741***	7.029***
				(0.707)	(1.754)	(2.513)
Num of Department	0.629	-0.573	-6.681**	2.257**	3.435	-2.052
	(1.059)	(2.538)	(2.825)	(1.012)	(2.326)	(2.670)
Prefecture	0.319	-0.723	0.0497	1.809*	2.851	4.143*
	(0.976)	(2.419)	(2.407)	(0.933)	(2.216)	(2.275)
Block	0.161	-0.120	-0.397	0.577	1.079	0.904
	(0.977)	(2.394)	(2.412)	(0.933)	(2.193)	(2.278)
Constant	-57.65***	-69.53***	-20.63**	-54.45***	-57.87***	-23.28**
	(3.778)	(11.70)	(9.906)	(3.631)	(10.89)	(9.365)
Observations	1,711	323	233	1,711	323	233
Modified R square	0.410	0.334	0.212	0.416	0.399	0.249

Standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Table 3-2. *Impact on Dropout rate:Cross-Section*

	(7)	(8)	(9)	(10)	(11)	(12)
	Small	Medium	Big	Small	Medium	Big
Admissions rate	0.000498	-0.0117	0.000937	-0.000375	-0.0257	0.000862
	(0.00430)	(0.0183)	(0.000655)	(0.00449)	(0.0199)	(0.000695)
Num of Enrollment	-0.000385***	-0.00206***	-2.20e-05***	0.000394***	-0.00221***	2.17e-05***
	(0.000119)	(0.000450)	(3.92e-06)	(0.000119)	(0.000450)	(3.93e-06)
Deviation Value	-0.0372**	0.0466	-0.00178	-0.0408***	0.0300	-0.00199
	(0.0157)	(0.0747)	(0.00188)	(0.0158)	(0.0745)	(0.00189)
Student-Teacher Ratio	-0.00679	-0.125	-0.00699*	-0.00805	-0.185	-0.00656
	(0.0129)	(0.134)	(0.00398)	(0.0129)	(0.136)	(0.00401)
Medicine-Pharmaceutical	0.596*	-2.425	-0.0681	0.591*	-2.933	-0.0574
	(0.306)	(2.222)	(0.0475)	(0.306)	(2.216)	(0.0488)
College	0.227	-0.307	-0.0550	0.200	-0.249	-0.0600*
	(0.140)	(1.035)	(0.0350)	(0.140)	(1.028)	(0.0354)
Registered Student	1.29e-06	9.94e-05	5.22e-06***	-1.12e-05	0.000135	5.03e-06***
	(8.58e-05)	(0.000296)	(1.48e-06)	(8.59e-05)	(0.000294)	(1.49e-06)
Newly Established	-1.002***	-0.986	0.121*	-1.064***	-1.047	0.119*
	(0.191)	(1.624)	(0.0665)	(0.193)	(1.609)	(0.0665)
Urban				0.290**	1.517**	0.0253
				(0.131)	(0.640)	(0.0264)
2004	-0.704***	-1.626**	0.0901***	-0.710***	-1.423*	0.0865***
	(0.187)	(0.816)	(0.0273)	(0.187)	(0.815)	(0.0271)
2009	-0.0338	-0.00490	-0.00482	-0.0359	0.118	-0.00899
	(0.173)	(0.783)	(0.0235)	(0.173)	(0.780)	(0.0237)
2014	-0.0168	-0.0204	0.00106	-0.0196	0.0398	-4.95e-05
	(0.173)	(0.775)	(0.0236)	(0.173)	(0.770)	(0.0236)
Constant	2.599***	2.825	0.240**	2.705***	3.501	0.235**
	(0.710)	(3.992)	(0.0965)	(0.712)	(3.987)	(0.0970)
Observations	1,711	323	233	1,711	323	233
Modified R square	0.035	0.090	0.367	0.037	0.106	0.370

Standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Table 3-3. *Impact on Num. of Enrollment: Cross-Section*

	(13)	(14)	(15)	(16)	(17)	(18)
	Small	Medium	Big	Small	Medium	Big
Admissions rate	-0.132	-3.175	-22.48**	-0.333	-5.410**	-22.77**
	(0.872)	(2.233)	(10.46)	(0.913)	(2.401)	(11.13)
Deviation Value	4.309	51.62***	131.7***	3.871	48.02***	133.5***
	(3.198)	(8.638)	(28.93)	(3.213)	(8.630)	(29.15)
Student-Teacher Ratio	6.631**	-19.93	46.42	6.429**	-28.58*	43.05
	(2.609)	(16.39)	(64.38)	(2.611)	(16.47)	(64.81)
Dropout rate	-15.89***	-30.74***	-5,671***	-16.28***	-32.57***	-5,621***
	(4.911)	(6.700)	(1,012)	(4.915)	(6.647)	(1,017)
Medicine-Pharmaceutical	-92.44	-1,327***	-1,343*	-92.52	-1,375***	-1,429*
	(62.13)	(261.2)	(761.4)	(62.11)	(258.5)	(781.2)
College	-33.23	333.9***	-564.4	-36.79	332.8***	-521.5
	(28.44)	(125.0)	(564.3)	(28.53)	(123.4)	(572.1)
Registered Student	0.269***	0.277***	0.290***	0.267***	0.276***	0.291***
	(0.0162)	(0.0326)	(0.0148)	(0.0162)	(0.0321)	(0.0150)
Newly Established	3.873	272.4	3,021***	-5.897	252.0	3,029***
	(39.19)	(197.8)	(1,057)	(39.59)	(195.0)	(1,058)
Urban				-49.09	-357.1***	-2,225***
				(38.10)	(97.41)	(419.4)
2004	-48.52	-399.5***	-2,318***	11.25	55.50	-4.609
	(38.06)	(97.69)	(421.5)	(35.13)	(94.66)	(381.8)
2009	11.14	33.04	-105.8	20.10	13.91	-29.68
	(35.10)	(95.60)	(378.2)	(35.10)	(93.49)	(379.6)
2014	20.41	3.561	-58.77	41.75	227.6***	-206.4
	(35.11)	(94.60)	(379.0)	(26.72)	(77.32)	(425.8)
Constant	-197.0	-2,285***	-4,640***	-184.3	-2,125***	-4,646***
	(144.7)	(470.3)	(1,541)	(145.3)	(469.6)	(1,550)
Observations	1,711	323	233	1,711	323	233
Modified R Square	0.224	0.394	0.821	0.225	0.411	0.822

Standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Table 3-4. *Impact on Rate of Change in Student Capacity: Cross-Section*

	(19)	(20)	(21)	(22)	(23)	(24)
	Small	Medium	Big	Small	Medium	Big
Dropout rate	0.000106	0.00271***	0.0785***	0.000381	0.00242***	0.0791***
	(0.00171)	(0.000614)	(0.0171)	(0.00171)	(0.000611)	(0.0172)
Admissions rate	0.000711**	1.78e-05	0.000903***	0.000838**	-0.000205	0.000962***
	(0.000316)	(0.000201)	(0.000170)	(0.000329)	(0.000215)	(0.000181)
Num. of Enrollment	-2.68e-06	-7.19e-06	3.70e-06***	-1.67e-06	-1.03e-05**	3.80e-06***
	(8.50e-06)	(4.90e-06)	(1.01e-06)	(8.48e-06)	(4.92e-06)	(1.02e-06)
Deviation Value	0.000716	-6.92e-05	-0.000241	0.00112	-0.000221	-0.000146
	(0.00115)	(0.000826)	(0.000484)	(0.00116)	(0.000818)	(0.000489)
Student-Teacher Ratio	0.000559	-0.00211	-0.00283***	0.000681	-0.00296**	-0.00306***
	(0.00103)	(0.00149)	(0.00105)	(0.00103)	(0.00149)	(0.00105)
Medicine-Pharmaceutical	-0.0123	0.0832***	-0.0185	-0.0132	0.0739***	-0.0233*
	(0.0222)	(0.0243)	(0.0125)	(0.0221)	(0.0241)	(0.0128)
College	0.00928	0.00824	-0.00459	0.0126	0.00804	-0.00253
	(0.0103)	(0.0122)	(0.00925)	(0.0104)	(0.0120)	(0.00937)
Registered Student	-6.35e-06	4.43e-06	-1.08e-06***	-5.21e-06	5.18e-06	1.05e-06***
	(6.29e-06)	(3.23e-06)	(3.78e-07)	(6.28e-06)	(3.19e-06)	(3.82e-07)
Newly Established	0.160***	0.0522***	-0.0463***	0.166***	0.0507***	-0.0460***
	(0.0137)	(0.0178)	(0.0176)	(0.0138)	(0.0175)	(0.0176)
Urban				-0.0288***	0.0232***	-0.0115*
				(0.00958)	(0.00700)	(0.00696)
Constant	-0.0391	0.0278	0.0167	-0.0518	0.0351	0.0213
	(0.0515)	(0.0448)	(0.0252)	(0.0516)	(0.0443)	(0.0254)
Observations	1,617	319	233	1,617	319	233
Modified R Square	0.090	0.165	0.237	0.095	0.194	0.239

Standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Table 4-1. *Impact on Admission rate: Panel Multi-Level (Num. of Department)*

	(25)	(26)	(27)
	Small	Medium	Big
Dependent Variable	Admissions rate	Admissions rate	Admissions rate
Num of Enrollment	-0.00106***	-0.00134***	-0.000123*
	(0.000327)	(0.000121)	(7.28e-05)
Deviation Value	1.424***	1.480***	0.847***
	(0.152)	(0.319)	(0.304)
Student-Teacher Ratio	0.0135***	0.461***	0.206*
	(0.00521)	(0.150)	(0.122)
Dropout Rate	-0.0446*	-0.443***	6.315***
	(0.0233)	(0.150)	(1.677)
Medicine-Pharmaceutical	1.367	-18.65	-4.437
	(3.091)	(14.16)	(6.965)
College	1.771	1.197	-3.609
	(1.696)	(3.863)	(4.178)
Registered Student	-0.000500***	-0.000466***	-0.000106
	(0.000130)	(0.000124)	(9.30e-05)
Newly Established	-10.60***	-20.02***	5.741
	(0.752)	(2.693)	(3.538)
Urban	-3.248**	-8.713***	-3.931
	(1.559)	(2.717)	(4.752)
Num of Department	1.522***	1.151*	0.557
	(0.518)	(0.588)	(0.477)
Prefecture	-0.215	-0.953	1.744
	(0.227)	(0.804)	(1.696)
Block	0.560	3.046	-11.84
	(1.190)	(4.979)	(8.821)
Constant	-47.77***	-35.31**	6.423
	(7.715)	(15.58)	(20.31)
Observations	1,626	319	233

※It has four levels of Number of Department, Universities Code, Prefecture and Block
Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 4-2. *Impact on Dropout rate: Panel Multi-Level (Num. of Department)*

	(28)	(29)	(30)
	Small	Medium	Big
Dependent Variable	Dropout rate	Dropout rate	Dropout rate
Admissions rate	-0.00738**	-0.0296	0.00273***
	(0.00349)	(0.0190)	(0.00102)
Num of Enrollment	-0.000639	-0.000333***	-3.64e-05***
	(0.000447)	(0.000119)	(8.04e-06)
Deviation Value	-0.0422***	-0.0558	-0.00312
	(0.0163)	(0.0654)	(0.00251)
Student-Teacher Ratio	-0.0101	-0.0412***	-0.00827
	(0.0100)	(0.0157)	(0.00762)
Medicine-Pharmaceutical	0.654***	0.726	-0.0412
	(0.250)	(0.836)	(0.0413)
College	0.356***	0.900	-0.171**
	(0.122)	(1.007)	(0.0672)
Registered Student	0.000354***	0.000127***	1.33e-05***
	(9.22e-05)	(4.28e-05)	(3.69e-06)
Newly Established	-0.911***	-1.701*	0.100***
	(0.320)	(0.936)	(0.0389)
Urban	-0.273	-1.401	-0.0452
	(0.210)	(1.279)	(0.0501)
Num of Department	-0.0460	0.246	-0.0152**
	(0.0540)	(0.198)	(0.00698)
Prefecture	-0.0348*	-0.476	-0.0392***
	(0.0196)	(0.426)	(0.0119)
Block	0.153	2.854	0.223***
	(0.106)	(2.605)	(0.0617)
Constant	2.587***	0.876	0.165
	(0.929)	(1.695)	(0.156)
Observations	1,626	319	233

※It has four levels of Number of Department, Universities Code, Prefecture and Block

Standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Table 4-3. *Impact on Num. of Enrollment: Panel Multi-Level (Num. of Department)*

	(31)	(32)	(33)
	Small	Medium	Big
Dependent Variable	Dropout rate	Dropout rate	Dropout rate
Admissions rate	-2.637***	-6.221***	4.499
	(0.746)	(2.264)	(15.48)
Deviation Value	16.50**	44.51***	27.77
	(7.809)	(13.57)	(43.00)
Student-Teacher Ratio	2.627**	-21.11	-50.92
	(1.339)	(24.34)	(143.7)
Dropout rate	-11.98*	-34.34***	-12,579***
	(6.875)	(8.941)	(2,074)
Medicine-Pharmaceutical	-233.5	-1,251**	-829.0
	(179.3)	(551.6)	(840.6)
College	-40.38	255.7	-3,014***
	(67.34)	(257.8)	(749.4)
Registered Student	0.0983***	0.240***	0.383***
	(0.0197)	(0.0641)	(0.0375)
Newly Established	-63.35*	327.2***	2,234***
	(33.30)	(92.22)	(424.4)
Urban	-98.80	-306.4***	-527.1
	(78.79)	(81.48)	(609.7)
Num of Department	76.98***	4.993	-293.4***
	(23.07)	(39.51)	(87.03)
Prefecture	7.761	11.58	-605.9**
	(7.047)	(13.42)	(290.3)
Block	-47.62	-13.34	3,496**
	(49.61)	(41.75)	(1,585)
Constant	-457.2	-1,821***	-1,289
	(316.0)	(524.8)	(2,379)
Observations	1,626	319	233

※It has four levels of Number of Department, Universities Code, Prefecture and Block

Standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

References

Becker, G.S. (1964). Human capital: A theoretical and empirical analysis, with special reference to education, *National Bureau of Economic Research*, New York.

Chamberlin, E.H. (1933). *Theory of Monopolistic Competition*, Harvard University Press.

Duyar, I., Gumus, S., & Bellibas, M.S. (2013). Multilevel analysis of teacher work attitudes, *International Journal of Education Management*, 27, 700-719. doi. 10.1108/IJEM-09-2012-0107

Epple, D., & Romano, R.E. (1998). Competition between private and public schools, vouchers, and group effects, *American Economic Review*, 88(1), 33-62.

Hanushek, E.A., & Welch, F. (2006). *Handbook of the Economics of Education*, 1 and 2. North Holland, Amsterdam.

Hanushek, E.A., Machin, S., & Woessmann, L. (2011). *Handbook of the Economics of Education*, 3 and 4. North Holland, Amsterdam.

Hanushek, E.A., Rivkin, S.G., & Schiman, J.C. (2016). Dynamic effects of teacher turnover on the quality of instruction, *Economics of Education Review* 55, 132-148. doi. 10.1016/j.econedurev.2016.08.004

Hill, P.W., & Rowe, K.J. (1996). Multilevel modeling in school effectiveness research, *School Effectiveness and School Improvement*, 7(1), 1-34. doi. 10.1080/0924345960070101

Panzar, J.C., & Rosse, J.N. (1987). Testing for 'monopoly' equilibrium, *Journal of Industrial Economics*, 35(4), 443-456. doi. 10.2307/2098582

Yuzuru, M. (1997). *Evaluation of Urban Redevelopment Project using Monopolistic Competition Theory*, Mimeo. (in Japanese).

Yoshiro, T. (2000). *Industrial Organization of Banking Industry*, Mimeo. (in Japanese).

Promotion and Mutual Aid Corporation for Private Schools of Japan, 2016. "Application trends at private universities and junior colleges", *Promotion and Mutual Aid Corporation for Private Schools of Japan*, Private Management Information Center. (in Japanese).