Physicians' Career Building and Their Shortage in Some Specialties*

Atsushi Yoshida
University of Tsukuba

Physicians have built their careers based on a network composed of a division of schools of medicine to which physicians belong (called *Ikyoku* in Japanese) and *sitz* hospitals which are closely tied to the *Ikyoku* in the supply of physicians. They enhance their treatment skills by gathering work experience in many hospitals and moving from one to another nearly every five years. The network benefits both the *Ikyoku* and the *sitz* hospitals. However, the network has come to play a smaller role for physicians' career building since the post-graduate clinical training system was introduced in 2004, because more than half of the graduates take courses provided by non-university hospitals rather than university hospitals. This new training system has nothing to do with the shortage of physicians or their misallocation among specialties or workplaces. Decline of physicians' wages and low rates of return of being a physician means no shortage of physicians. The misallocation is partly caused by preferences for female physicians in some specialties and clinics.

I. Introduction

In this paper, we review first how physicians have built their careers and are associated with the career systems. We then discuss whether the total number of physicians is too small compared to the total population, whether physicians are misallocated between clinics and hospitals, and whether physicians are mismatched among specialties.

We have three points to be discussed in physicians' career building. First is the job-information network system based on the *Ikyoku*. An *Ikyoku* is a division of a school of medicine in a university composed of one or a few full professors and other staff such as associate and assistant professors, researchers and graduate students. Alumni of an *Ikyoku* are also its members. A physicians' network based on the *Ikyoku* (*Ikyoku* alumni network hereafter) is different from an alumni network or a simple job-information network. As Ikai (2000) indicates, the *Ikyoku* plays a role similar to a personnel division of a company that makes decisions on who works in which hospital for how many years. The hospitals that accept physicians preferentially from an *Ikyoku* are called *sitz* hospitals. The term *sitz* originated from the German term meaning "a seat" in English. Yoneyama (2002) called the relation between *Ikyoku* and *sitz* hospitals "Rule of Academic Cliques." We will discuss what maintains such a relation and what rationale exists in the relation.

Second is how the *Ikyok*u alumni network has changed after introduction of the post-graduate clinical training system (PGCTS) in 2004. New graduates can take training courses provided in any teaching hospitals other than a university hospital. Then the points of inter-

* This research is supported by the Ministry of Education, Culture, Sports, Science and Technology (MEXT) grants #14530029 and #17330045 and funding through the New Research Initiatives for Humanities and Social Sciences from the Japan Society for the Promotion of Science (JSPS).

est are which hospitals the graduates choose, and whether or not they return to the school they graduated from and join an *Ikyoku* after completing the training course.

Third is at what age physicians quit their jobs in hospitals and start their own clinics. In the United States, physicians are mostly concerned with what specialty they choose and in which hospitals they perform clinical cases. This is because income is determined by specialty (Arcidiacono and Nicholson 2005). This is also true for other professions. Graduates in law schools decide at which law firms to apply by considering pecuniary or non-pecuniary rewards, possibility of dismissal and applicability of their human capital to other law areas (Sauer 1998). Professionals establish specialties and the rewards depend on the specialty so that the selection of a specialty is crucial for professionals' career paths.

In Japan, there is no formal accreditation system in medical specialties. After obtaining a physician's license, a physician can publicize her/his specialty, although she/he never took enough courses and lacks experiences for the specialty. Even a physician specializing in a specific organ or disease can start a primary care clinic. It is inefficient medical resource allocation that drives a skilled specialist to become a general physician. Quitting a hospital and working in a clinic is also a critical decision for specialists themselves. We discuss at what age physicians quit their jobs at a hospital and start a clinic, whether or not they do so now at a younger and whether or not there are differences in the likelihood between male and female physicians.

We also discuss the so-called problem of physician shortage. This is argued from the following three points of view: first, the total number of physicians to total population is too small; second, physicians are misallocated between clinics and hospitals; and third, physicians are mismatched among specialties. The first argument states that physicians are actually in short supply, while the second and third arguments state that misallocation of physicians is more important for the problem.

In the long run, redundancy or shortage should be solved by price adjustment even for goods like housing supply for which requires a lot of time. Redundancy lowers price and shortage hightens price. If the first argument is true, there must be an excess demand for medical services so that physicians' incomes are expected to become higher. Then, one of the ways to judge if physicians are in short supply is to see if the internal rate of return (IRR) is higher than for other occupations. If the IRR is relatively high, physicians are actually in short supply.

When misallocation of physicians between hospitals and clinics or among specialties really matters, increasing the number of physicians does not necessarily solve the physician shortage problem. The introduction of PGCTS may enhance possibilities of misallocation of physicians, in particular the mismatch caused by female physicians' likelihood to choose clinics and specific specialties. This is because female physicians are likely to go into dermatology or ophthalmology, quit a hospital at a younger age and find a job in a clinic.

This paper is organized as follows. In section II, a typical career path of a physician is explained and then it discusses how graduates have changed their career choices after

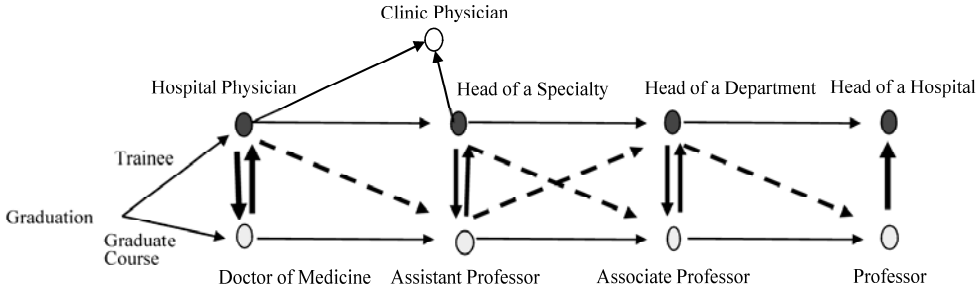


Figure 1. Physician's Career Path

introduction of PGCTS, gender differences in how long they work for a hospital and what functions the *Ikyoku* alumni network has taken. In section III, I introduce studies of physicians' income changes, the IRR of being a physician and discuss if female physicians' preferences matter in the mismatch.

II. Physician's Career Building and *Ikyoku* Alumni Network

1. Physician's Career Path

Figure 1 depicts a physician's career path. A physician moves from one *sitz* hospital to another of the *Ikyoku* alumni network including academic posts at a school of medicine. In fact, a physician in the network is a dispatched worker from an *Ikyoku*, although legislatively she/he is employed by the hospital.

Before introduction of PGCTS, graduates took training courses for almost two years in the university hospital from which they graduated and then were dispatched to *sitz* hospitals until they were in their mid-30s. Meanwhile most of them obtain the title of Doctor of Medicine. The first turning point for physicians is when they are around 40 years of age; that is, whether to become an assistant professor. Being an assistant professor of a university is important for the physician's career building and an MD title is necessary for it. Even though she/he is not promoted to an associate or a full professor, she/he can find a good post at a prestigious hospital of the network. The second turning point is in their late 40s. Some of the alumni compete for better posts like becoming an associate professor or a head of a division at a prestigious hospital. The others have to decide whether to work for a hospital of the network or quit to start their own clinics.

Those who start clinics are still tied to the *Ikyoku*. In many cases, their clinics tend to be located near the hospital they worked for, since their hospital patients become their clinic patients, as indicated by Yoshida and Kono (2007). Not only are new patients transferred to their clinics from the hospital but also serious patients from a clinic can be easily admitted to the hospital because the key physicians of the hospital are members of the *Ikyoku*. Key persons of a local medical association or of a local government health division are also

sometimes graduates of the same school of medicine, so the network benefits them.

2. Postgraduate Clinical Training System

The Postgraduate Clinical Training System (PGCTS) was started in 2004. Graduates have to take two-year training courses to learn all-round basic treatment skills in a teaching hospital. Graduates and hospitals are matched by a matching program as in the United States or United Kingdom. They have monthly earnings ranging from 200,000 to 400,000 yen at the hospital. In general, monthly earnings at a non-university teaching hospital are higher than a university hospital.

One of the purposes of introducing PGCTS is to let the graduates study primary care in all fields of medicine. It was alleged that graduates were likely to learn the specific field of medicine or organs that their *Ikyoku* was mainly concerned with, so that there were few opportunities for the graduates to learn general skills.

Although PGCTS does not aim to weaken the power of the *Ikyoku*, graduates come to be independent of the *Ikyoku* because teaching hospitals offering attractive courses can recruit physicians by themselves. As a result, the number of graduates taking courses provided by university hospitals has decreased. In 2003, about 6,000 out of 8,000 graduates took postgraduate training programs in university hospitals. In 2004, about 6,000 graduates took programs in non-university hospitals. Now the ratio of the number of trainees in non-university to university hospitals is 3 to 1.

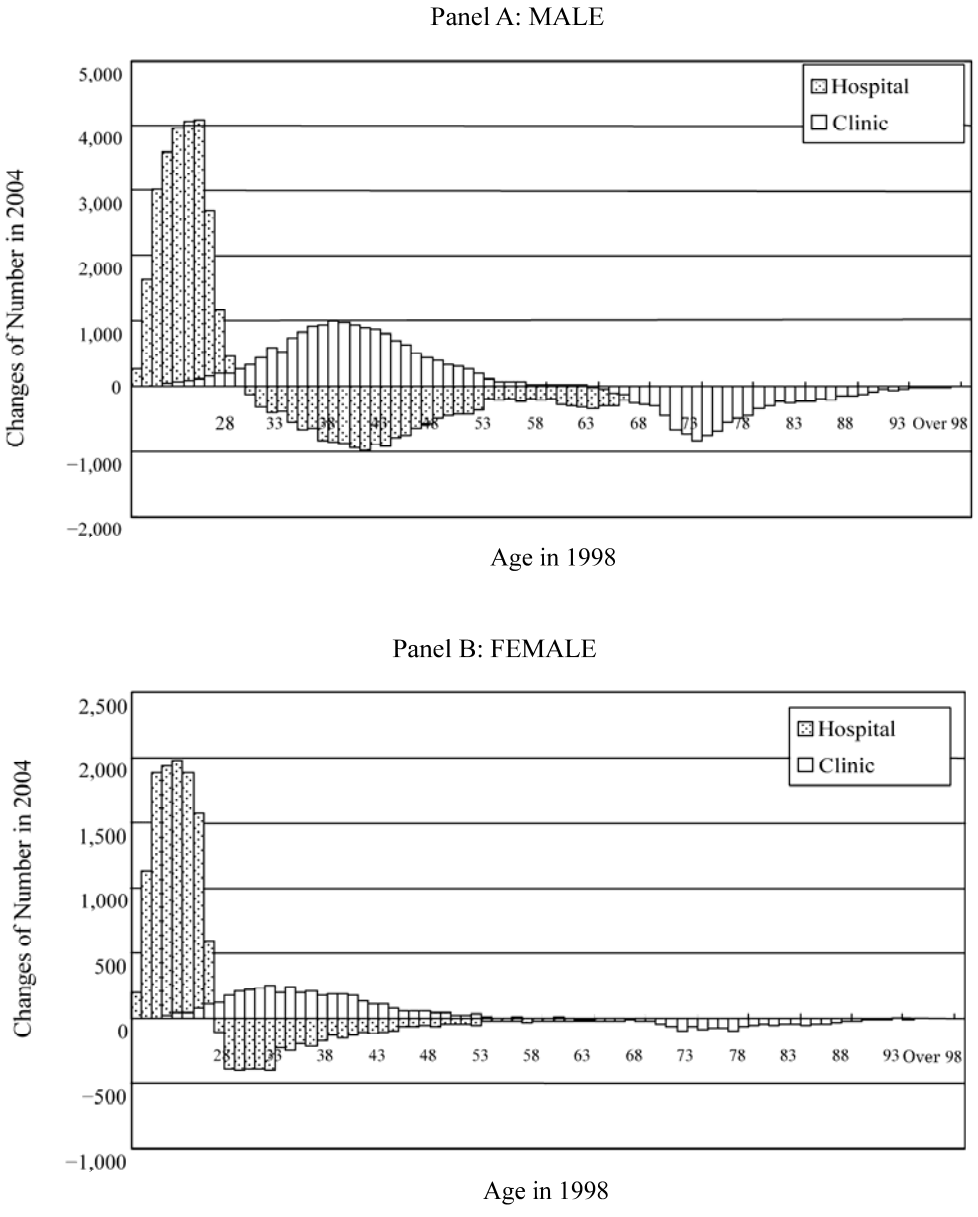
Then what characteristics of a hospital will attract the graduates? Kawamura (2009) shows that the graduates prefer hospitals that have many diagnosis and treatment departments, many beds and many ER patients, but they do not value high salary or advisory systems as much. This is also confirmed in the survey by the Ministry of Health, Labour and Welfare (MHLW 2005).

After the two-year training under PGCTS, where do the trainees go next? Another survey by the MHLW (2007) indicates that 75% of the graduates trained in university hospitals want to stay in the hospitals as members of an *Ikyoku*, but only 50% trained in non-university hospitals do. In total, 61% want to be members of an *Ikyoku*. Thus, the power of the *Ikyoku* has been generally weakened under PGCTS.

3. Change of Career Path

Quitting a hospital and starting an own clinic is an important decision for a physician's career path. Honda (2008) and Kawamura (2008) examine at what age hospital physicians start clinics using the Survey of Physicians, Dentists and Pharmacists conducted every two years by the MHLW. Honda (2008) examines the validity of the assertion that the physician shortage in hospitals is caused by an early switch to clinics and finds that it is invalid.

On the other hand, Kawamura (2008) makes it clear that female physicians are likely to quit earlier than male physicians. Figure 2 tracks physicians of the same age cohort in



Source: Kawamura (2008).

Figure 2. Changes of Number of Physicians in Hospitals and Clinics

1998 and where they are working in 2004, depicting increases in the number of physicians at hospitals or clinics. For physicians who were in their 20s in 1998, both male and female physicians were still working in hospitals in 2004. The biggest drop in number of male

Table 1. Average Frequency of Turnover and Current Workplace by Cohort

	Number of Graduates	Average Frequency of Workplace Changes after Graduation	Current Workplace			
			University Hospital	Non-University Hospital	Clinic	Others
1981 graduation						
Total	103	3.6	8	51	24	20
Male	90	3.6	8	44	22	16
Female	13	4.2	0	7	2	4
1986 graduation						
Total	92	4.5	20	40	16	16
Male	69	4.7	13	33	12	11
Female	23	4.2	7	7	4	5
1991 graduation						
Total	93	3.6	27	30	6	30
Male	68	3.5	23	22	2	21
Female	25	3.8	4	8	4	9

Source: Author's calculation from lists of graduates in a school of medicine.

physicians working in hospitals is for those hospital physicians who were in their early 40s in 1998, which implies that male physicians in their mid-40s or early-50s quit their jobs at hospitals and start clinics. On the other hand, the peak for female physicians is for those who were in their early 30s in 1998, suggesting that female physicians leave the hospital 10 years earlier than male physicians.

We also find that a part of the female physicians quit their full-time jobs in their 30s. The negative sum of the increase of female physicians in clinics and their decrease in hospitals in 2004 implies that they quit their full-time jobs temporarily. The reason may be for childbearing or child care as is likely for female workers in other occupations.

There is a study making use of individual data of the MHLW survey. Once a graduate obtains her/his physician's license, she/he has a physician registration number that enables us to pursue individual physicians' career paths, whether or not and where she/he is working, and what specialty she/he is in charge of. Koike et al. (2008) accumulated individual data using the survey from 1972 to 2004 and find that the age at which physicians quit their job at a hospital and start a clinic used to be higher.

Focusing on three cohorts of graduates from a school of medicine, namely graduates in 1981, 1986 and 1991, Table 1 shows how many times they change workplaces and where they are working now, namely, university hospital, non-university hospital, clinic or other. Since 1981 graduates and 1986 graduates are more than 50 and 45 years old, respectively, it

is not expected that they will change workplaces several times in the future. On the other hand, since the 1991 graduates are more than 40 years of age, they are likely to change workplaces. The average physician turnover at hospitals is 3.6, 4.5 and 3.6 for graduates in 1981, 1986 and 1991, respectively, which implies change in workplace every 7.5 years, 4.9 years and 7.5 years, respectively. There is no critical difference between genders.

One-quarter of the 1981 graduates are working in clinics and half of them in hospitals. One-sixth of 1986 graduates are working in clinics, more than 40% in non-university hospitals and more than 20% in university hospitals. More physicians among 1991 graduates are working in hospitals than the other cohorts. These data are consistent to the findings of Koike et al. (2008). Female physicians are also found to be working in various workplaces, while male physicians are likely to work in hospitals.

The results are summarized as follows: (1) Graduates work in hospitals with turnover every five years. (2) Male physicians decide in their 40s whether to quit their jobs at a hospital and start a clinic, while female physicians decide in their 30s. (3) Physicians are starting their own clinics at an older age.

4. Competition between Schools of Medicine

In the 1970s, schools of medicine were founded in national or public universities located in prefectures where there was no school of medicine. At the same time, private schools of medicine were also allowed to be founded. Before their foundation, each hospital in the prefectures without a school of medicine was a *sitz* hospital of a major school of medicine located in a neighboring prefecture. Then in the mid-1980s when the graduates of newly founded schools had to find workplaces, the *Ikyoku* of the schools tried to make connections with hospitals which were already tied to the other schools.

Let us look at the case of Ibaraki prefecture. Major hospitals were tied to schools of medicine in Tohoku, Tokyo, Tokyo Medical and Dental or Niigata Universities before the school was founded in the University of Tsukuba. Graduates of the school are now physicians in charge of middle management in most major hospitals of Ibaraki prefecture and the proportion of the graduates to total physicians is growing.

Table 2 shows the number of hospitals by strata of the number of physicians who graduated from the same school and by school. The University of Tsukuba is at the top in the number of graduates working in hospitals, Tokyo Medical University second, Tokyo Medical and Dental University third and the University of Tokyo fourth. The number of hospitals where no less than 11 alumni are working is 17 for the University of Tsukuba, 1 for Tokyo Medical University, 3 for Tokyo Medical and Dental University and 2 for the University of Tokyo. Since the number of graduates implies the strength of the tie between a school and a hospital, it can be said that the University of Tsukuba has the largest number of *sitz* hospitals.

On the other hand, there is no other school than the top ten schools which has no less than 11 alumni working in a hospital. In the row for the other schools, the average number

Table 2. Number of Alumni Physicians and *Sitz* Hospitalst

Rank	School of Medicine	No. of Alumni in Ibaraki Pref.	Number of Hospitals by Number of Alumni Physicians Working in the Same Hospital		
			No. of Alumni: 0 to 5	No. of Alumni: 6 to 10	No.of Alumni: 11 and above
1	Univ. of Tsukuba	786	80	25	17
2	Tokyo Med. Univ.	151	38	1	1
3	Tokyo Med. & Dent. Univ.	118	26	4	3
4	Tokyo Univ.	77	27	3	2
5	Nippon Med. School	73	37	2	0
6	Tohoku Univ.	72	25	4	1
7	Keio Univ.	63	24	3	2
8	Chiba Univ.	63	28	2	1
9	Showa Univ.	58	31	1	0
10	Niigata Univ.	51	18	1	1
	The other 90 Universities	898	7.6	0	0

Source: Author's calculation from List of Hospital Physicians in 2004.

of hospitals is listed. The average number of hospitals is 0 where no less than six alumni are working, while it is 7.6 hospitals where no more than five alumni are working, which is smaller than the number of Niigata University that has the tenth largest physicians' alumni network in Ibaraki prefecture.

Table 3 presents how stable the relation is between a school and hospitals. For example, more than 11 alumni of the University of Tsukuba were working in seven hospitals from 1995 to 1998. The number of hospitals of that category is stable in the other periods, while the number of hospitals where there are no more than six alumni is likely to change. Taking the hospitals where more than 11 alumni are working as the *sitz* hospitals, the University of Tsukuba has five to eight *sitz* hospitals.

5. Merits and Demerits of the *Ikyoku* Alumni Network

There is a reciprocal relationship between schools of medicine and hospitals. I have interviewed a manager of a hospital which has 1,001 beds, located near the University of Tsukuba but closely tied to Tokyo Medical and Dentist University. The hospital had 700 beds in 1984, then increased the number of beds to 865 to open an ER in 1988, and to 893 in 1995 to provide beds for AIDS patients, and to 1,001 to expand ER facilities and organ transplants.

The hospital has requested the school to dispatch physicians who can provide treatment to accommodate the increased demand for medical services associated with the new

Table 3. Number of Hospitals Where Number of Alumni Physicians Are Stable Over Time

		Number of Alumni								
		Year: 1995-1998			Year: 1998-2000			Year: 2000-2004		
Rank	School of Medicine	0-5	6-10	11 and above	0-5	6-10	11 and above	0-5	6-10	11 and above
1	Univ. of Tsukuba	36	11	7	48	11	5	46	13	8
2	Tokyo Med. Univ.	27	2	1	24	2	1	20	1	1
3	Tokyo Med. & Dent. Univ.	13	2	2	20	3	3	16	3	3
4	Tokyo Univ.	26	2	1	24	1	1	15	1	1
5	Nippon Med. School	21	2	0	23	1	0	16	1	0
6	Tohoku Univ.	20	2	0	24	5	1	17	3	0
7	Keio Univ.	14	2	1	12	0	0	13	1	1
8	Chiba Univ.	28	1	1	28	1	1	15	1	1
9	Showa Univ.	20	0	0	23	0	0	22	1	0
10	Niigata Univ.	15	1	1	15	1	1	14	1	1

Source: Author's calculation from Lists of Hospital Physicians in 1995, 1998, 2000 and 2004.

beds. Physicians' abilities are assured by the school so that the hospital can keep the quality of treatment at a high level. When a physician's ability is low or she/he causes trouble with patients or the other staff of the hospital, the hospital can ask for a substitute for the doctor. There is little legal risk in dismissal. On the other hand, the school has merits to have a *sitz* hospital with more than 1,000 beds because the hospital preferentially accepts the graduates of the school as trainees and provides proper posts for assistant or associate professors of the school.

The network is also useful for individual graduates. The graduates can experience various cases and obtain necessary knowledge and skills by moving from one hospital to another of the network. It is also useful for the *Ikyoku* to select capable physicians for the staff of the university hospital or as a professor because the *Ikyoku* can obtain sufficient information of an individual graduate from the hospitals of the network.

On the other hand, the *Ikyoku* alumni network has demerits. First, it may cause inefficiency in management. Since alumni of a specific school of medicine decide the personnel matters of the *sitz* hospital, the hierarchical seniority system based on age and graduation year is likely to decide promotion without referring to ability or performance of treatment. Second, it may cause deferral of accepting superior treatment developed by other schools. Instead, a specific combination of pharmaceuticals and treatment learned in the school of medicine is used regardless of the cost and benefits for the patients, thus prolonging the days in hospital compared to other treatment.

Phelps (2000) indicates that there are clear differences in practice pattern between

physicians, but he did not mention the reason. Epstein and Nicholson (2005) say that young physicians are likely to accept their mentor's practice pattern and do not change for a long time. Ikegami and Campbell (1996, 196-97) suggest that there is no standardized curriculum for medical practices and students in schools are expected to learn their mentor's style in Japan. Introduction of a new reimbursement scheme called Diagnosis Procedure Combination (DPC) clarifies how different treatments for the same disease are between hospitals, but how different they are between physicians is still veiled. It is an important viewpoint for examining the *Ikyoku* alumni network to see how the network plays a role in transmitting treatment practices and medical technology.

III. Supply and Demand of Physician—What Causes Physician Shortage?

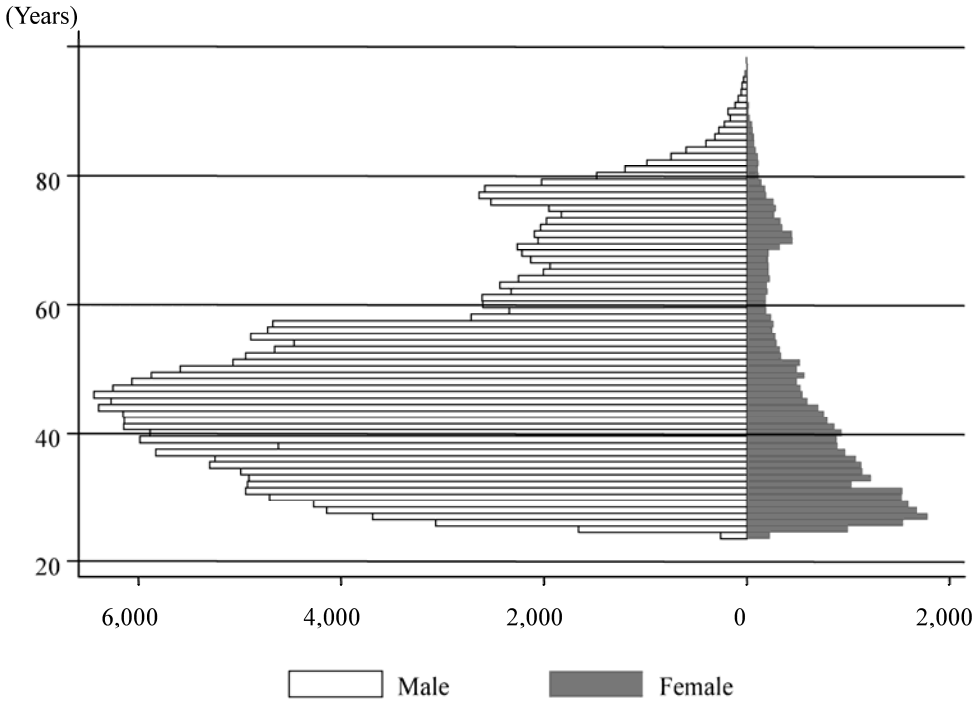
It is often alleged that physicians are in short supply, but what are the reasons for it? First, I discuss whether the total number of physicians to total population is too small; second, whether physicians are misallocated between clinics and hospitals; and third, whether physicians are mismatched among specialties.

1. Are Physicians in Short Supply?

The newest prediction of demand and supply of physicians is reported by the committee on supply and demand for physicians established in the MHLW. The prediction of this committee is based on Hasegawa's (2006) study. He calculated the total demand for medical services and the corresponding number of physicians necessary to provide these services. He then concludes that we are in a situation where physicians are in short supply if the feasible supply of physicians based on the current quota of students in schools of medicine is smaller than the number of required physicians.

Prediction of future supply of physicians is simple because there is no migration of physicians and the quota of students is rigid. Therefore, we can correctly predict the age distribution of physicians so that the total supply of medical services is obtained by the numbers of physicians by age multiplied by the working hours by age. Prediction of demand is based on the current in-patient and out-patient ratios to population by age strata and on the assumption that the ratios will be unchanged in future. We can obtain the total future demand following the changes of age structure. Note that changes of the number of necessary physicians or medical staff due to the development of medical technology or changes of demand caused by relevant price changed of medical services are not taken into consideration. Hasegawa (2006) reports that there is a shortage of physicians of 10,000 in 2004, but supply of physicians will exceed demand in 2022. He also suggests that there is much room for improving productivity in medical service provisions so that the shortage of physicians would be solved by the productivity improvement before 2022.

Reviewing the past discussion on this matter briefly, the first turning point of policy change from increasing physicians' supply to restraining it was in 1984, when the



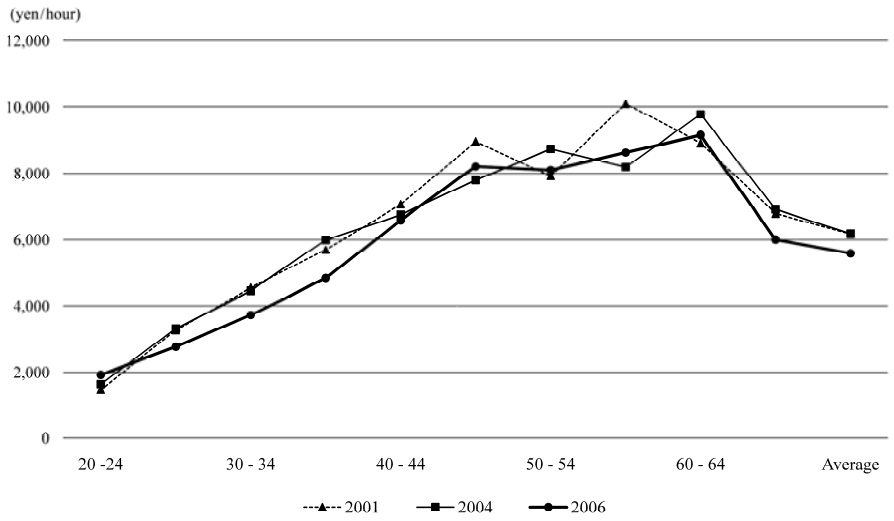
Source: Author's arrangement from Survey of Physicians, Dentists and Pharmacists in 2004.

Figure 3. Number of Physicians by Age and Sex in 2004

intermediate report was published by the committee examining future demand and supply of physicians established in the MHLW. The report proposed that new entrants of physicians should be decreased by at least 10% by 2000. Following the report, the MHLW slashed the quota of students in schools of medicine from the mid-1980s onwards. Note that the number of physicians per 100,000 population is 201 in 2004 and this ratio is regarded as a 10% decrease of physicians compared to the prediction in the report, so the committee's proposal was followed through.

Figure 3 shows a population pyramid of physicians in 2004 disaggregated by gender. Male physicians who graduated in the mid-1980s are decreasing, while female physicians are increasing for the same periods. Their sum total, however, has been decreasing since the late-1980s.

When physicians were in short supply, wages of physicians would increase. In reality, however, the wages have been decreasing. Figure 4 shows wage rates of employed physicians by age based on the Wage Census in 2001, 2004 and 2006. They have changed downwards. In particular, wage rates of those in their 30s have been decreasing. In terms of annual income, it decreased from 10 million yen to 8.2 million yen for those in their early



Source: Author's calculation from Wage Census in 2001, 2004 and 2006.

Figure 4. Wage Rates by Age Strata

30s, and from 12 million to 11 million yen for those in their late 30s, while it was unchanged for those in their 40s. Even taking the deflation economy into consideration, these decreases are large. These facts do not support that physicians are in short supply.

One of the economic approaches to examine if physicians are in short supply is to look at the social rate of return of being a physician. If the marginal rate of return obtained by social benefits and costs of marginal increase of a physician is greater than the proper social rate of return, for example, long-term real interest rate, then there exists a shortage of physicians and it would thus be advisable to increase the number of physicians.

Weeks et al. (1994) compare estimated internal rates of returns (IRRs) of five professionals, namely primary care physician, specialist physician, dentist, lawyer and MBA graduates to high school graduates. The IRR of primary care physicians is lowest, namely 15.9%, while it is 29.0% for MBA graduates, 25.4% for lawyers, 20.9% for specialist physicians and 20.7% for dentists. The IRRs of physicians, in particular that of primary care physicians, is relatively lower than that of the other professionals, which implies that primary care physicians are abundant and their number may decrease in future.

Arai (1995) estimated the IRR of the graduates from private schools of medicine and private dental schools in 1982 as 8.7% by considering the income of high school graduates as opportunity costs. He compared their IRR to that of male graduates of private university, namely 6.7%, and concluded that being a physician or dentist was a good investment opportunity. On the other hand, Yoshida (2009) estimates the rate of return roughly as around 3% by taking income at one of the largest banks as an opportunity cost. Since such estimates represent private rate of return, we have to include external economies into the return

and subsidies to the cost terms in order to estimate the social rate of return. It would be expected, however, that external economies and subsidies per physician are negligible in private schools of medicine so that social rate of return is nearly the same as the private rate. Since the real long-term interest rate in the early 2000s was nearly 3%, we cannot say that physicians are in short supply from this viewpoint.

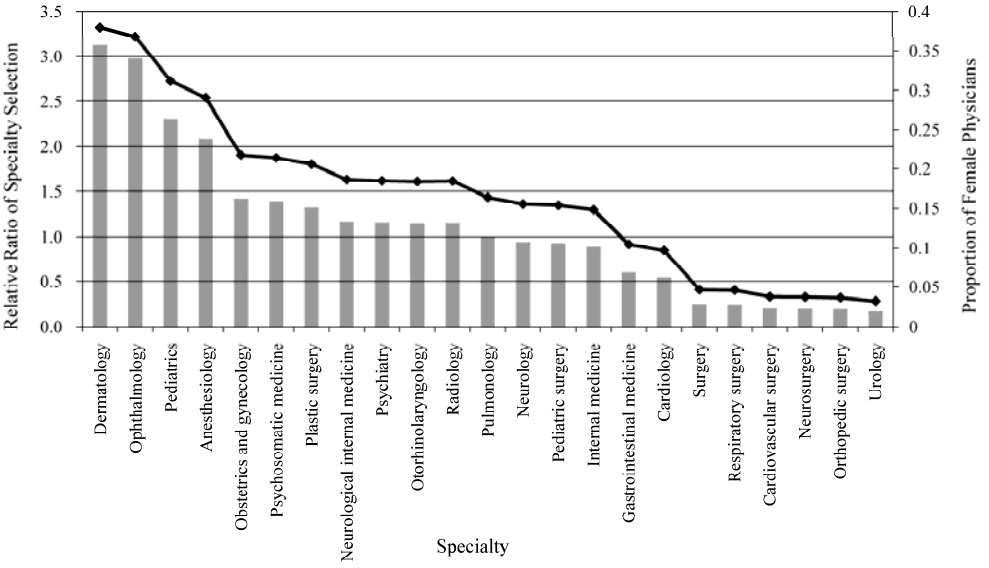
2. Increase of Female Physicians

Now let us look at the shortage of physicians from the viewpoint of misallocation or mismatch in the specialties of medical care. It is also alleged that there is no shortage of total physicians but physicians are in short supply in hospitals and in some specialties of medical care, in particular in surgery, obstetrics and anesthesiology. There are two reasons for thinking that the increasing number of female physicians leads to the shortage. First, female physicians are likely to change workplace from hospital to clinic in their 30s, leaving physicians in hospitals in short supply. Second, female physicians are less likely to select the department of surgery for their specialty, leaving surgeons in short supply. They tend to become specialists of dermatology, ophthalmology and pediatrics.

The proportion of female physicians has increased rapidly from 10% in 1980 to 16% in 2004. The number of female physicians is 42,000 out of 257,000 total physicians in 2004. Let us look at Figure 3 again. The number of male physicians by age is the largest around their mid-40s, while the number of female physicians is the largest in their late-20s. Thirty-five percent of physicians less than 30 years of age are female. In the age strata younger than 30 years, male physicians decrease by 752 but female physicians increase by 506 from 2002 to 2004. That is, in 20 years from now, nearly one-third of physicians of 40 years of age will be female and a proportion of them will be working in clinics or as part-time physicians as we see in Figure 2.

Figure 5 presents proportions of female physicians by specialty of medical care (represented by the line graph with scale on the right axis) and the relative ratio of specialty selection (represented by the bar graph with scale on the left axis). As of 2004, more than 30% of physicians in dermatology and ophthalmology are female but no more than 5% in surgery or urology, while 16% of physicians overall are female. The relative ratio of specialty selection is defined as the female proportion in a specialty, namely (number of female in a specialty)/(number of female in all specialties), divided by the male proportion, namely (number of male in a specialty)/(number of male in all specialties). When the value of the relative ratio is greater than 1 in a specialty, it implies that female physicians are likely to select that specialty. We find that it is three or more times more likely for female physicians to select dermatology and ophthalmology than male physicians. On the other hand, surgery is selected only one-fifth as often as male physicians. If the increasing trend of female physicians and of their diminished likelihood to select surgery as a specialty remains unchanged, the supply of surgeons will be short in the near future.

It is not only for Japan that the number of female physicians has been increasing.



Source: Author's calculation from the Survey of Physicians, Dentists and Pharmacists in 2004.

Figure 5. Specialties Preferred by Female Physicians

McKinstry (2008) indicates that the increase in female physicians is a worldwide trend that is observed in the United Kingdom, the United States, Canada and Australia. The proportion of female students has become larger than that of male students in all medical schools in the UK from 2002 to 2003 with more than 65% of students in some medical schools being female. He also indicates that female physicians in the UK are likely to select family-friendly fields of medical care such as primary care or psychiatry and that they prefer a part-time job. They have high communication skills and tend to spend longer time on care of a patient than do male physicians. Arcidiacono and Nicholson (2005) also point out that female students in medical schools tend to select primary care in the US, which is the same as in Japan. We have to examine if the tendency of female physicians is based on female-specific preferences or on cultural background of male dominance in physicians' circles.

IV. Conclusion and Discussion

Physicians have built their careers based on a network composed of a division of schools of medicine to which physicians belong (*Ikyoku*) and *sitz* hospitals which are closely tied to the *Ikyoku* in supply of physicians. They enhance skills by changing hospitals nearly every five years. A proportion of male physicians quit their job at a *sitz* hospital to start a clinic in their 40s, while female physicians quit in the 30s. Of recent, the age of leav-

ing the hospital has tended to be on the rise. The network is beneficial both for the *Ikyoku* and *sitz* hospitals: the former can select capable physicians to be a professor by monitoring the performance in the hospitals, while the latter can decrease cost and uncertainty in ability when recruiting new physicians. The network, however, has come to lose its importance in physicians' career building since the Postgraduate Clinical Training System was introduced in 2004. Nearly 75% of newly graduated physicians take training courses in non-university hospitals rather than university hospitals, though nearly three-fourths took postgraduate courses in schools from which they graduated before the introduction. Only 60% of physicians select university hospitals for post-PGCTS residency now. It is alleged that the PGCTS accelerated the shortage of physicians. However, it has not been verified that physicians are actually in short supply. Decline of physicians' wages or the low rate of return of being a physician would imply their abundance. There could be misallocation or mismatch of physicians among specialties or between hospitals and clinics. It would certainly be partly caused by female-specific preferences for some specialties and clinics.

The most effective way to amend the misallocation of physicians among specialties is to set quota for each specialty. In fact, quota systems have been introduced in many countries. We also have to examine why female physicians prefer specific specialties, whether or not females feel uneasy working in some male-dominated workplaces, and whether or not females have comparative advantages in some specialties due to female-specific characteristics.

References

Arai, Kazuhiro. 1995. *Kyoiku no keizaigaku: Daigaku shingaku kodo no bunseki* [Economics of education: Analysis of motivations for continuing on to university]. Tokyo: Yuhikaku.

Arcidiacono, Peter, and Sean Nicholson. 2005. Peer effects in medical school. *Journal of Public Economics* 89, no. 2:327−50.

Epstein, Andrew, and Sean Nicholson. 2005. The formation and evolution of physician treatment styles: An application to Cesarean sections. Working paper no. 11549, National Bureau of Economic Research, Cambridge, MA.

Hasegawa, Toshihiko. 2006. *Nihon no ishi juyo no jisshoteki chosa kenkyu* [Empirical research on the demand for physicians in Japan]. Report of the FY2006 Health and Labour Sciences Research Grants.

Honda, Eiko. 2008. Ishi, shika ishi, yakuzaishi chosa wo riyo shita ishisu bunseki ni tsuite [Analysis of the number of physicians based on the survey of physicians, dentists and pharmacists]. *Shakai Hoken Junpo*, no. 2349:22−32.

Ikai, Shuhei. 2000. Nihon ni okeru ishi no kyaria: Ikyoku seido ni okeru ishi sotsugo kyoiku no kozo bunseki [Physicians' careers in Japan: Structural analysis of Japanese postgraduate medical education under the *Ikyoku* system]. *The Quarterly of Social Securi-*

ty Research 36, no.2:269−78.

Ikegami, Naoki, and John C. Campbell. 1996, *Nihon no iryo: Tosei to baransu kankaku* [The art of balance in health policy: Maintaining Japan's low-cost, egalitarian system]. Tokyo: Chuokoronsha.

Kawamura, Akira. 2008. Josei ishi no kyaria sentaku: Byoin, shinryosho sentaku no danjo hikaku [Career selection of female physicians: A comparison of hospital/clinic selection between male and female physicians]. *Japanese Journal of Health and Medical Sociology* 19, no. 2:94−104.

———. 2009. Shinsotsu ishi no kenshusaki kettei yoin [Determinants for newly graduated physicians when selecting where to receive clinical training]. *Hospital* 68, no. 12:100−104.

Koike, Soichi, Yuichi Katsumura, Tomoko Kodama, Hiroo Ide, Hideo Yasunaga, Shinya Matsumoto, and Tomoaki Imamura. 2008. Shinryosho kinmui no jokyo no henka to taso seimeihyu no genri wo mochiita ishisu no shorai suikei ni tsuite [Changes in the circumstances of clinic physicians and projection of the number of physicians based on the principle of multistate life tables]. *Journal of health and welfare statistics* 55, no. 11:22−28.

McKinstry, Brian. 2008. Are There Too Many Female Medical Graduates? Yes. *British Medical Journal* 336 (7647):748−49.

Ministry of Health, Labour and Welfare. 2005. Rinsho kenshu byoin oyobi rinsho kenshui ni taisuru anketo chosa kekka gaiyo [Outline of the results of the questionnaire survey targeting postgraduate training hospitals and clinical trainees]. Compliled by Office for Clinical Training, Ministry of Health, Labour and Welfare. http://www.mhlw.go.jp/houdou/2005/07/dl/h0705-3a.pdf.

———. 2007. "Rinsho kenshu ni kansuru chosa" hokoku no gaiyo: Kenshu 2-nenjisei ni kansuru chosa [Outline of the report on the "Survey on Clinical Training": Survey of second-year clinical trainees]. http://www.mhlw.go.jp/topics/bukyoku/isei/rinsyo/chosa-saisyu06/dl/01c.pdf.

Phelps, Charles E. 2000. Information diffusion and best practice adoption. In *Handbook of Health Economics*, vol. 1A, ed. Anthony J. Culyer and Joseph P. Newhouse. Amsterdam: North Holland.

Sauer, Robert M. 1998. Job mobility and the market for lawyers. *Journal of Political Economy* 106, no. 1:147−71.

Weeks, William B., Amy E. Wallace, Myron M. Wallace, and H. Gilbert Welch. 1994. A comparison of the educational costs and incomes of physicians and other professionals. *New England Journal of Medicine* 330, no. 18:1280−86.

Yoneyama, Kimihiro. 2002. *Gakubatsu shihai no igaku* [Medicine ruled by academic cliques]. Tokyo: Shueisha.

Yoshida, Atsushi. 2009. *Nihon no iryo no naniga mondai ka?* [What should be changed in the Japanese health care systems?]. Tokyo: NTT Shuppan.

Yoshida, Atsushi, and Satoshi Kono. 2007. Ibaraki-ken ni okeru shinryosho-kan no kukan-teki kyoso [Spatial competition among clinics in Ibaraki porefecture]. *Journal of the Japan Statistical Society* 37, no. 1:133−50.