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Competition between Professional Universities and Traditional Universities -A Cas for Japan

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ABSTRACT: This paper provides the theoretical results of the competition between MBA schools and universities. 1) It is thought that admission is decided at a professional university, etc., without observing the research results of the faculty's two types of outputs (education and research). In such a case, the number of schools and researchers at research universities will be too small. Accordingly, an accredited evaluation organization that is an external organization will confirm the research results and disclose the quality and quantity of the research results to admission examiners. Enrollment is done. 2) The number of professional universities will increase to the point where the rate of the teacher ratio will also increase. In the model where the discount rate of education for practitioners and teachers (the length of the period of practical use in the field) fluctuates, as the number of professional universities increases, the expiration date for practical use is short (the discount rate for education is large) Recruitment of practitioner teachers will reduce the return on education at professional universities. 3) A law that sets a guideline for the practitioner teachers' educable period is desirable for economic growth. 4) Subsidies to professional universities with higher educational returns will lead to a decrease in researcher faculty and research universities through a reduction in research expenses at research universities.

KEYWORDS: Professional-Researcher teacher ratio, Professional teachers, MBA, Number of Professional Universities, Number of Professional teachers, Subsidy

JEL:M10, I21, I23, I26

1. INTRODUCTION

In Europe and the United States, many graduates of business schools become senior executives in large companies, and an MBA degree plays a major role in the advancement of business careers. In addition to business schools, there are several other professional training schools around the world, including law schools, medical schools and schools for policy makers. In the United States, higher education degrees are divided into two categories: research degrees and professional degrees. In the United States, higher education degrees are divided into two categories: research degrees and professional degrees, which are awarded to researchers engaged in academic research and professionals who have worked in the field.

In general, universities and graduate schools with a large number of researchers and courses taught by researchers award research degrees, while universities and graduate schools with a certain number of professionals and courses taught by professionals award vocational degrees.

This study aims to examine theoretically the competition between universities for research degrees and professional universities for vocational degrees. Although previous research has examined theoretically the competition between public and private

universities, to the best of the author's knowledge no research examines the competitive relationship between professional universities and other universities in general. The types of vocational degrees are diverse and the definition of professional schools offering vocational degrees varies from country to country.

This study focuses on Japan, a country that has been active in the introduction of professional degrees in recent years. For simplicity of discussion, we focus on Japanese business schools, as professional schools are defined differently in different countries and there are multiple fields of study, but we believe that the implications of this study are applicable worldwide. In Japan, the supervisory authority for higher education institutions, including universities, is called the Ministry of Education, Culture, Sports, Science and Technology (hereafter MEXT).

In Japan, there is a high demand for business administration, as it has always been one of the top departments that prospective students want to study at university. However, in recent years there has been an increase in the demand from companies for graduates in the sciences and a decrease in the demand from companies for graduates in business administration. The demand from companies for graduates and the demand from students who wish to study business administration are no longer the same. Since the 1990s, Japan's economy has entered a prolonged recession and industrial competitiveness has declined. Since the 1990s, the Japanese economy has entered a prolonged recession and industrial competitiveness has declined. However, Japan has not emerged from the prolonged stagnation and MBA graduates in Japan have not brought the same rate of income growth as in the West. In this context, a law was drafted in 2017 to allow professional schools to be established at the undergraduate level rather than at the graduate level. The establishment of professional schools requires a minimum percentage of practising teachers and a teacher training system for practitioners to become practising teachers, and a number of new systems are regularly introduced through the Certification Evaluation System (CES). In examining the effects of the introduction of such systems, we believe it is appropriate to consider Japan as a case in point.

In Japan, to increase industrial competitiveness, the education system has been reformed by establishing professional universities and professional graduate schools where students can study practical education such as nursing, teaching, and management, in addition to the traditional research degree universities. In professional degree universities, not only researchers teach, but also practitioners are the main teachers in the curriculum of professional graduate/professional universities. There are several fields of study available, including law, management, education, fashion, nursing and teaching. Also, in order to train business people who can play an active role in the business world, and to train professionals with a high level of professional knowledge who can play an active role overseas, we have made it possible for students to study practical content at universities, such as professional graduate schools and professional universities, rather than at vocational schools. The aim is to increase the country's return on education, increase competitiveness and stimulate economic growth.

The purpose of this study is to examine the impact of the establishment of professional universities and professional graduate schools on traditional universities. It will also theoretically clarify the changes in the number of universities and the composition of their teaching staff through the competition between professional universities and professional graduate schools and regular universities. In Japan, professional graduate schools have been established since 2005, and many practitioners have been assigned to them. It is important to examine the effects of the increase in professional schools to consider the future of higher education.

In previous research on school education, many theoretical and empirical studies clarify the competitive relationship between private and public high schools, but most of them are studied from the demand side. On the other hand, some studies are conducted from the aspect of supply, which is analyzed from the viewpoint of economic growth. The present study is analysed from the aspect of supply. However, it will not be analysed only in terms of the rate of return on education as a result of traditional educational activities and educational content. It includes research activities. The activities of high school, secondary school and primary school teachers are mainly education and school administration work. University faculty members, however, include

research activities in addition to teaching and school administration, and many university faculty members devote a major part of their working time to research. The results of their research activities are an important factor in their promotion and remuneration within the university and in their ability to move to another university. The results of their research activities are also likely to be linked to the quality of their teaching.

This study focuses on professional universities and professional graduate schools, which are legally required to include practitioner teachers as faculty members. Professional universities and professional graduate schools include a variety of graduate schools and faculties such as nursing, education, law and management. To facilitate understanding, this study will focus on business schools as one example.

2. PREVIOUS REVIEW

An outcome measure in higher education is the rate of return on education. When comparing the rate of return on education of universities offering research degrees and business schools, one of the professional universities offering vocational degrees, previous studies show that vocational degrees are higher (Dale and Krueger 2002,2011).

Estimates of the rate of return on education have been widely used in Japan and other countries. International survey papers exist, such as Card (1999). In Japan, Seo and Kusakada (2011) and others have summarised studies of the rate of return on education in Japan.

However, there are not many studies in the world that focus on postgraduate education. Although few, research on the rate of return to higher education, including postgraduate education, has accumulated, mainly in Europe and the U.S. Jaegar and Page (1996) used U.S. Current Population Survey (CPS) data to analyze the effects of higher education degree attainment for white men, white women, black men and black women. They analysed the effects. Their analysis also compares the rates of return on general (Masters), professional (Professional) and doctoral degrees compared to undergraduate degrees. They conclude that there is a wage premium of between 5.5% and 15.5% for a general Masters degree, between 28.6% and 48.8% for a professional Masters degree and between 8.3% and 10.3% for a PhD compared to an undergraduate degree. It shows a higher rate of return for professional master's degrees.

Hussy (2012), using panel data on MBA graduates in the US, found that the educational rate of return for MBAs at top universities is about 30%. Fu and Ross (2013) found that the return on the education of US master's graduates was 10-12% higher than that of bachelor's graduates. Fu and Ross (2013) found that the returns to education for US master's graduates were 10-12% higher than for bachelor's graduates. Doctoral programs are 22-24% higher than bachelor's programs. Kakizawa (2014) estimated the internal rate of return for master's degree graduates, taking into account the number of years of employment, using the Employment Status Survey in Japan, and found that it was 11.4 for men and 10.1 for women. A theoretical analysis of the learning effects of Japanese higher education on research degrees using a macro production function was conducted by Murata (2016). Murata (2016) incorporates human capital formation into the macro production function and shows that labour productivity rises as government subsidies to higher education increase, based on the profit maximisation hypothesis for firms and the higher education level maximisation hypothesis for households. Epple and Romano (1988) analyzed the competitive environment between private and public schools and found that the voucher system increased the demand for private high school education, and also increased the selection of students based on ability. Grove and Hussey (2014) found a relationship between indicators of school quality and indicators of career success, with peer presence and school quality (curriculum, institutions, and teacher characteristics) being important. analysed the average salaries of graduates and found that pre-MBA salaries and curriculum quality are the most influential; Blackburn (2011) found that university reputation is the most important enrolment factor. Blackburn (2011) found that the reputation of the university was the most important entry factor, compared to the reputation, syllabus, quality, facilities and

careers; Gai and Polutnik (2016) found that salaries increased particularly for those entering MBAs with experience in the accounting, banking, finance and consulting industries; GMAT and elite undergraduate education were not associated with employment probability or distress levels; Guha et al. (2013) found that the effect of tuition fees on the choice of an MBA was not statistically significant.

Valera et al. (2013) argue that an MBA does not equip you with business management skills. Shue (2013), who developed the methodology, finds that executive peer networks influence executive compensation and acquisition strategies, especially for graduates of similar courses. In the year following the reunion, the peer effect is more than twice as strong; Grove and Hussey (2013) found a return of 7%, with MBAs returning twice as much as MIS; Bishop and SchWeber conduct a cost-effectiveness analysis of online MBAs.

Trieschmann et al. (2017) found that MBA performance is affected by budget per faculty member and professor ratio; research performance is affected by a number of faculty members, professor ratio, and associate professor ratio; Hussey (2012) found that the majority of returns are signaling; Arcidiacono et al. found that the top 25 and below full-time MBAs have even higher rates of return than the top-ranked.

Burbidge et al. (2012) aimed to estimate the effective tax rate and effective subsidy rate on investment in higher education using Canadian data, measuring the rate of return on investment in higher education. The estimates show that the private rate of return is estimated to be 8.8 percent for males and 10.3 percent for females in master's programs, and 2.4 percent and 7.7 percent for doctoral programs, respectively.

Walker and Zhu (2011) use data from the UK Labour Force Survey (LFS) to analyse the wage premium for undergraduates by discipline and estimate a wage premium of around 15 percent for postgraduate women and 5-10 percent for postgraduate men in all disciplines. Song et al. (2008) find that those with higher scores on the GRE quantitative test tend not to enter graduate school in the US, while those with higher scores on the verbal test tend to enter graduate school. Fu and Ross (2013) analyze the relationship between economic agglomeration and wages in the U.S. and find that the wage premium for master's degree holders increases from 5% to 7.3% and that for doctoral degree holders increases from 5% to 12.8%. Fu and Ross (2013), in their analysis of the relationship between economic concentration and wages in the US, report estimates of wage functions that include master's (MA) and higher degrees as explanatory variables, with wage premiums of 10-12% for MA and 22-24% for higher degrees compared to undergraduate degrees.

Recent studies that estimate the rate of return on education in Japan, including higher education, include Ono (2004), Sano and Yasui (2009), and Nakamuro and Inui (2012). However, there have been no estimates of the rate of return on professional and technical schools.

While Sano and Yasui (2009) and Nakamuro and Inui (2012) estimated the general rate of return on education, Ono (2004) conducted an analysis focusing on the quality of university education and found that the wage premium for university education varies widely from 2.5% to 15.6% depending on the quality of the university education Kawaguchi (2011) found that the wage premium for university education varies widely from 2.5% to 15.6% depending on the quality of university education. Using micro data from the Basic Survey on Wage Structure (2005-2008), Kawaguchi (2011) analyzes what points should be kept in mind when applying a Mincer-type wage function to data on male general workers in Japan. The study estimates potential years of experience-wage profiles for junior high school graduates, high school graduates, junior college graduates, technical college graduates, and four university and graduate school graduates. Hirao, Umezaki and Matsushige (2007, 2011) also analyse the postgraduate wage premium using individual data from a survey of Japanese firms. In the former, they show that if the starting salary of a postgraduate (master's) degree is higher than that of an undergraduate degree with two years of service, the subsequent wage increase is also higher for the master's degree. The latter shows that the wage premium has been declining over the past decade since the late

1990s as workers become more highly educated and that the substitutive relationship between postgraduate degrees in the humanities and undergraduate degrees in the humanities has become more pronounced.

According to Morikawa (2011), the postgraduate wage premium in Japan is about 20%, which is comparable to the US and UK. The wage premium is larger for women than for men. It has also been found that workers with postgraduate degrees experience a smaller decline in wages after the age of 60. Morikawa (2013a) also uses micro data from the Basic Survey on Employment Structure to compare the employment and wages of postgraduates with those of workers with undergraduate degrees. The results show that postgraduates have higher employment and full-time employment rates than undergraduates. Postgraduates also have higher incomes and lower poverty rates in terms of both personal and household income. There is a 30.3% wage premium for postgraduates compared to undergraduates, and by industry and type of work, it is very small for public service and very large for self-employed. There is little difference in the postgraduate wage premium between men and women, and postgraduates have been shown to have smaller wage declines after the age of 60. Morikawa (2013b) also compares the wage structures of the public and private sectors using micro data from the same Basic Survey on Employment Structure. According to the results, the wage premium for university and postgraduate graduates compared to high school graduates is 22.4% and 44.4% respectively in the private sector, while in the public sector it is smaller at 9.8% and 25.8% respectively. In particular, the results show that the premium for university and postgraduate degrees is very large for women working in the private sector.

3. THE SYSTEM OF PRACTICAL EDUCATION IN JAPAN

3.1 Professional University

Research universities and professional universities are the same universities, but the characteristics of the teaching staff differ between professional universities, which offer more practical content, and research universities, which teach the systematisation of knowledge and its application to reality through literature and research. The increase in the number of professional universities will lead to an increase in the number of practitioners, as professional universities will have more practitioners.

Professional universities were required by industry to respond to the need for practical education and the need for relearning as the rate of students entering higher education increased. They were established to strengthen the development of human resources capable of coping in a rapidly changing society, i.e. those with advanced practical and creative skills. The university system is a system that focuses on practical vocational education and aims to strengthen the training of professional human resources through cooperation with industry.

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A professional universities is similar to a technical college in that it is a vocational-focused school. Professional universities are similar to professional universities in that they are vocational schools. They provide students who wish to become designers, cake makers, bakers or other artisans with the knowledge and skills necessary to work in their chosen profession. Like professional universities, vocational schools also offer practical training. The most obvious difference between a vocational school and a

professional university is the degree that can be obtained after graduation: a vocational school offers a "professional" degree, whereas a professional university offers a "bachelor (professional)" degree. After graduating from a professional university, students can go on to graduate school or study abroad to pursue their studies. Professional universities are also directly linked to industry, allowing students to earn credits by working in the field. You can also study related subjects as in a normal university, so you can acquire a wide range of knowledge.

They also differ in that the period of study is four years for professional universities and at least one year for vocational schools. A professional university is a university that offers both theoretical and practical training and prepares professionals. A vocational school can be seen as a hybrid school, combining the elements of training craftsmen with those of improving university expertise, while the institutional boundaries between vocational schools and vocational universities are disappearing. Professional universities are backed by industry, so students are able to form close relationships with industry. The fact that many of Japan's top companies lend a hand in accepting students for off-campus training shows that there is a growing expectation that they will be able to secure human resources with the ability to work immediately. By experiencing first-hand the atmosphere of a professional workplace, students develop the ability to think and solve problems in an appropriate manner, and develop human resources who can be immediately effective.

Table1. Professional Schools in Higher education

	Professional University /Professional Junior College	Specialized Training Colleges
Years of service	4 years/2-3 years	1-4 years
Degrees and titles of graduates	Bachelor(professional) Junior college Student(professional)	Advanced Diploma or Diploma
Educational content	theory and practice	practice
Teaching content	practice(1/3), research in industry(2/3)	mainly practice
Instructors	practitioner teacher, researcher teacher	practitioner teacher
Number of students in class at the same time	in principle, 40 or less	in principle, 40 or less
Graduation credits	124 credits/62 or 93	800 hours/year

Technical school

At a vocational school, you can specialise in a particular profession (specialised course). If you want to be a hairdresser, you should go to a beauty school. If you want to be a designer, you should go to a design school. It takes two to three years to acquire the necessary skills, and the title given after graduation is limited to schools approved by prefectural governors in accordance with the School Education Law, but if you complete the two-year course designated by MEXT, you can become a specialist, and if you complete the four-year course, you can become an advanced specialist.

A vocational school is an educational institution that offers specialised courses. It is a formal institution of higher education and is open to students who have graduated from high school or a technical college. The duration of study is at least one year. The education at special training colleges differs from that at universities, which award research degrees, in that the emphasis is on practical training to develop professionals, with 50% of classes consisting of lectures, 40% of practical training and 10% of in-company training. Graduates of two- or three-year courses are awarded a Diploma, and graduates of four-year courses are awarded an Advanced Diploma. The Diploma is generally transferable to universities, while the Advanced Diploma entitles the holder to

enter a graduate school. Professional training colleges that offer higher education without specialised courses can be called special training colleges. In recent years, there has been an increase in the number of normal vocational schools and university-affiliated vocational schools being converted into universities.

3.2 Professional Graduate School

The statutory aims of the graduate schools awarding research degrees are as follows

The purpose of the school is to teach and research academic theories and applications, to cultivate profound knowledge and outstanding ability, comprehensive and comprehensive skills to develop profound knowledge and skills for occupations requiring a high degree of specialization, and to contribute to the development of culture (Article 99, Paragraph 1 of the School Education Law).

While the above graduate schools aim at the advancement of culture, professional graduate schools aim at the training of highly-skilled professionals. According to the laws and regulations (University Establishment Standards for Professional Graduate School), 30% or more of the faculty members must be practitioners (with no requirement for research ability).

In Japan, there is not necessarily a high demand for the establishment of graduate schools that specialize in the training of high-level professionals like professional schools in the U.S. As a result, graduate schools in Japan have been developed mainly by universities that mainly offer research degrees. In some graduate schools, such as master's degree programs in engineering and pharmacy, the weight of training practitioners such as engineers has become larger than that of training researchers in response to social demands and the progress of science and technology. However, on the whole, the graduate school system before 2005 focused on the role of training researchers.

However, in recent years, in response to rapid technological innovation, rapid changes in the social economy, and diversification, complexity, sophistication, and globalization, there have been increasing expectations and social demands for graduate schools to train advanced professionals who can be accepted by society and the international community. Expectations and social demands for the training of highly-skilled professionals of international standing are increasing in various fields, not only for the training of those who are going to work in specific professions or acquire professional qualifications, but also for the provision of opportunities for continuing education and re-education to enable those who are already working in professions or have acquired qualifications to acquire a higher level of professional knowledge and practical skills. It has become more important than ever before to enhance practical education, such as the acquisition of highly specialized knowledge and the development of skills required to engage in a particular profession.

The system of professional graduate schools was launched in April 2005, ahead of the system of professional universities, in order to dramatically improve the quality and quantity of training of highly-skilled professionals who will be active internationally and in society, and to enable universities to fulfill their function of developing human resources to meet the expectations of society. Professional graduate schools are required to realize practical education through cooperation and exchange with the business world through the participation of practitioners, and to guarantee flexible and high quality education in response to changes by introducing evaluation by a third party.

3.3 International accreditation bodies and the role of practitioner teachers in business schools

In Japan, there are three accreditation bodies for professional graduate schools of business administration: the Japanese Association of University Standards, ABEST21, and the Association of Graduate Schools of Accountancy (AOPAS). On the other hand, looking outside Japan, accreditation bodies in the field of business education have been actively promoting their accreditation in Asia. The EFMD issues EQIS and EPAS. The EFMD publishes the EQIS and EPAS accreditations, and the three institutions share a common focus on (1) mission and strategy, (2) learning outcomes, (3) faculty qualifications, (4) quality assurance, and (5) permanence. In addition, with regard to the perspectives (6) internationalisation and (7) corporate collaboration,

although not common to all three institutions, they are treated as priority criteria by the EFMD.

On the first point, mission and strategy, the EFMD require a clear mission, a clear strategy for each activity, and alignment of the mission with the curriculum and learning outcomes. Based on the basic mission of a professional school of management, each graduate school is required to establish its own "specific objectives". In terms of strategy, the question is whether the graduate school has developed a medium- to long-term vision for achieving its specific objectives, and whether it has developed and implemented a strategy for achieving these objectives.

Regarding the second point, learning outcomes, the standards of international evaluation organizations require quality assurance of learning through outcome assessment. The Japanese accreditation standards for professional graduate schools of business administration include a viewpoint on learning outcomes, but they only use the status of degrees awarded and the career paths of graduates as indicators, and do not provide a substantive assessment of learning outcomes.

Thirdly, there are differences in the evaluation criteria for the qualifications of teachers. According to the evaluation standards of international evaluation bodies, research activities are mandatory for teachers, and the degree required for teachers is, in principle, a doctorate, with a minimum of a master's degree. In addition to research achievements, collaborative efforts with companies, such as consultancy, are also expected as a matter of course. In Japan, however, the requirements for qualifications of teachers are set in accordance with the professional graduate school system. The "Standards for the Establishment of Professional Graduate Schools" stipulate that full-time teachers should be "practitioners" from the viewpoint of emphasizing practical education, but the definition of "practitioner" is based on the provisions of Notification No. 53 of the Ministry of Education, Culture, Sports, Science and Technology in 2003 (Article 5, Paragraph 1 of the Standards for the Establishment of Professional Graduate Schools). However, the definition of a "practitioner teacher" is given only in the Ministry of Education, Culture, Sports, Science and Technology's Notification No. 53 of 2003 (Necessary Matters for Professional Graduate Schools under the Provisions of the Standards for the Establishment of Professional Graduate Schools, Article 5, Paragraph 1, etc.), which states that "a practitioner teacher shall be a person who has approximately five years or more of work experience in his/her major field and has a high level of practical ability. This is the only requirement. In addition, the ratio of practitioner teachers to the total number of teachers is only stipulated to be "approximately 30% or more of the number of full-time teachers to be appointed for each major. Accordingly, there is no provision on the degree requirements for practitioner teachers. This Japanese approach to the composition of teaching staff is at odds with the approach of international evaluation bodies, which require the recruitment of researchers with doctoral degrees. There is no definition of a practitioner teacher in the first place, and it is recognised that teaching only with work experience is not in itself appropriate in terms of ensuring the quality of teachers. In this study, in addition to assuming that those who teach only with practical experience are considered as practitioners, we also assume that those who have little or no research achievements after their arrival at the university are also considered as practitioners, although they had research achievements before they arrived at the university.

The fourth point is the treatment of quality assurance. Some international evaluations require the visualisation of learning outcomes in order to guarantee the quality of education, and some internal quality assurance systems have set standards for evidence of processes to guarantee the quality of education and the effectiveness of learning. For a university-wide internal quality assurance system to function effectively, it is essential that improvements and reforms are made not only at the university level, but also at the programme and classroom level in each department. There is a lack of validation of the three policies - degree-awarding policy, curriculum design and implementation policy, and student acceptance policy - and the curriculum, and measurement of learning outcomes.

The fifth point is about the sustainability of the university. From the point of view of the sustainability of the professional graduate school in the university organization, the change in the ratio of the number of students admitted and the ratio of applicants to the

number of students admitted will be looked at in the evaluation as a reference indicator. Sustainability is not only about securing resources and financial resources, but also about the university's contribution to the local community and society. There are no criteria that require the development of a system for assessing the contribution of universities to society, nor is there an assessment perspective that recognises the role and contribution of universities to society.

In its evaluation, the EFMD places emphasis on international perspectives and interaction with business in all its activities, including mission and objectives, programmes, students and faculty. As we deal with business in education, we must be aware of the global situation surrounding business and of developments in business schools abroad. In addition, it is necessary to think about the state of education from an international perspective. It will be obligatory to establish an "advisory board" for strengthening and cooperation between professional graduate schools and society (exit).

This section compares the evaluation criteria of the three international business school accreditation bodies (EMBA, AMBA and AACSB).

Criteria relating to the qualifications of teachers are set out in the main section by all the accreditation bodies.

Towards the activities of the faculty, EFMD requires that there are activities such as research, consultancy, collaboration with companies and international initiatives, while AMBA requires active involvement in all activities of research, consultancy and collaboration with companies.

Different organisations have different standards for the number of faculty members according to their academic qualifications and the commitment of faculty members. The EFMD requires that faculty members have (or will have) a Ph.D and that core faculty members work at least 25 FTE. The AACSB classifies faculty into participating faculty and supporting faculty, and requires that participating faculty comprise at least 75% of the faculty. The AACSB divides faculty into four types by classifying them as Academics or Practitioners according to their background, and as Academic or Applied/Practice according to their approach.

(1) Scholarly Academics ("SA"), (2) Practice

Academics (hereinafter referred to as "PAs"), 3) Scholarly Practitioners (hereinafter referred to as "SPs"), 4) "Instructional Practitioners (hereinafter referred to as A doctorate is required for SA and PA, and a master's degree is also required for SP and IP. A doctorate is required for SA and PA, and a master's degree is also required for SP and IP. The criteria are that the proportion of SAs to the total number of core faculty members including Other O must be at least 40%; the total number of SAs, PAs and SPs to the total number of core faculty members must be at least 60%; and the total number of SAs, PAs, SPs and IPs to the total number of core faculty members excluding Other O must be at least 90%. AMBA requires that at least 75% of the core faculty hold a postgraduate degree, with the majority holding a Ph.D.

The Japanese Association of University Standards, the accrediting body for business schools in Japan, has set a minimum number of core faculty members above the legal minimum, at least half of the faculty members must be professors, and at least 30% of the faculty members must be practitioners, as required by law (Standards for the Establishment of Professional Graduate Schools). ABEST21 has similar standards.

3.4 What is a practising teacher?

Certified Evaluation and Accreditation Organization (AACSB) minimum requirements for practitioner teachers are a master's degree or higher, and AACSB standards assume that the education of practitioner teachers is obsolete; and It is assumed that the teacher is capable of taking charge of responsible and practical education within the period of employment as a practitioner teacher. In Japan, the law (Standards for Professional Graduate Schools of Management) defines a practitioner teacher as follows

Those with at least five years of work experience in their major field and a high level of practical ability.

In Japan, there are no set standards for degrees for practising teachers and no set system for the minimum level of research activity that practising teachers must undertake or for the obsolescence of their teaching content.

Table 2. Number of Students

	2015	2016	2017	2018
Master	159,481	165,422	162,693	163,100
Doctor	71,363	74,231	73,917	74,367
Professional	645	23,033	18,776	16,546
of which, number of adult students	560	9,056	8,037	8,637

1. Created by the author using the Basic School Surve

Table 3. Num. of Teacher

	2011			2018		
	Core Faculty			Core Faculty		
		Num. of Practitioner	Practitioner /All teacher		Num. of Practitioner	Practitioner /All teacher
Business/MOT	568	311	55	636	368	57.9
Accounting	247	111	45	169	76	45
Public Policy	113	37	33	106	37	34.9
Public Health	81	30	37	90	36	40
Intellectual Property	40	21	53	12	11	91.7
Clinical Psychology	52	22	42	52	23	44.2
Others	226	97	43	276	137	49.6
Law school	1,632	536	33	-	-	-
Teacher Education	427	191	45	913	430	47.1
Sum	3,386	1,356	40	2,254	1,118	51.3

4. ANALYSIS

4.1 Basic Model

In this section, we confirm the production Y^* of a country. Y^* is the total production of Professional School and Research University. This is the output of a country where the output of each university is multiplied by the number of schools.

At Professional University, researchers and practitioners coexist. Practitioner faculty conducts education only, and research faculty conducts education and research.

The production of a research university is obtained by multiplying the production function y_m of the research university by the number m of research universities. The size of each university is the same. Practitioners with higher educational returns are employed first as practitioner teachers.

This is the total production of Professional School, which is the production function y_n of Professional University multiplied by

the number *n* of Professional University.

The total of both the above-mentioned Professional University gross product and the research university gross product is the national production Y^*.

Each university determines the ratio of researchers and practitioners. In this model in this research, the total of Professional Universities and Professional Graduate School is called Professional Universities, and the total of a research university and research graduate school is called a research university.

$$Y^* = my_m + ny_n$$
$$= m\left[p_0 y_{rm}(E_r(1-L_R), R(p_0+p_1, L_R)\right]$$
$$+ n[qy_{pn}\left(E_p(L_p)\right) + p_1 y_{rn}(E_r(1-L_R), R(1-q, L_R))] \qquad (1)$$

The production function y_m of a certain research university is obtained by multiplying the ratio of researcher teachers of a certain university p_0(<1) by the production function y_{rm} of a representative individual of a researcher and faculty member of a certain university.

The production volume of the production function y_{rm} of the researcher, the teacher is the sum of the result E_r of the education activity of the researcher teacher and the result R of the research activity.

Professional University's production function y_n consists of two terms. It is obtained by multiplying the practitioner teacher ratio q by the practitioner teacher production y_{pn}, and by multiplying the professional teacher ratio p_1 of the Professional University by the researcher teacher production function y_{rn}. q is the number of practitioners divided by the total number of teachers.

The result R of the research activity is a function of the time required for the research L_R and the ratio of all researcher teachers in a certain country $p_0 + p_1$.

The sum of the ratio of researcher teachers at each of the two universities.

An increase in the ratio of researchers and teachers will increase the outcome R of research activities. Increasing the research time L_R also increases the research outcome R. $p_0 + p_1 + q = 1$ and $0 < L_p < 1,\ 0 < L_R < 1,\quad L_p > L_R$.

In previous studies, the production function of a school includes only education. In this study, we include research output in the production function, i.e. both teaching and research are productive activities, and the sum of the products is the output of the school. The research output is assumed to depend on the time spent on research by the research faculty and the number of research faculty in the country. Research output includes both quantitative and qualitative aspects of academic research output, such as articles. Indicators for the quantitative aspect include the number of papers, while indicators for the qualitative aspect include the impact factor, etc. An increase in research output is an increase in the output of a university; it is a natural assumption that research output is a function of the increase in the ratio of researcher-faculty members, since an increase in the number of researchers increases the overall research output of the university even if the research output per researcher is the same.

A theoretical analysis of the learning effects of Japanese higher education on research degrees, which includes the number of researchers in the macro production function, is provided by Murata (2016). An increase in the number of researcher teachers in a country increases output by contributing to a rise in the level of basic research in that country. We believe that an increase in the number of researcher-faculty members will lead to an increase in the quantity and quality of research activities through increased activity in research groups and conferences. Research output may also be expected to increase through increases in quantitative aspects such as the number of researchers who can advise on thesis drafts, the number of collaborators, and the number of teachers who supervise doctoral students, as well as qualitative aspects such as the enhancement of teaching content. In a typical university with a research component, an increase in the number of research faculty members will lead to an increase in the number of faculty members per student, which in turn will lead to an increase in the intellectual standards of the country as faculty

members devote more teaching time to their students.

The amount of time a researcher teacher can devote to research is the total hours worked minus the time the researcher teacher spends teaching. There are a number of practising teachers in Japan who do not engage in research. Practitioner teachers spend their total working hours only on teaching. The total output of the two is the output of the university. It is assumed that an increase in the ratio of researcher-faculty members increases research output. In addition to the pathway through national level exchanges, where an increase in the number of researchers within a country increases through collaborations between researchers, research meetings, reviews, etc., the pathway through which an increase in the ratio of researchers within a university increases research output is also assumed, as shown below. It is assumed that a decrease in the ratio of researcher faculty members within the university leads to a decrease in the internal evaluation of research performance. Since a certain percentage of the faculty members of professional universities and graduate schools are practitioners, practitioners account for a certain percentage of the members of the Faculty Council and the Board of Directors. In many cases, either the President or the Vice-President is a practising teacher. As research activities are not included in the main duties of practising teachers, the evaluation of their research activities may differ from that of research universities. The lesser importance of research achievements in academic promotion and faculty evaluation is also more common in professional universities. Applying the same evaluation criteria to practitioners as to researchers in professional universities would disadvantage them in terms of research performance and would require different evaluation criteria. When two sets of criteria, one for researchers and one for practitioners, coexist in a university and are discussed in one faculty meeting, it is difficult to set quotas for promotion and a compromise is likely to be reached. Some universities have set quotas for some practitioners in terms of research achievements, but this study assumes that there are no practitioners who conduct research activities for the sake of simplification.

In this study, only teaching and research activities are shown as productive activities of university teachers. In small and medium-sized universities in a country like Japan, where the declining birth rate is a social phenomenon, activities to attract students are emphasized and the time engaged by faculty members is significant. For the sake of simplicity of the model, we do not take into account the time spent by faculty members in various social contribution activities of the university, such as visiting lectures to high schools to attract students, raising the profile of the university in the community, and contributing to the local community.

There are also external effects of research such as an increase in product development and various businesses, an increase in consumption through social changes caused by digital transformation, and an increase in national production as a result of research results spreading to the industry through industry-academia collaboration, etc. These external effects through the spillover of research results to society are included in the university's research results R.

While the inclusion of research output as a product is a feature of our model, there are several other features. The ratio of practitioners to researchers is calculated by dividing the number of practitioner teachers per university by the number of researcher teachers. It is assumed that practitioner teachers are only enrolled in professional universities and not in regular universities. An increase in the number of practitioner teachers would allow for an increase in the number of practical subjects taught by practitioner teachers as subjects and for more than one practitioner teacher to be in charge of one practical subject. An increase in the number of practitioner teachers and in the ratio of practitioner teachers will lead to a greater number of practical subjects. At the same time, an increase in the ratio of practitioner teachers will mean a decrease in the ratio of researcher teachers. As the number of practical subjects in the university curriculum increases, so does the importance of research teachers in terms of educational effectiveness.

Professional universities and professional graduate schools require less time for theoretical education than regular university education, because they provide more time for practical education, part of which is on-the-job training in business settings. The disadvantage of professional universities and professional graduate schools may be that they narrow the scope of educational

content to aspects from a particular profession. On the other hand, they allow students to learn in-depth through experiential learning. We assume that researcher teachers allocate only part of their working time to teaching and that the rate of return on education is lower than that of practitioner teachers who allocate all of their working time to teaching.

In Japan, a certain ratio of practitioner teachers is required as a condition for the establishment of professional universities and graduate schools. The law requires that a minimum of 40% of full-time faculty members be enrolled in professional universities and a minimum of 30% in professional graduate schools. Many universities in Japan have only the minimum number of practising teachers required by law, while others have a very high ratio of practising teachers. The high ratio of practising teachers indicates an important characteristic of professional universities. However, the optimal ratio of practitioner teachers that maximises the production of a university has not been identified in previous studies. In this study, the optimal ratio of practitioner teachers will also be discussed. The relationship between university production and the rate of return on education will be discussed. The educational rate of return arises through the educational activities carried out by the university faculty. Research activities have a positive impact on the rate of return on education by influencing the quality of educational content. Since the main purpose of this study is to contrast professional universities/graduate schools with research universities, we do not consider the effect of differences in research ability and research activities among research faculty on the richness of educational content.

From the demand side, the utility function of candidates taking the entrance examination is as follows. This utility function can be considered as a constraint equation on the production function of universities on the supply side. $u = u(E_p^{-\lambda\tau} * E_r^{-\lambda(1-\tau)})$. The utility of a prospective student is a function of the return to education of the practitioner and the return to education of the researcher. λ is a measure of whether the curriculum is specific to a particular profession; for research universities, λ = 0. τ is the degree of preference that the average admissions officer has for learning from a practitioner teacher; the higher τ, the higher the ratio of practitioner teachers to prospective students.

4.2 Real rate of return on education E_p^* and discount rate r_p

Professional graduate schools, which train highly-skilled professionals, offer practical education. However, practical education includes universal contents, but many contents that become obsolete with time. The content of practical education often changes due to changes in the technology prevailing in the real world, or due to changes in the law or society. For the above reasons, even if the rate of return on education is very high, the period during which the content learned is applicable in society is often short. Even if the content taught by practitioners can be used effectively to increase students' incomes to a very large extent, if the time for which the content is valid is, for example, five years, the content of the practitioner's education will only be valid for five years. If the education of a practitioner teacher goes beyond the period when it can be said to be sufficiently practical, it is not desirable for that practitioner teacher to be engaged in education at a professional university. As stated above, professional universities should recognise that, given their founding principles, there is a limit to how long the content of a practitioner teacher's education can be valid, and a practitioner teacher should only be a practitioner teacher for as long as the content he or she teaches can be valid. Alternatively, it is desirable for practitioners to transform themselves into researchers by applying their practical experience to academic frameworks and producing academic research results. Or it is desirable to return to the world of practice. In such a case, universities must be constantly aware of the freshness of the educational content of practitioner teachers and must consider recruiting new practitioner teachers. However, it is difficult to ensure a smooth turnover of practitioners, and since such a system has not yet been legislated, the practitioners hired will be engaged in teaching for a long time.

In this section, in order to take into account the above-mentioned characteristics and circumstances of practitioner teachers, we define the real rate of return on education as the rate of return on education divided by the discount rate. The longer the content of the education provided by practitioners is available to society, the higher the real rate of return on education will be, while the shorter the period of availability to society, the longer the period of providing obsolete education, and the lower the rate

of return on education for universities.

Professional School:

$$y_n^* = qy_{pn}\left(E_p^{*-\lambda\tau}L_p\right) + p_1 y_{rn}(E_r^{*-\lambda(1-\tau)}(1-L_R), R(1-q, L_R)) \quad (2)$$

$$E_p^* = \frac{(1+\rho_p)E_p}{1+r_p},\ E_r^* = \frac{(1+\rho_r)E_r}{1+r_r},\ r_r = 0$$

Non-Professional School:

$$y_m^* = p_0 y_{rm}(E_r^*(1-L_R), R(p_0+p_1, L_R) \quad (3)$$

u_p represents the real rate of return on education by practitioners; ρ_p represents the nominal rate of return on education by practitioners; and r_p represents the discount rate. If the content of the education is effective in the world of practice over a long time, the discount rate will be low, while if the content is only effective in the short term, the discount rate will be high and the real rate of return on education u_p will be low.

If the content is effective for a long time, the discount rate is low. The nominal and real rates here do not imply the effect of prices. In the long term, the number of professional universities will increase to the point where the rate of return on education of practising teachers, taking into account the period for which the content of their education is valid, is balanced by the rate of return on education of research universities.

λ indicates the specialisation of the curriculum. The more specialised the curriculum, the more specialised the teaching content, and the more students whose jobs or professions do not match the curriculum.

The more specialised the curriculum, the more specialised the teaching content. Therefore, an increase in specialisation leads to a decrease in the number of students considered for admission and a decrease in the target group. $1 \geq \lambda \geq 0$. When the specialisation of the curriculum λ is 0, there is no specialisation and the target group for admission is not narrowed down. Research universities have λ = 0.

τ is the average orientation of prospective students towards practitioner teachers; a rise in τ means that more prospective students want a curriculum with more practitioner teachers. In Japan, executives in large companies require more theory-intensive courses, and executives in corporate planning departments especially require universities to have an understanding of theoretical subjects, as they analyze companies by trying to apply various management theories to their own companies. On the other hand, few SME managers and students who want to start their own business are in a position to try to apply management theories to their own companies. Many SME managers are keen to increase their immediate sales and are motivated by the importance of their leadership and understanding of systematic management theory, as well as by the experience, tips, decision criteria, experiential considerations and priorities for decision-making of practitioner teachers. In this way, SME managers and entrepreneurs and executives have the same orientation towards professional universities, but the curricula they seek are different.

$0 \leq \tau \leq 1$, where $\tau = 0$, practitioners are not sought by prospective students. Research universities have τ = 0, where $\tau = 1$ is the statutory maximum ratio of practitioners desired by the average prospective student.

PROPOSITION 1: In the long term, the number of professional universities will increase to the point where the rate of return on the education of practising teachers, taking into account the period for which the content of their education is valid, is balanced by the rate of return on the education of research universities.

$$Y^{**} = my_m^* + ny_n^* = m\left[p_0 y_{rm}(E_r^*(1-L_R), R(p_0+p_1, L_R)\right] + n[qy_{pn}\left(E_p^* L_p\right) + p_1 y_{rn}(E_r^*(1-L_R), R(p_0+p_1, L_R))] \quad (4)$$

$$\frac{\partial Y^{**}}{\partial q^*} = -my_{rm} + mp_0 \frac{\partial y_{rm}}{\partial R}\frac{\partial R}{\partial q} + ny_{pn} - ny_{rn} + p_1 \frac{\partial y_{rn}}{\partial R}\frac{\partial R}{\partial q} \qquad (5)$$

$$\frac{\partial Y^{**}}{\partial q^*}\frac{\partial q^*}{\partial r_p} = n(1+\rho_p)E_p {r_p}^2 \times [n(y_{pn} - y_{rn}) - my_{rm}] \lesseqgtr 0 \qquad (6)$$

$$\frac{\partial y_n^*}{\partial r_p} = q\frac{\partial y_{pn}}{\partial E_p^*}\frac{\partial E_p^*}{\partial r_p}L_p < 0,\ \frac{\partial Y^{**}}{\partial y_n^*}\ \frac{\partial y_n^*}{\partial r_p} < 0 \qquad (7)$$

The number of research and professional universities is determined based on the rate of return on education. The number of professional universities with a high rate of return on education increases more than that of research universities. If the increase in the number of professional universities leads to the depletion of practitioner teachers who produce a high rate of return on education, and if the rate of return on the education of professional universities decreases through the obsolescence of the educational content of practitioner teachers, then the number of professional universities will increase to the point where the rate of return on the education of the number of professional universities and the rate of return on the education of research universities are balanced. To increase the rate of return on education, research universities should disseminate to society the content of their research and the methodologies by which their research is implemented in society.

The number of research universities will increase.

PROPOSITION 2: If the utility of the content of the education of practising teachers is guaranteed for a long time (low r_p), the real rate of return on education E_p^* will also remain high for a long time. If the utility value of the content of the education decreases in the short term (high r_p), the output of the professional university will be small and the overall outcome *Y* of the economy will be depressed. In such a case, the optimal ratio of practising teachers q^* will decrease

AACSB requires the creation of a faculty based on the premise that the usefulness of practising teachers is short term, but other institutions and Japan do not structure their faculty based on such a criterion. Practitioners are employed for long periods and are responsible for teaching. Since maintaining a high rate of return on teaching increases the output of the university, there must be a system to replace those who teach obsolete material which reduces the rate of return on teaching. If we do not have such a system, then we need to constantly provide some form of feedback to the world on what practitioner teachers can teach and seek to receive feedback from society to renew our knowledge. By creating such a situation, it is possible to create new educational content that can respond to the changing times. However, given the purpose of a professional university, the teaching staff be replaced.

$$\frac{\partial q^*}{\partial r_p} = -n(1+\rho_p)E_p {r_p}^2 < 0 \qquad (8)$$

PROPOSITION 3: If a professional university has a higher rate of return on teaching than a research university($E_p^* > E_r^*$), the ratio of practising teachers to total teaching staff q^* will increase, as practising teachers with a higher rate of return on teaching are more likely to be recruited.

PROPOSITION3 is consistent with previous studies. Professional universities have a higher rate of return on education than research universities. Since the reason for the high rate of return on education is the education provided by practitioners, professional universities employing practitioners with a high rate of return on education will aim to further increase the rate of return on education by increasing the ratio of practitioners.

4.3 Increase in the number of professional universities

The impact of the increase in the number of professional universities is examined in this section.

$\frac{\partial Y_n}{\partial n}$>0

$$\frac{\partial Y_m}{\partial n} = \mathrm{m}[p_1 \frac{\partial y_{r,n}}{\partial R}\frac{\partial R}{\partial q} - y_{rn}][y_{p,n} - y_{r,n}(1+p_0)]$$

$$if\ y_{pn} > y_{rn}(1+p_0), \quad \frac{\partial Y_m}{\partial n} < 0$$
$$if\ y_{pn} < y_{rn}(1+p_0), \quad \frac{\partial Y_m}{\partial n} > 0 \qquad (9)$$

PROPOSITION 4: An increase in the number of professional universities *n* increases the production Y_n of professional universities, but does not necessarily increase the production Y_m of research universities

An increase in the number of professional universities implies an increase in the number of students in professional universities. As a result, it will lead to a decrease in the number of students in research universities, which has the potential to reduce the number of research universities. As professional universities have both researcher and practitioner faculty members, the lower the ratio of practitioner faculty members in professional universities (the higher the ratio of researcher faculty members), the less the decrease in the number of research universities will lead to a decrease in the number of researcher faculty members.

4.4 Optimal ratio of practising teachers q^*

Below is a formula for the ratio of practising teachers in relation to the production of practising teachers.

$$q^* = \frac{m(1-p_0)^{\partial y_{rm}}/_{\partial R}{}^{\partial R}/_{\partial q} + n y_{pn} + n(1-p_1 y_{rn})}{m y_{rm} + m^{\partial y_{rm}}/_{\partial R}{}^{\partial R}/_{\partial q} + 2n y_{rn}} \qquad (10)$$

PROPOSITION 5: The optimal ratio of practising teachers q^* is an increasing function of the production y_{pn} of practising teachers

The ratio of practitioner teachers in each university increases as the output of each practitioner teacher increases. Practitioners who focus on teaching have a higher rate of return on education, and an increase in the number of practitioners has a positive impact on the expansion of universities' output. The high output of practitioner teachers has the effect of increasing not only the number of professional universities but also the number of practitioner teachers through an increase in the ratio of practitioner teachers. On the other hand, when we also consider the aforementioned PROPOSITION that requires a shorter period of employment of practitioner teachers due to the obsolescence of their educational content, the figures indicated by the ratio of practitioner teachers are only short-term figures as practitioner teachers need to be replaced. In the long term, the number of practitioner teachers required in Japan will be very large. Teachers who are in charge of the entire curriculum of a professional university must be able to restructure the entire curriculum appropriately, as the practical content to be taught to students becomes obsolete every few years. It is also necessary to change the person who is in charge of the whole curriculum, because he or she must know the latest knowledge that is useful in the real world, and must be able to update the information gathering ability of the person who is in charge of the whole curriculum. If not, the person in charge should have the ability to collect information from overseas universities and update his or her knowledge to be useful for working in overseas companies.

4.5 Circumstances in which research outputs *R* are not observed by prospective students

Applicants to professional universities are often people who have worked before. Some professional universities require work experience as an entry qualification. Prospective students with work experience are looking for an education that will contribute to their success and achievement in the workplace in the occupation in which they are currently engaged or will be engaged.

More than research universities, students at professional universities want a practical education that will lead them to success in the world of practice, and therefore need to be educated by practitioner teachers with successful experience in practice.

The overemphasis on teaching by practitioners not only reduces the proportion of research faculty but also means that recognition of research achievement through research activities becomes less important. If the tuition fees of prospective students, which are the source of funding for the university, are paid only in return for teaching by practitioner teachers, and if the research output of researcher teachers is not included as a criterion for the choice of university when prospective students choose whether to attend a research university or a professional university, then research output *R* will not contribute to the sales of the university. If the research output *R* is excluded from the production function of the university, it excludes not only the research output of the researcher-faculty at the research university but also the research output of the researcher-faculty at the professional university. By comparing the case where research output is removed from the production function with the case where it is included, we consider the role that research output plays in inter-university competition. We assume that the researcher-teachers at both universities work for research and produce research output *R*, but that they are not included in the production function. Therefore, as in the previous section, the time spent on education by researcher-faculty members is the time spent on education minus the time spent on research. When research output *R* is excluded, the production function of both universities depends only on teaching.

$$Y^{***} = my_m^* + ny_n^* = m[p_0 y_{rm}(E_r^*(1 - L_R)] + n[qy_{pn}\left(E_p^* L_p\right) + p_1 y_{rn}(E_r^*(1 - L_R))] \quad (11)$$

$$\frac{\partial Y^{**}}{\partial q^*} > \frac{\partial Y^{***}}{\partial q^*}$$

To analyse the environment when prospective students do not identify research outputs *R*, we compared the production functions of the two universities with and without the inclusion of research outputs *R*. Again, when prospective students do not identify research output, the results confirm that an increase in the ratio of practising teachers increases overall economic output, regardless of whether research output is included or not. However, when research outputs were not included, overall economic outcomes were found to be lower than when they were included. If research outcomes *R* are not observed in prospective students and only teaching *E* is observable as an outcome, the overall economic outcome *Y* associated with the rise in practising teachers will slow down.

PROPOSITION 6: If research outcomes *R* are not observed in prospective students, and only teaching *E* is observable as an outcome, overall economic outcomes *Y* slow down with the rise in practitioner teachers

To increase the share of research universities contributing to the overall research output, the media for disseminating research results should be expanded and the volume of dissemination increased: summaries of research results should be disseminated on social networking sites (Twitter, Facebook etc.). Researchers and post-doctoral fellows at universities need to disseminate the results of analyses they have read as prior research or in leading journals in their fields on social networking sites weekly or more. This will provide access to the latest research results, help prospective students to think about how to apply their research results to society, and help prospective students to formulate their research themes. This will help to increase the number of students entering research universities.

The number of universities in Japan has almost tripled since the relaxation of the University Establishment Standards began in the 2000s, from around 300 in 2000 to around 800 in 2019. The number of 18-year-olds, the age at which people generally attend university, is 1.17 million in 2019, compared with 1.51 million in 2000, due to the declining birth rate. The number of students enrolled at university in 2000 was 600,000, while in 2019 it will be 630,000, a significant decrease. Universities are subsidised through schemes such as the Government Subsidisation of Private Education (GSE). Perhaps the most widely used source of funding for researchers in Japan is the Grants-in-Aid for Scientific Research from the Japan Society For The Promotion of Science (JSPS). Grants-in-Aid for Scientific Research from the Japan Society for the Promotion of Science are funded by taxation.

The Certified Evaluation and Accreditation Organisation (CEA), which is responsible for the accreditation of universities, encourages universities to support research activities by establishing a research fund for individual teachers. This is often funded

through autonomous university administration, which requires that faculty members' research be funded from the university's own earnings rather than from government grants. Despite this demand on universities to secure research funding, researchers still rely on Grants-in-Aid for Scientific Research for much of their research funding. However, accreditation bodies recommend bridging practical and theoretical education, and require that researcher teachers are mainly placed in theoretical subjects.

Most grants are awarded to universities based on several indicators of their performance, such as the number of students and research output, and not solely on research. However, some of these funds are earmarked for research as part of the funding for the running of the university, and these sources are also taxpayers' money.

If a university requires continuous research output as one of the outcomes of teaching at the university, many of its teachers will be research active, but continuous research activity often requires a lot of funding. Research activities require funding, which in many cases comes from the state. As mentioned above, there are many different types of research funding, from university-based to research project-based. Government Subsidization of Private Education (GSPE) and other criteria may well be changed.

In this section, we analyse the effects of two types of subsidies from the state to universities. The state grants subsidies either to professional universities or to research universities for research support. The amount of the subsidy is determined either by the overall output of the university, i.e. the rate of return on teaching and the research output or only by the high rate of return on teaching. The rate of return on education is often compared with the rate of increase in income at two points in time, after the completion of the professional graduate school and when the student is enrolled (at the time of admission or completion), especially in business schools. The rate of increase in income is very high in business schools, and in the United States, it is sometimes said that the rate of increase in income is 80% between five years after graduation and the time of enrollment. In the United States, it is sometimes said that the rate of increase in income is as high as 80% after five years of study.

Compared with professional universities and graduate schools, the rate of return on education at research universities is usually lower. Professional graduate schools, which aim to train highly-skilled professionals who can play an active role in society and on the international stage, and which do not require research guidance or thesis examination, can differentiate themselves from research universities by increasing the ratio of practitioners and decreasing the ratio of researchers. In addition, since the goal of professional graduate schools is to train businesspersons who can play an active role in society, the definition of the active role is the rate of increase in income, or in other words, the rate of return on education. In other words, the system of professional universities and graduate schools itself has as one of its missions the maximisation of the rate of return on education.

In this case, there is a high possibility that government subsidies, which were previously allocated to research, will be allocated to education at professional universities in the future. In conventional universities and graduate schools, teachers teach the results of their predecessors' research and their research activities acquired in the process of acquiring academic theories and applications, but they specialise in increasing the rate of return on education.

When the rate of return on education in professional universities and graduate schools is high and subsidies flow to professional graduate schools, the ratio of practitioner teachers will increase as a result.

$$Y_m = my_m = m\left[p_2 y_{rm}(E_r(1 - L_R(F)), R(p_0{+}p_1, L_R(F))\right] \quad (12)$$

$$Y_n = ny_n = n\left[q(F)y_{p,n}(E_p, L_p) + p_1 y_{r,n}(E_r(1 - L_R(F)),\ R(p_0{+}p_1,\ L_R(F))\right] \quad (13)$$

$$if\, y_{pn} > y_{rn}, \quad \frac{\partial Y_n}{\partial F} > 0$$

$$if\, y_{pn} < y_{rn}, \quad \frac{\partial Y_n}{\partial F} < 0$$

If the government decides that the only criterion for granting subsidies is the rate of return on education, part of the subsidy will be transferred from research universities to professional universities. The number of research universities and the ratio of research faculty members will decrease as a result of a decrease in the research output of research universities. The subsidy *F* from the government to universities may shift from support for research *R* to support for teaching *Ep* to practitioner teachers.

PROPOSITION 7: If the only criterion for government grants *F* to universities is the rate of return on education, grants could shift from supporting research *R* to supporting the education E_p. of practitioner teachers

If subsidies are awarded based on the rate of return on education, more will be given to professional universities with a higher rate of return on education. As a result, subsidies for domestic research activities would be reduced, leading to less research activity and therefore less research output. Given the above results, subsidies should be divided into two buckets: subsidies for education, which are supported based on the rate of return on education, and subsidies for research, which are supported based on research outputs. When the rate of return on education at research universities is compared with the rate of return on education at professional universities, it is difficult in the short term for research universities to exceed the rate of return on education at professional universities because of the purpose of their establishment and the criteria for their establishment. The rate of return on the education of research universities should not be measured only by the rate of increase in post-graduation income, but should be measured by a variety of indicators, with minimum standards for each indicator and standards for each level. The undergraduate education at research universities should include the breadth and depth of the liberal arts education, and should take into account the diversity of job opportunities, employment in foreign and international companies, and the advantages of changing jobs as indicators. Postgraduate education at research universities should provide students with the basic skills to apply their expertise in business, innovation in the field of applied research that can contribute to society, and innovation in the field of basic research that cannot be used immediately in society, through the development of the ability to understand cutting-edge expertise in the form of theses. You will learn the fundamentals for innovation in the field of applied research, which can contribute to society, and in the field of basic research, which is not immediately available to society. As a result of these studies, it would be inconsistent to establish a research university to use only a high rate of return on education as an indicator. A more appropriate indicator for a master's programme at a research university would be the number of graduates and their placements in research institutes and companies where they can apply their knowledge in a more specialised way. It is also important to produce master's graduates who can show that their master's studies are useful for companies by introducing advanced knowledge to companies through their master's education, which students acquire through their master's education that cannot be fully used in companies through their undergraduate education.

Professional graduate schools need to devote more time to learning practical content, which makes it more difficult to learn cutting-edge financial knowledge and expertise such as data scientists than research graduate schools. The advantage of a research graduate school over a professional graduate school is that graduates will have an understanding of the latest knowledge, which means that they will not be limited to the technology of the company they work for, but will have the potential to introduce the latest technology into the company when major changes occur in the world. Graduates are also able to become entrepreneurs. Graduates of research universities have the advantage of being able to understand foreign papers and to select the most advanced knowledge that they need and can use. In other words, graduates of research universities, rather than graduates of professional graduate schools, have the basic skills to develop skills that can be used over a long period and can support their graduating companies over a long period, using the basic skills they learned in the past. If we ask about the rate of return on education and the number of times a graduate has been active in a company over a long period, such as 20 years after graduation, research graduates will outperform professional graduates.

However, the rate of return on education over a certain period after graduation is lower than that of graduates of professional graduate schools. The reason why the educational rate of return of professional graduate school is high in the short term but limited in the period it is valid is that they can learn current cutting-edge knowledge and practical methods more specifically, and to learn cutting-edge industry common sense and knowledge thoroughly.

5. POLICY IMPLICATIONS

Master's and doctoral programs are more academically advanced than undergraduate education, but they are less practical for business people. This led to the establishment of professional graduate schools, which provide both theoretical and practical training for business people. The aim is to produce graduates who can play an active role in the business world after completing their degree. In recent years, however, the sophistication of digital technology and the increasing sophistication of knowledge has meant that a certain proportion of study time is spent on practical work, and there are some fields where it is not possible to acquire sufficient knowledge in a professional degree, where theoretical education time is shorter than in a master's or doctoral course. This is particularly the case in the field of information processing. Thus, the proportion of practical and theoretical education required in business differs from field to field, and it is not clear whether a higher proportion of practical education is desirable in business in the short or long term.

In this study, we have analysed the competitive environment between professional and research universities. In Japan, professional graduate schools require a certain period of business experience as a prerequisite for entry, which means that the average age of entrants is in the 30s. In Japan, the average age of students enrolled in professional graduate schools is in the 30s, which means that the average age of students enrolled in master's programmes at research universities is in the 20s, so it is highly unlikely that there will be strong competition between research universities and professional graduate schools. However, as the qualifications for entry to the new professional universities to be established from 2020 will be the same as those for entry to research universities, it is expected that there will be competition between research universities and professional universities. In addition, the number of students in their 30s enrolling in master's programmes is now increasing, so research universities and professional graduate schools are becoming more competitive.

Under the circumstances described above, this study considered the optimal ratio of practitioner teachers that would maximize the output from the supply side of maximizing the output of educational and research activities by universities. The results obtained are as follows

1) It is considered that admission decisions are made without observing the research results among the two types of results (teaching and research) of teachers at professional universities etc. In such a case, the number of schools and researchers in the research university will be underestimated. Therefore, the accreditation body, which is an external body, will check the research results and disclose the quality and quantity of the research results to prospective students, so that the admission can be allocated appropriately.

2) If the rate of return on the education of professional universities is greater than that of research universities, and if practitioner teachers become practitioner teachers from practitioners with a higher rate of return on education, the number of professional universities will increase to the point where the rate of return on the education of research and professional universities is equal. The ratio of practitioner teachers will also increase. In a model where the discount rate of education of practitioner teachers (the length of time they are practically available in the field) varies, the rate of return on the education of professional universities will decrease as the number of professional universities increases, due to the recruitment of practitioner teachers who have a shorter time to be used in practice (a higher discount rate of education). In the case of professional universities in fields where the discount rate for education is high, the turnover of practitioner teachers occurs in a short time and the rate of return on the education of professional universities will decline faster unless there are enough qualified practitioner teachers in the market. If the discount rate for practitioner teachers is high, the rate of return on the education of professional universities will decline faster with the increase in the number of professional universities and with time since the establishment of professional universities. As the rate of return on the education of professional universities falls, the number of research universities with a higher rate of return on education increases.

3) An increase in the number of professional universities implies an increase in the number of students in professional universities. As a result, it will lead to a decrease in the number of students in research universities, which has the potential to reduce the number of research universities. As professional universities have both researcher and practitioner faculty members, the lower the ratio of practitioner faculty members in professional universities (the higher the ratio of researcher faculty members), the less the decrease in the number of research universities will lead to a decrease in the number of researcher faculty members. However, as the ratio of practitioner teachers is expected to increase due to the high rate of return on education in professional universities, the number of researcher teachers will decrease.

4) Legislation setting out guidelines for the length of time practising teachers can be trained is desirable for economic growth

5) Subsidies to professional universities, which have a higher rate of return on education, lead to a reduction in the number of research teachers and research universities through a reduction in research funding.

Due to the special nature of their education, professional universities have a shorter shelf life for the content of their practical education than for the content of the education of researcher teachers. The content of the education provided by researcher teachers is likely to be at the cutting edge of education as long as they continue their research, whereas the content of the education provided by practitioner teachers is subject to obsolescence as the experience of practitioner teachers rapidly moves with the times. For example, in two or three years, the most advanced methods in the field of marketing will change and old marketing theories will become obsolete. It is clear that as the content of practical education becomes obsolete, the return on education for graduates declines. To prevent such a situation from occurring, there is a need for an appropriate rotation of practitioner teachers in professional universities and a system whereby practitioner teachers are employed to move between businesses and universities at regular intervals.

Through competition, the number of professional and research universities increases, with the result that the number of professional universities with higher output increases, while the number of research universities decreases. This result is due to the assumption in previous studies that professional universities have a higher output from their teaching activities because they have a higher rate of return on teaching than research universities. An increase in the number of professional universities will lead to an increase in the number of researcher teachers belonging to professional universities, but a decrease in the number of research universities will lead to a decrease in the number of researcher teachers belonging to research universities. A certain percentage of the increase in the number of teachers due to the increase in the number of professional universities is researcher teachers, but the decrease in the number of teachers due to the decrease in the number of research universities is the entire number of teachers for one university. A decrease in the number of research universities is therefore a decrease in the number of researcher teachers. A decrease in the number of research teachers reduces the output of the research university through a decrease in research output. The decline in the output of research universities is a negative spiral, which can lead to an accelerated decline. In this way, the decrease in the number of research universities will reduce the number of research teachers and research output. The number of research universities will also increase if the research output of research universities exceeds the difference between the educational output of professional universities and that of research universities, even if the educational output of professional universities is greater than that of research universities.

What needs to be taken into account is that even if there is an optimum ratio of practising teachers that maximises output, it may not be the most favourable ratio for the demand side, i.e. for prospective students. Analysis of this point is a matter for future research. If the optimal ratio of practising teachers that maximises the utility of prospective students in terms of demand is higher than the ratio of practising teachers that maximises output in terms of supply, then the country will be under-represented in terms of researchers compared with its optimal output. Even if we exclude the perspective that the optimum ratio of practitioners is determined based on the demand side of supply and demand, if a person who is considering whether to enter a professional

university or a research university does not make a decision based on the research output of the research university and does not observe the research output of the teachers as a criterion for admission, then the researcher ratio of the country will be underestimated compared with the optimum output. If this is not observed, the number of schools in research universities will be underestimated.

Inevitably, the number of professional universities with a high rate of return on teaching will increase, but it is necessary to put in place a system of faculty turnover as soon as possible to avoid the obsolescence of teaching content. In addition, the number of research universities will be lower than the appropriate number if the situation where research results do not lead to an increase in enrolments is not improved. Through the dissemination of research results, there is a need to increase the number and volume of media through which research results are disseminated; summaries of research results should be disseminated via social networking sites (Twitter and Facebook). Researchers and post-doctoral fellows at each university should disseminate the results of analyses they have read as prior research or in leading journals in their fields on social networking sites weekly or more. This will provide access to the latest research results, help prospective students to think about how to apply their research results to society and help prospective students to formulate their research themes. This could lead to an increase in the number of students entering research universities. If these systems are supported not only by individual research universities but also by the state, there is innovation potential. Under the current system, it is assumed that when the recession hits, working people with stagnant incomes will enroll in professional universities with a high return on education in the short term. However, students with the ability to access and use the world's most advanced knowledge are also fostered at research universities, so it is important to foster the ability of graduates of research universities to apply the knowledge they have learnt in society and to disseminate the results of research, which is a public good, widely in society. It will be important for the future of higher education to create an environment in which students can innovate through self-study without having to return to university several times.

The spread of COVIR-19 in 2020, which resulted in a period of curfew, led to the introduction of distance learning in almost all universities. As a result, the boundaries between distance and commuter universities are disappearing. Competition between distance and commuter universities will intensify. In addition, commuter universities have historically capped their capacity according to the size of their facilities, but with the spread of distance learning, there is an opportunity to increase enrolments regardless of the size of the university facility. In the past, if the size of a university's facilities was small, it had no choice but to set lower admission and capacity limits. If 60% of the capacity utilization rate means a break-even point, and if one time the capacity utilization rate is the appropriate number of students to run courses within the university facilities

The stability and control of the capacity-at-risk ratio are important for the management of universities. If a 60% capacity utilization rate is an important management indicator, i.e. a break-even point, or if a capacity utilization rate of 1 time is an appropriate figure to guarantee the quality of education, or if a capacity utilization rate of 1.3 times indicates the limit of capacity for university education, then capacity management can be used as a useful indicator by accreditation bodies and external organizations such as MEXT. If this is the case, then accreditation bodies and external organisations such as MEXT can be used as useful indicators. However, in the future, with the proliferation of distance learning courses, universities will not need to worry about the size of their classrooms and rarely need to worry about the maximum number of students enrolled in a course, as long as they can create a stable distance learning environment. Under these circumstances, the capacity utilization rate of a university is not an appropriate indicator for business management. It would be important for each university to set and publish its break-even student numbers. In addition, as we have shown in this paper, it is essential for proper inter-university competition that the educational achievements of each university be made public externally. It may be necessary to have an external body periodically evaluate the relative ability of students at each university to their employers, or to distribute some of the lecture videos of each university's main courses online as samples so that the courses themselves can be subject to evaluation by each stakeholder.

Competition between Professional Universities and Traditional Universities -A Case for Japan

University management and higher education policy in Japan has so far emphasised the management of the number of students admitted and enrolled, but it is expected that the traditional policy of capacity management will no longer function. Rather, the applicant ratio will become an important indicator to ensure the quality of students at the time of admission. If universities create distance learning departments and majors with attractive subjects, small regional universities will have the potential to attract more students than famous private universities.

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