

Chapter 10
From Brain Drain to Brain Competition:
Changing Opportunities and the Career Patterns of
U.S.-trained Korean Academics

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Abstract

For the last several decades, South Korea has been one of the countries that send the largest numbers of students to the U.S. The returned Korean students played a vital role in the process of successful economic development of the country since the 1960s. In particular, the U.S.-trained Ph.D.'s contributed greatly in the expansion and advancement of the higher education sector and science and engineering fields. The rapid economic development of Korea during a short time period has changed the relative employment and living conditions of Korea compared with the U.S. In response to the changing domestic and international conditions, the career choices of the U.S.-trained Ph.D.s have been changing. Roughly speaking, three different periods can be identified since the Korean War: brain drain (1953-1970), brain gain (1970-1997), and brain competition (since 1997). The first period is typical of low-income countries in which talented students leave for a rich country for further education and stay there after their training by being *de facto* immigrants. In the second period a large number of Korean graduate students come to the U.S. for advanced degree and return to seek employment in the burgeoning Korean economy. During this period, Korea virtually outsourced graduate education to the U.S. In the third period, the education and career choices are more globalized, i.e., more and more U.S.-trained Korean Ph.D.'s seek employment opportunities in a more globalized professional labor market and the mid-career interactions are more diverse and complex. International migration of post-docs and more professional cooperation and competition for talents across borders are emerging. In this environment, it is imperative that the employer and country need to be attractive for their professional and personal lives. The Korean experience can serve as a leading-edge example of the internationalization of the U.S. higher education vis-à-vis with China and India.

**From Brain Drain to Brain Competition:
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1. Introduction

As other chapters in this volume have shown, many students around the world are coming to the U.S. universities to study, and some of them return to their native countries while others stay in the U.S. More and more Ph.D.'s, particularly in science and engineering, are awarded to foreign nationals, particularly from the students from China, India, and Korea, and they are becoming a major component of the research activities of the U.S. universities. Currently, the majority of Chinese and Indian Ph.D.'s intend to stay in the U.S. after their graduation.¹ However, based on the experience of Korean Ph.D.'s trained in the U.S., it is not clear this pattern will continue into the future, raising the question whether and how the U.S. research universities will continually maintain their preeminence. The Korean experience shows that the situation in home country plays a decisive role in determining the career choice of those foreign-born talents.

Obviously, Ph.D.'s are the core resource in the research and development activities, and where and how they work will determine the effectiveness of not only the higher education sector but also the national innovation system as a whole. The decision of those people to stay or

¹ According to the 2006 Survey of Earned Doctorates, among 45,596 doctorates awarded in the U.S., about one third (15,916) were awarded to foreign nationals. In engineering, the share of foreign nationals was 63%, and in physical science 53%. Chinese are the largest group with 4,774 degrees, followed by Indians with 1,742, then followed by Koreans with 1,648. 89.8% of Chinese, 88.1% of Indian, and 60.9% of Korean said they intended to stay in the U.S. (Hoffer et al. 2007) The share of the people who intended to stay has increased over time recently, but the trend reflects the increasing number of students from China and India.

return to their native country will depend on several professional and personal considerations. In this paper, we examine employment opportunities and career patterns of the U.S.-trained Korean Ph.D.'s in academia over the past several decades. Korea is an interesting country to study the employment and residence choice of the U.S.-trained highly-skilled knowledge workers. Over the last fifty years, Korea has transformed itself from a low-income agrarian country to a fledgling advanced economy. Consequently, the Korean labor market situation for academics has changed significantly. In fact, the desirability of staying in the U.S. after gradation has changed significantly due to Korean government's policy as well as the forces of internationalization in higher education and the globalization of the professorial market. The purpose of this paper is to highlight the changes in government policies, institutional arrangements, and market forces in Korean higher education system, and relate them to the employment choices and career patterns of the U.S.-trained Korean academics.

If one examines the post Korean War period from the perspective of employment choice of the U.S.-trained Korean academics, three different periods can be identified: brain drain (1953-1970), brain gain (1970-1997), and brain competition (since 1979). The first period is typical of low-income countries: talented Korean students left for the U.S. to study abroad and stayed there after their education and training by being *de facto* immigrants. In the second period, a large number of Korean graduate students came to the U.S. for advanced degrees and returned to seek lucrative employment opportunities in the burgeoning Korean economy. During this period, Korea effectively outsourced its graduate education to the U.S. In the third period, more U.S.-trained Korean Ph.D.'s sought employment opportunities outside of Korea. The professorial market became more globalized, and their mid-career movements were more diverse and complex. The Korean academic labor market became more competitive as a result of the

greater supply of Ph.D.'s and the adaptation of merit-based personnel policies. Also, the competition among elite universities to seek world-class status became more evident, and they actively recruited mid-career researchers working in the U.S. At the same time, there has been an increase of migration of Korean-educated post-docs to the U.S. More professional cooperation and competition for and among talents across borders are emerging.

The paper is organized as follows. In the next section, we describe the large presence of Koreans in U.S. higher education, and the large influence of U.S.-trained academics in Korean higher education. In Section 3, historical context before the Korean War (1950-53) explaining the close relationship between Korean and the U.S. higher education is provided. In the following Section 4, the first period of brain drain (1953-1970) is discussed. In Section 5, we discuss how Korea used the brain gain (1970-1997) of the Korean expatriate for economic development and increasing the capacity of the Korean higher education sector. At the same time, we highlight the structural characteristics of the academic job market in Korea. In Section 7, we discuss and analyze the consequence of the brain gain, and explain why the Korean model of brain gain could not be sustained after the Asian economic crisis (1997-99). Also, we discuss the current situation including the trend of mass internationalization of higher education, the institutional changes, particularly, reforms in higher education and the emerging global brain competition. Finally, in the conclusion we discuss the implications of this new trend of brain competition to American universities.

2. The Importance of Korea and the U.S. in Each Others' Higher Education Sector

According to the data provided by the U.S. Institute of International Education, there were 564,766 foreign students enrolled in higher education institutions in the U.S. in the

academic year of 2005-06. (IIE 2006) There were 58,847 Korean students in the same year, representing 10.5% of all foreign students. Korea ranks the third in terms of the number of students in the U.S. higher education, following India with 76,503 students and China with 62,582 students. Considering the fact that both China and India have much bigger populations, Korea sends the most students per capita to the U.S. in the world. Among them, 46% are registered in undergraduate programs, 41% in graduate programs, and the rest in special programs. In addition to the students enrolled in the regular academic programs, there are about 10,000 Korean students studying in intensive English programs in the U.S. Currently, Korea sends the largest number of students to the U.S. for English language training in the world, followed by Japan, which used to occupy the top position until recently.

Korean presence in U.S. higher education is prominent at the doctorate level as well. According to the 2006 Survey of Earned Doctorates, the number of Ph.D.'s awarded to Korean nationals was 1,648, only outranked by China (4,774) and India (1,742) (Hoffer et al. 2007). Despite the large supply of Ph.D.'s, the number of Korean faculty members in American Universities is relatively small. The 2008 Directory of KAUPA (Korean American University Professors Association) lists about 2,500 faculty members working in North America, and the majority of them are in the U.S. While this number is relatively small, it has been growing rapidly for the last ten years due to the changes in the Korean and world academic labor markets. In addition, there are about 8,000 Korean visiting scholars and substantial number of Korean post-docs in the U.S. universities.

On the other side of the ledger, the presence of the U.S. universities in the Korean higher education sector is also quite remarkable. Among Korean academics working in Korea who received their Ph.D.s abroad, the U.S. is the biggest contributor. According to the data provided

by the Korean Research Foundation, 52.8% Korean researchers with foreign Ph.D.s who registered their degree during the period between January, 2000 and August, 2007 at the Foundation received their degrees in the U.S. Following the U.S., the proportion of Japanese Ph.D.'s accounts for 17.7%, followed by Germany (7.1%), U.K. (5.5%), and China (4.6%). (Dong-A Daily, October 24, 2007) Since these data are based on self reporting, and ignores the fact that many U.S. Ph.D. don't tend to return to Korea immediately after their degree (compared to the degree recipients from other countries), the U.S. proportion is likely to be higher.

Currently, U.S. Ph.D.'s dominate the professorial positions in Korean universities. The pattern is most striking in top rank universities. In Seoul National University, 886 out of 1,683 professors with Ph.D.s (52.6%) received their Ph.D.'s in the U.S. Some disciplines have much higher proportions than others. In general, management, social sciences, natural sciences and engineering have higher proportions of U.S. Ph.D.s than humanities, law, medicine and nursing. Almost 90% of business school faculty members have U.S. Ph.D.s. In social sciences, the proportion is 78.8%, in natural sciences, 77.6%, in engineering 76.8%, and in biological and life sciences, 76.8%. (Chosun Daily, October 18, 2007) The other two premier science and engineering universities in Korea, Korea Advanced Institute of Science and Technology (KAIST) and Pohang School of Technology (POSTECH) also have very high proportion of U.S. Ph.D.'s. In KAIST, 84 out of 101 (83.2%) science professors and 170 out of 239 (71.1%) engineering professors received their Ph.D.s in the U.S. In POSTECH, 73 out of 81 (90.1%) science professors and 99 out of 120 (82.5%) engineering professors received their Ph.D.s in the U.S. (KCUE, 2004) Beyond their sheer number, the U.S.-trained academics form the basic tenets and methodology of many academic disciplines (e.g., see Choi (1977) on the influence of U.S.-trained academics on the economic science in Korea).

In the second-tier universities, the proportion of U.S.-trained Ph.D.s is smaller. For example, in Hanyang University, a private university, whose overall ranking in Korea is around five or seven among all Korean universities, 41.1% of professors in sciences and 40.3% in engineering are U.S. Ph.D.s. At Kyunghee University, another private university, whose overall ranking is around ten, 43.4% of science professors and 33.3% of engineering professors are from the U.S. At Kyungbook University, a national university in Daegu (a major provincial city), 51.5% of science professors and 27.9% of engineering professors received their Ph.D.s from major U.S. universities.

3. Historical Legacy (From Late 19th Century to the Korean War, 1950-1953)

It is natural to wonder why Korea, a relatively small country located far away from the U.S., has such a strong relationship with the U.S. higher education system. In order to answer this question, one needs to start with longer and broader historical backgrounds since the beginning of the modern education in Korea before the mass internationalization started in the latter part of 20th Century. In the 19th Century when Korea was faced with the encroachment of then powerful imperialistic nations, several U.S. missionaries sowed the seeds of modern higher education. During the Japanese colonial period and the direct involvement of the U.S. after World War II and the Korean War, Korean society in general and the nation's higher education system in particular was heavily influenced by U.S.-trained academics (Lee 1989).

During the period between 1880 and 1910, when the Chosun Dynasty struggled to cope with the encroachment of the powerful imperialistic nations of the period, the student flow to the U.S. was minimal because of the obvious difficulty of traveling the long distance between the nations at that time. Most foreign cultural and intellectual influence from advanced nations was

through the students who studied in neighboring Japan and China. However, American missionaries during the time period actively participated in the beginning of modern education in Korea by establishing higher education institutions. Many of those institutions, such as Yonsei University, Soongsil University and Ewha Womans University, are still in existence today and they constitute top-rung private universities in Korea.

During Japan's forced annexation of Korea between 1910 and 1945, the development of modern education in Korea was severely suppressed by the colonial government. For the first 25 years of the colonial rule, no universities were allowed in the Korean peninsula and all institutions of higher learning were converted to technical colleges in order to provide technical manpower necessary in governing the colony. Most top Korean students who wanted to further their study went to Japan for several reasons. First, Japan was the colonial power, and the elites who were attached to the colonial government were favored in Japan, and their children were welcome in Japanese higher education institutions. Second, as the economic and social ties between Japan and its Korean territory increased, more information regarding study in Japan was available to the potential students. However, there were only a few dozen Koreans in the U.S. universities at any given time until 1940s.² However, the U.S. provided an alternative to Japan to those who overtly or covertly worked for Korean independence. For those students, Japan was a dangerous place and the U.S. provided a safe haven for their independence activities. In contrast to the education in Japan, that stressed the importance of the national power and the collective ethos, American social philosophy was based on individual freedom and democracy. Therefore, the philosophy and attitude of the Korean students in the U.S. were very different from those in Japan regarding Japanese colonialism and Korean nationalism.

² Around 1930, it was reported that there were about 300 Korean students in the U.S. higher education institutions, while there were more than 3,000 in Japan. (Chang 2005)

The victory of the U.S. over Japan in World War II gave the scholars and leaders who were trained in the U.S. a great deal of leverage, and they often served as the conduit of the American policy toward the occupied land. In fact, many of those who studied in the U.S. felt quite strongly about such social responsibility. The list of the Who's Who in the independence movement and early Korean government, business and social leaders were dominated by those who studied in the U.S. during the colonial period. (e.g., Ahn Chang-Ho, Rhee Syngman, Ahn Ick-Tae, Yeom Sang-Seop, Cheon Young-Taek, Paik Nack-Jun, Helen Kim, Yun Chi-Young, Hong Nan-Pa, and so on) In particular, Rhee Syngman, who studied at Harvard and Princeton, mobilized Koreans in Hawaii for the nation's independence movement during the Japanese colonial period and became the first President of the newly independent South Korea in 1948. Despite the large influence of the U.S. educated Korean leaders, the number of Koreans who were exposed to U.S. universities was very small. However, the outbreak of the Korean War (1950-53) and the U.S. military involvement in the War changed the picture dramatically.

4. Brain Drain: The First Wave of Study Abroad (1953 – 1970)

Figure 1 depicts the changes in the number of Korean students in U.S. higher education institutions since 1954, the first year that IIE started to keep track of the statistics. According to the Figure, there were two major waves of study in the U.S. by Koreans. The first wave, a relatively small one, started immediately after the Korean War. The second wave, a major wave that started around 1980, does not show any sign of slow down despite a temporary setback during the Asian Financial Crisis of 1997-99. However, the nature of the study in the U.S. and the behavior of the students in the two waves are quite different from one another. The first wave was a typical brain drain in which talented students went to the U.S. and stayed

there after their education and training by being *de facto* immigrants. The second wave is a large-scale internationalization of higher education between Korea and the U.S.

During the first wave, increasing numbers of Koreans started to come to the U.S. for study abroad. Motivations and financial support for those students were quite diverse. Some students were sent by the Rhee government. The Korean government wanted to use them as a vehicle for technology transfer in order to reconstruct and develop the war-torn nation. Most of these students concentrated in graduate studies in science and engineering. Some students were supported by the U.S. government, including Fulbright Scholarships and East-West Center Fellowships. Some students were adopted or sponsored by American soldiers and missionaries, whose number increased dramatically since the Korean War. Some were financed by their own families.

In any case, many bright Korean students who finished their advanced degree in the U.S. ended up settling down in the U.S. This phenomenon was particularly keen in the science and engineering fields, where scholarships for graduate students and employment opportunities for graduates in the U.S. were much more abundant. Korea lost these talented people for two major reasons.

First, there was a large difference in living standards between the U.S. and Korea. Figure 2 shows the relative income between Korea and the U.S. between 1960 and 2007. The ratio of the Korean GDP per capita to the U.S. GDP per capita was calculated using the official exchange rate and purchasing power parity (PPP). The graph using the exchange rate is more volatile of the two because of the exchange rate fluctuation, as Korea has maintained the managed flexible exchange rate regime since the late 1960s. The Figure shows that the relative income between the two countries remained pretty stable up until 1967 (3-5% using exchange rate and 11% using

PPP). Since the late 1960s, the relative income has steadily increased to around 45% until the Asian Financial Crisis in 1997-98. After this significant negative shock, the Korean economy recovered fairly quickly, and the relative income reached about 54% in 2007. Rapidly rising income in Korea certainly had an important influence on the return decisions of the students in the later period, which will be discussed later.

The second reason for the drain was the lack of professional opportunity, due to the underdevelopment of research infrastructure in Korea. When the student returned to Korea after the successful study, he/she would find that the working conditions in Korea were much inferior to the ones in the U.S. Even if the student were financed by the government, and were obligated to return home, the government found it difficult to place the returnee. Consequently, the returnee was often forced to work in a field different from his/her specialization or went back to the U.S.

It is difficult to obtain quantitative measures of the extent of the brain drain in this period. However, the pattern is not very different from the current brain drain of highly educated and trained professionals from low income countries to high income countries, widely observed in many countries (Beine et al. 2001, Kao and Lee 1973, Kwok and Leland 1982, Wong and Yip 1999, Katz and Stark 1984).³ In the case of Korea, however, its brain drain was not a total waste. Rather, it can be regarded as a “brain saving,” because some of the expatriate Korean talents were effectively mobilized during the subsequent push for rapid economic growth and the expansion of higher education sector.

³ 63% of foreign-born students who earned science and engineering doctorates from U.S. institutions between 1988 and 1996 said they planned to locate in the U.S. Two-thirds of those who planned to stay had firm plans for further study or employment (Johnson 1998)

5. Brain Gain (1970 - 1997)

Human Capital and Economic Growth in Korea

In explaining the Korea's successful economic development experience since early 1960s, economists usually point out several reasons. Rapid expansion of production capacity through heavy investment in capital goods and infrastructure, stable governments, high domestic savings rates, disciplined Confucian work ethic, and well-timed government-led economic policies have been often cited as the major determinants of Korea's high growth rates (e.g., Amsden 1989, Song 1997). However, the accumulation of Korea's human capital has been relatively ignored in the discussion Korea's successful economic development process.

Domestically, when Park Chung-Hee Administration (1961-1979) started to implement the government-led economic development plan, Korea was already prepared with quite substantial human resources as a result of more than a decade of intensive human capital investment by the previous administration. Immediately after independence, the previous Rhee Syngman Administration (1948-1960) pushed for universal primary school education under the guidance of American education planners (McGinn 1980). Although the effort had been seriously jeopardized by the outbreak of the Korean War, the successful post-war implementation of universal primary schooling increased the primary school enrollment from 1.37 million students in 1945 to 2.27 million in 1947 to 4.94 million in 1965. Despite the substantial foreign aid provided by the U.S., Rhee's government failed to establish a peaceful and prosperous economy, due to widespread corruption among its political elite and political instability. But, its legacy of expanding universal primary education paid off handsomely several years later. The number of teachers increased from 20,000 in 1945 to 79,000 in 1965. By 1965, the goal of universal primary school education had been more or less achieved, and the

human resources for Park's export promotion policies by specializing labor intensive manufacturing industries were already in place (KMOE 1998).

The second important aspect of human capital resources in that era was the availability of highly educated people that assumed leadership roles in Korean economy. Many of these people received advanced degrees in the U.S. The Korean government did not pursue a systematic policy of "learning from the West" that the Meiji government of Japan adopted in the middle of nineteenth century. However, many Korean talents went to the U.S. for advanced study through personal and religious affiliations, because the U.S. was heavily involved in the Korean War and the reconstruction efforts afterwards. As early as 1953, the number of Korean students enrolled in U.S. higher education jumped to around two to three thousands (IIE). During the 1950s, there were about 50-60 thousands foreign students in the U.S., and Korean students accounted about 5-6% of them. Surprisingly, Korea ranked between 5th and 10th in terms of the number of students enrolled in the U.S. higher education in the late 1950s despite the lower income and relatively small population. When the Park Administration set the goal of economic development by recruiting U.S. trained engineers and economists, there were already substantial numbers of Korean expatriate professionals in the U.S.⁴

Push for Brain Gain

As a part of economic development strategy, the Park Administration actively recruited and utilized the U.S.-trained knowledge workers. For example, in 1966, Korea Institute of Science and Technology (KIST) was established and wholesale recruitment of Korean scientists and engineers from abroad, particularly from the U.S., began.⁵ Korea Development Institute

⁴ See Kapur (2001) and Vasegh-Daneshvary et al. (1987) for international migration of professionals and technology transfer.

⁵ Major funding for the establishment of KIST was provided by the Johnson Administration as a

(KDI) was established in 1971 in order to advise the government for the active economic planning exercise. To launch these institutions, created as they were outside of the existing universities and other government agencies, their presidents began by recruiting qualified scientists, engineers and economists who could lead their research groups. Salaries were set much higher than the local pay level. Generous allowances for research equipment and assistants were provided. In addition, modern housing and educational allowance for their children were provided (Yoon 1992, Song 1997).

From the perspective of Korean Ph.D.'s in the U.S., such job offers presented opportunities as well as substantial risks. On the one hand, they presented a great opportunity to go back home and contribute to the homeland. Although the working conditions and the material reward may not have been comparable to the existing jobs in the U.S., the positions offered more professional freedom because they were given wider and greater responsibility. There was a certain personal satisfaction about being able use their knowledge and skills in promoting the welfare of the people in the homeland. Also, being able to be close to relatives (particularly parents) and friends was a plus. On the other hand, there were certain personal and professional risks. Other family members, particularly young children, might not adjust well to the Korean society and be unhappy about the move back. Professionally, the move could lead to a dead-end career prospect, and loss of valuable professional connections in the U.S. Based on these obvious trade-offs, not all expatriates welcomed such offers. But, some were willing to take the risk and come back to Korea in such environment.

Overall, the government-sponsored institutions were a great success. The institutions were able to recruit enough expatriates to Korea, and the returnees were able to contribute

quid pro quo to Park's decision to send fighting forces to Vietnam War.

greatly to the scientific, engineering, and economic progress (Song 1997, Yoon 1992).

Observing the success of government-sponsored research institutes, universities and private firms also participated in the recruitment of the U.S.-trained talents. Since the supply of talents was rather limited, their labor market return was quite high. Such positive market signal for the U.S. educated professionals and rising income in Korea created a bonanza of going to the U.S. for the purpose of studying. Having seen the successful career developments of the U.S. trained professionals, large scale study abroad started.

With the strong market signal, many bright young people leave Korea to study in the U.S. Some of them may end up staying in the U.S. because of its superior working condition and quality of life. However, if the Korean economy provided high enough incentives, a majority of these talents would come back to Korea. The high incentives of the returnee created strong incentives for more young people to go to the U.S. In effect, Korea virtually outsourced its graduate education to the U.S. As long as the incentive existed, the process of brain gain continued. In Korean universities, the U.S.-educated Ph.D.'s started to fill many professorial positions in Korea. Following their favorite professors' advice, the brightest students who aspire to obtain advanced degrees go abroad, and the U.S. has been the most popular destination for those expecting to obtain a professorial position in Korea (Mountford 1997). In 1999, about 80% of 40,000 full time faculty members in Korean universities have doctoral degrees, and about 50 percent of them earned Ph.D.s from abroad, with 67.2% of the foreign doctorates being from the U.S. (Korean Council for University Education 2000). This ratio is undoubtedly higher among younger faculty members.

There are several reasons that the Korean government's initiative to invite back the high-skilled expatriates was successful. First, the timing of the recruitment strategy worked out well.

There was enough supply of highly educated and skilled Korean knowledge workers in the U.S. already so that there were enough people who would be willing to return despite the risks mentioned above. Second, the success of the subsequent economic growth gave enough confidence to the potential returnees. Third, the size of the recruitment was substantial enough so that the potential recruit felt that s/he is not alone, and the community of returnees can form a community to support one another in Korea. Fourth, the stronger political and military ties between Korea and the U.S. due to Korea's participation in the Vietnam War gave confidence to the Korean government officials as well as to the returnees.

Professorial Market in Korea and Brain Gain

During the Park Administration (1961-79), the expansion of higher education in Korea was heavily suppressed. During the Administration the enrollment in secondary schools has increased more than five times, the graduates are encouraged to follow technical careers after their graduation rather than advancing to universities. In the previous Rhee Administration, the higher education sector was left to the market. With little government support and supervision, the sector was expanded mainly by profit-seeking academic entrepreneurs. Consequently, a substantial part of private high education sector was plagued with low-quality education and corruption. The Park government that obtained the power through military coup was trying to gain legitimacy by cleaning up the corruption. Heavy regulation toward the higher education sector was adopted as an anti-corruption measure. For example, individual institutions are required to obtain specific permission by the government in order to increase the size of the department within the institution. Moreover, the economic development plan during the Park Administration called for the rapid increase in the supply of semi-skilled production workers.

Meanwhile, professors and students in universities were regarded as trouble makers to the government because of their incessant criticism and protests against the dictatorial government.

The natural consequence of the enrollment quota in higher education was a large wage premium for university graduates. As the government's support for higher education was relatively small, tuition revenue was the major source of income for Korean universities. Naturally, households are required to bear the bulk of the higher education expenditure and student tuition and fees were set relatively high. At the same time, Korean universities have enjoyed the freedom to choose students albeit the government's heavy regulations on the methods of student selection. As a result of the freedom and the competition among students, universities have a well known pecking order.⁶ As the perceived monetary and social gain for the elite universities was high, the competition to enter universities in Korea was extremely fierce even with high tuition payment.

The phenomenon of brain gain made the pursuit of graduate education in particular Ph.D. programs in top American universities even more desirable. An advanced degree was regarded as an important credential for professorial positions, and this credential was more important than teaching and research performance. As we shall discuss below, professors in Korean universities are granted *de facto* tenure when they are hired, and salaries and promotions are mostly determined by years on the job. Their salaries were quite high, and the job security was extremely high. Consequently, professorial positions were very desirable. The mandatory retirement age for professors was 65, which was five to ten years later than most private sector jobs. While their teaching load was typically higher than U.S. norms (typically nine credit hours

⁶ Lee and Brinton (1999) examined how university prestige generates advantage for entry into the labor market, Social background of the new job seeker does not directly influence the job search outcome, but institutional social capital (the help of the placement office, professors, or friends and alum) play an important role.

per semester in research universities and twelve credit hours in teaching schools), compared with private sector employees in Korea their working lives were much more pleasant.⁷

Until 1975, Korean professorial positions were well protected. The Korean Constitution and higher education related laws guarantee the independence of higher education institutions, and academic staffs in those institutions enjoyed *de facto* tenure when they were appointed as a full-time lecturer, both in public and private universities.⁸ They move up to the rank of assistant professors, associate professor, and professors over time. There were part-time lecturers as well, but they were subject to one- or two-year limited time appointments.

In 1975, the dictatorial government changed the regulations regarding the university personnel. A reappointment system was introduced. Professors and associate professors were supposed to be reappointed every 6 to 10 years, and assistant professors and full-time lecturers every 2-3 years. Although the stated objective of the new system was to sanction academic staff who are not doing their jobs properly, the real motivation was to control one of the most vocal and influential social groups opposing the dictatorship, professors. While some politically active professors failed to be reappointed, the number of them not reappointed was in fact extremely small. Between 1975 and 1999 only 226 professors failed to be reappointed, and 115 universities did not have a single case of no reappointment (Lee and Im, 2000, Ham and Hong 2007, Seo et al. 2000).

In 1987, dictatorial government backed by the military gave away to a democratically

⁷ Korea has by far the longest working hours among OECD countries.

⁸ The Korean university system has public universities and private universities. Most of the public universities are national universities which are run by the Ministry of Education. Other public universities are run by local governments and other government agencies. Private universities (some with religious affiliations and the others are independent) are governed by the board of trustees. The Korean higher education system is dominated by private universities, and about three quarters of university students are enrolled in private universities. See Kim, S. (2008) for more detail on Korean higher education system.

elected government. As part of the anti-dictatorial government regime, students and faculty members had struggled for a more democratic internal and external governance of the universities. With the democratic government in place, presidents in national universities became elected by the direct votes of the full-time regular faculty members. In private universities, while the boards of trustees still appointed the president, the faculty council gained a stronger voice against the administration. Although all the private universities in Korea are *de jure* non-profit institutions, many behave like *de facto* for-profit institutions on behalf of the founder's family.

Korean professors were relatively well-paid as well. In 1990, the average salary of full professors was 27 million Korean won (about 5.5 times of the GDP per capita), and that of full-time lecturers was 16.7 million won (about 3.5 times of the GDP per capita). Professors in private universities were paid on average about 10% more than those in public universities. Most universities have a seniority-based salary system, i.e., salary is mostly determined by the years on the job. While there is a component based on the performance and the area of specialty, the difference is marginal. For example, in 1995, the average salary of professors in humanities and social science was 42 million won, science and engineering 39 million, and medical science 44 million based on the salary survey done by Kim (1996). In 2000, the average salary at the rank of full professor was \$40,422; associate professor, \$33,231; assistant professor, \$28,948; and instructor, \$24,305 (Lee 2003).

Performance played very little role in determining the salary. The total compensation also includes a substantial amount of various non-taxable components, including a research fund, which ranges from 10-30% of the total compensation, children's educational expenses, and so on. The non-salary components account for 40-60% of the total compensation depending on

institution. There are other perks associated with being professors in Korea. Korean universities have a very liberal leave policy. Professors have been allowed to take a leave of absence for a variety of reasons without much penalty. For example, they commonly run for public offices such as members of the National Assembly or mayors. When they fail or decide to come back to the old position, they have been routinely taken back to the previous positions. Second, professors have been able to actively participate in social and public activities. Some are paid activities such as consulting for the government or private firms, or voluntary civic actions such as in non-governmental organizations.

Because the professorial positions have been coveted by most Ph.D.'s, exit from the professorial positions to other types of jobs are extremely rare. According to Lee et al. (2007), out of 372 job transfers who moved out of industry during the period between 1994 and 2006, 47% moved to higher education institutions and 8.3% to research institutions, and the remainder to other private firms. Among 400 transfers out of higher education institutions, 81% moved to other higher education institutions, 12% to research institutes, and only 7% to private firms. Among 233 transfers out of research institutes, 73% moved to higher education institutions, 16.7% to research institutions, and only 9.4% to private firms. According to the same survey, of Ph.D.s working in science and engineering fields, 68.3% received their degrees outside of Korea. Among the foreign Ph.D.s, 64% are from the United States.

6. Emerging Trend (1997 -): Brain Competition?

Up until the mid-1990s, Korea did relatively well in minimizing brain drain. Compared to other Asian countries such as China and India, the percentage of Korean Ph.D. recipients who intended to stay in the U.S. was substantially lower. In this regard, the large influx of Korean

students into the US during this period can be regarded effectively as a mechanism for training high level human resources without much domestic investment. In particular, the Korean higher education sector had been able to allocate substantial human resources to professorial positions in a relative short time period. However, this Korean model of brain gain could not be sustained. Structural problems such as low turnover rates of faculty members, lack of performance-based personnel policy, and the politicized governance structure generated a stale system that could not effectively deal with the changing domestic and global economic environment.

Ph.D. Glut

With the strong return market for Ph.D.'s, more students pursued the degree both in the U.S. and in Korea. Figure 3 shows the dramatic increase in the number of Korean Ph.D.s received during the 1980s both in Korea and in the U.S. In 1980, only 249 Ph.D.'s in the fields of humanities, social sciences, natural sciences and engineering (150 of whom were in natural sciences and engineering) were awarded in Korea. In 1990 the number reached 1,916 (1,137 in S&E). In the U.S., the number of Ph.D. degrees awarded to Koreans increased from 116 (87 in S&E) to 1,275 (767 in S&E) during the same period. This Korean bonanza of U.S. Ph.D.s culminated in 1993-94. In those years, more than 6% of total Ph.D.s granted in the U.S. institutions were awarded to Koreans. Much of this study abroad phenomenon was driven by individual students and occurred outside of formal government programs. Most of the students came to the U.S. with temporary visas, and more and more students are supported by personal means since 1985 (see Table 1).⁹

The sharp increase in the number of Korean Ph.D.'s during the period was due to several factors. First, the number of undergraduate students in Korea increased very rapidly after the

⁹ These figures include any partial supports by the University or the government.

late 1970s. Because of the burgeoning number of high school graduates and increasing advancement rate to universities, the government was forced to increase the quota of college enrollments. In 1978, the enrollment in the Korean university system was about 278,000. In the education reform pushed by the Chun Doo-Hwan Administration in 1980, the quota for university students increased substantially. Due to the relaxation of the quota, the enrollment figure increased to 932,000 in 1985. The sharp increase in the number of undergraduate degrees created higher demand for graduate degrees, including the Ph.D.¹⁰

Second, the economic rate of return to Ph.D. was quite high. As the number of Ph.D.'s was very small, and the higher education sector was expanding quite rapidly, the domestic demand for professors was quite high. Until the early 1990s, despite a substantial gap in earning potential between the U.S. and Korea, many U.S.-educated talents gladly chose a career in Korea because the jobs in Korea tended to be higher in status and responsibility. Korean jobs tended to have more stress and longer hours, but they could be more fulfilling, as they carry more responsibility. Between 1965 and 1995, the Korean economy was growing rapidly, and there was a strong demand for such talents as firms and society needed highly educated manpower for its leadership positions. Most of the U.S. educated Ph.D.'s were able to take up such positions.

Third, as the process of brain gain continued, the number and the capacity of graduate faculty increased within Korean universities. Most of the faculty members in top Korean universities have Ph.D.'s from elite universities around the world, particularly from the U.S. Consequently, more graduate programs were established and the number of Ph.D.'s awarded by those institutions started to increase rapidly.

¹⁰ See Kim (2008) for more on the rapid expansion of higher education in Korea.

Given the low turnover among professors due to *de facto* tenure at hire, the supply of Ph.D.'s quickly outnumbered the domestic demand. During the late 1980s and early 1990s, it became evident that the job prospects for new Ph.D.'s dimmed as the number of U.S.-educated Ph.D. grew rapidly. More graduate students then wanted to stay in Korea for their Ph.D. in order not to lose contact with the professors who could help in securing teaching positions. Also, the quality of faculty and graduate education in Korea improved substantially, thanks to the quality of the new faculty and the establishment of graduate and research oriented universities. Consequently, the relative attractiveness of pursuing a Ph.D. in Korea (vis-a-vis in the U.S.) increased substantially. At the same time, the Korean government provided military service exemptions to those who pursue graduate education in Korea.¹¹ Because of all these factors, the number of graduate students and Ph.D.s awarded in Korea has risen rapidly since 1985. As shown in Table 2, the number of doctoral-level degrees (Ph.D.'s and professional doctorate degrees including law, medicine, and so on) awarded in Korea increased from only about 400 in 1970 to 9,314 in 2006.

As the supply of qualified Ph.D.'s increased, many of them with degrees from top-notch universities around the world, Korean universities could afford to be choosier over time. Universities tended to look for Ph.D.'s from higher ranking universities over time. As the supply of Ph.D.'s from top universities became more plentiful, universities could consider not only the university from which a candidate received a the degree, but also her/his research

¹¹ Korea maintains a compulsory military service for all men. Because of the post-War baby boom, the military was not able to take all draftees. One principle that was accepted as the reason for the exemption of the service was the contribution to the nation in alternative way. Apparently, graduate level education in science and engineering was regarded to meet the criterion to policy makers.

output (particularly in the form of publications) after graduation. Naturally, younger faculty members tended to have better credentials and have stronger research capability.

The glut of Ph.D.s made the job market prospects of the recent Ph.D.'s rather dismal. A peculiar trap resulting from this excess supply Ph.D.s is the under-employed "part-time instructor." Most Korean universities, particularly private universities under strong incentives to reduce expenditure on teaching personnel, have relied heavily on cheap part-time instructors.¹² In 2007, the number of full time academic staff in 4-year universities was 52,592, whereas the number of part-time lectures in those institutions was 59,848 (KEDI and MOE database). There has been a steady increase of part-time lecturers; in 2001 there were 38,050 part-time lecturers and 46,283 full-time academic staff in 4-year universities (Kang and Paik 2005). In 2-year junior colleges, the situation is worse: that same year there were 11,543 full time staff and 22,180 part-time lectures. This heavy reliance on part-time lecturers became a serious structural problem in Korean higher education. Private universities used them to reduce the instruction costs, and even with a Ph.D., they cannot make a decent living. After investing so many years in schooling and for Ph.D.s, part-time instructors struggle with low earnings for many years, hoping eventually to secure full time teaching positions (Kim, W.-Y. 2008).¹³ Because of the slow turnover of the regular professorial positions and the sluggish expansion of new positions, the wait becomes longer every year.

The situation is worse for domestic Ph.D.'s because foreign Ph.D.'s typically have a better reputation. In the academic year 2007, 4,749 new faculty members were hired in 4-year

¹² Most "part-time" instructors do not have other meaningful occupations, but teach several courses, sometimes in several schools simultaneously.

¹³ The issue of part-time instructors has been surfaced to a social problem by the suicide of a long time part-time instructor at Seoul National University in June 2003. There has been an effort to organize a labor union for part-time instructors recently. For more information, visit www.kangno.com.

universities, and 1,595 of them (42.5%) received their final (mostly Ph.D.) degrees abroad. In fact, the proportion of foreign Ph.D.'s has been increasing, not decreasing, steadily over the last few years. In 2002, it was only 34.6%. A similar pattern is found in 2-year junior colleges: the proportion of new hires in the colleges with foreign degrees increased from 19.2% in 2002 to 28.7% in 2007.

In 2002, full-time-non-tenure-track instructors were introduced, and by 2005 53 universities had adopted this type of position. Although there are only 557 of them, the system became more popular, and in some universities they account for more than 30% of the instruction staff. Their working conditions are substantially worse than full-time-tenure-track positions. They have lower salaries (50-80% of the tenure-track counterpart) and heavier teaching loads (the majority of them have more than 12 credit hours per semester).

The growing supply of Ph.D.'s and the mass internationalization of higher education create new forces of reform in the higher education sector. The first force was created by individual Ph.D.'s and academic administrators who try to respond to the changing market environment. The administrators want to create a better institution in order to attract better students and greater reputation in a more competitive higher education market. The new Ph.D.'s want to look for better professional and personal environments when they decide where to work. The second force was from the government. Since the early 1990s, the government recognized the importance of research and development in science and engineering as the new engine of economic growth. The IMD's ranking on national competitiveness has been adopted as the new objective of the government interventions in the economy. Additional resources to and institutional reform in higher education became an important priority in the national agenda.

Mass Internationalization of Higher Education

Meanwhile market forces have increased the competition among universities. Joong-Ang Daily, one of the leading daily newspapers now regularly publishes a Korean university ranking similar to that produced by U.S. News and World Report. As the tuition fees of Korean universities, even the public universities, are quite substantial, students and parents are quite sensitive to the education value of the universities. The recent sharp decline of the age cohort of college going age has also encouraged many universities to recruit students. Attractive academic programs and star faculty members in addition to better student services became major tools for student recruitment.

Internationalization also increased the competition. While there are as yet no credible foreign institutions that effectively compete with top Korean universities in Korea, many top high school students opt to study at elite U.S. universities for their undergraduate and graduate degrees. In addition to degree programs, many Korean students go abroad for intensive English courses. According to a recent study done by the Korea Trade Association, the number of Korean students seeking degrees or language training abroad in 2003 was about 350,000. The amount they spent in one year was estimated at about 4.6 billion U.S. dollars, which is about a quarter of the budget of the Korea Ministry of Education and Human Resources.¹⁴ There has been a steep increase in these numbers. Currently, there are about 150,000 Korean students enrolled in higher learning institutions abroad. Out of these students, about 60,000 (40%) are in the U.S. Other popular destinations are English speaking countries, such as Canada and Australia, which take an additional 30,000 students. Moreover, increasing numbers of primary and secondary school students are seeking study abroad.

The trend of early study abroad is motivated by the dissatisfaction over the current

¹⁴ Hankyoreh Daily Newspaper, www.hani.co.kr, February 19, 2003.

secondary education system. Korea regularly attains one of the highest ranks in standardized international tests of academic achievements such as The Trends in International Math and Science Study (TIMSS) and Programme for International Student Assessment (PISA).¹⁵ However, many parents and educational specialists are concerned about the level of education spending. In 2003, the government spent 3.5% of GDP on primary and secondary education, a relative size of public expenditure that is in line with other OECD countries. At the same time the household sector spends an additional 3.2% of GDP (2.3% in private tutoring and 0.9% for high school tuition payments, textbooks, and other teaching material) in primary and secondary education (Kim and Lee 2009). In addition to the resulting financial burden, Korean secondary students spend an inordinate amount of time in private tutoring in addition to regular schooling. The heavy financial and emotional costs of education translate into genuine dislike for schools. Another major dissatisfaction over the secondary educational system is that it emphasizes rote memorization over creativity and critical thinking. Consequently many upper middle class households are willing to take their children out of the Korean system and send them to foreign countries to study. While the effectiveness of this growing early study abroad is not certain, its socio-economic costs are not trivial.

¹⁵ The International Associations for the Evaluation of Educational Achievement (IEA) conducts standardized achievement tests in about 50 countries and report the results as TIMSS since 1995. Korea's scores have been consistently at the top. According to the latest reported tests conducted in 2003, Korea ranked the second in math and the third in science among 44 countries that participated in the tests. Another well-known international test is PISA conducted by the Organization for Economic and Cultural Development (OECD). While TIMSS tries to measure scholarly achievements based on the standard curricular material, PISA tries to measure more applied ability such as problem solving skills. Korea ranks very highly in PISA as well. In 2003 tests, 15-year old Korean students ranked number one in problem solving, ranked the second in reading, the third in math and the fourth in science among 40 countries where the tests were conducted. The dispersion of the test scores of Korean students is known relatively small, and this finding was considered as that Korean education system not only produces high average academic achievements but more equalized outcome than most OECD countries.

In an attempt to reduce the education deficit, estimated to be between US \$3-10 billion a year, the Korean government has been trying to attract foreign universities and research institutions into the 52,000 acre Incheon Free Trade Zone by giving generous incentives such as rent-free buildings and tax-free land. SUNY Stony Brook and North Carolina State University have signed agreements to operate degree programs and research projects, and USC, George Mason and George Washington University are reportedly in the process of negotiation. (Chronicle of Higher Education March 21, 2008, vol. 54, no. 28)

At the same time, more English-only institutions are starting to operate. Underwood College of Yonsei University started its operation by attracting Korean and foreign students. Virtually all major universities offer some classes exclusively taught in English, and some programs or schools are planning to offer all classes in English. Most major Korean universities have exchange programs that send students abroad regularly.

However, the Korean push for internationalization of its higher education institutions has not produced any noticeable changes in inbound internationalization. In the 2007 Ministry of Education Survey, 23 public universities employed a total of only 22 full-time foreign professors. Private universities have hundreds of foreign professors, but most of them are English instructors. Korean universities have tried to attract foreign students, but the result is rather dismal. There are only 22,000 foreign students in Korea, compared to about 100,000 in Japan. Kim (2005) observed that despite the official goal of “30% of academic staff by 2005,” the bureaucratic rules have not been updated. For example, a rule that only Korean scholars are allowed to receive research grants from Korea Research Foundation was on the books until 2008. Cultural and bureaucratic exclusion of the small number of foreign faculty members were common.

Reform Initiatives by Universities

The massive outbound internationalization of students and increased competition among institutions encouraged some innovative academic administrators to implement a variety of reform measures, including more rigorous tenure evaluations, merit pay schemes, and large prizes for high visibility publications. Other changes in the governance structure turned out to be much more difficult to implement. In 2000, Seoul National University (SNU) asked a blue ribbon commission, composed of internationally-known scholars and academic administrators, to review the university and to provide recommendations to make SNU a world class university. The commission's recommendations (2001) were quite relevant, in pointing out the malaise of SNU and Korean public universities in general. The first set of recommendations concerned the governance structure of SNU. Instead of having the university president elected through direct vote among faculty, it recommended the establishment of an independent board of directors, which would appoint the president for a longer (or indeterminate) term of office. Also, it recommended more rigorous review of the program and faculty. Up until then, the rate of granting tenure in SNU was 100%, and there was no effective program review. Without such reviews, it was natural to expect the quality of research and teaching at SNU to be mediocre. Third, it recommended that resources should be allocated based on merit and scholarly excellence.

The difficulty of institutional reform in university governance can be seen at KAIST as well. KAIST is a public university founded by the Ministry of Science and Technology in 1971, not by the Ministry of Education that supervises most of the national universities and provides funding. In this regard, KAIST is different from a typical national university. Its aim, from the beginning, was to be a world class research university that specializes in science and technology. The basic rationales for establishing the institution were: first, science and technology would be

one of the most important determinants of economic growth in the future, second, the Ministry of Science and Technology would be the better agency to supervise the new institution, because it would be free of heavy regulation imposed by the Ministry of Education on other national universities. Its basic model of operation is heavy government subsidy of elite students with an emphasis on graduate education, particularly Ph.D. In order to attract the best students, KAIST charged no tuition. At the same time, KAIST hired top-notch faculty, many of whom had advanced degrees from top research universities in the U.S., with the expectation of high research productivity and minimal teaching loads. In 2004, KAIST hired a Nobel Laureate in physics, Dr. Robert B. Laughlin from Stanford University, as the President. The goal of hiring Dr. Laughlin who had no prior administrative experience, was to provide credibility to the institution as a world class research university.

This hiring of a non-Korean reflected the national sentiment that foreign experts would be better able to adopt revolutionary reform to improve the efficiency of the organization, because they have no existing ties to domestic stakeholders whose interests might be jeopardized by reform. The success of Mr. Gus Hiddink, who led the Korean soccer team to the quarterfinals of the 2002 World Cup, was an inspiration for such bold recruiting at the executive level.

However, the rosy expectations of Hiddink-like institutional reform at KAIST were not realized. On the contrary, there was a tremendous backlash against the Laughlin strategy. President Laughlin suggested that in order to become an elite university (such as M.I.T or Stanford), KAIST should be privatized. For a physicist, his analysis was surprisingly economic. The original KAIST model, he suggested, would not be sustainable, as the government budget allocation would not be enough for KAIST to compete effectively. KAIST's emphasis on graduate education, which is expensive to maintain, would not be sustainable without

compensating tuition revenues generated by undergraduate students attracted by the prominent faculty members and the reputation of the institution. He wanted to have more diverse undergraduate programs (with substantial tuition fees) which are attractive to a wide variety of talented undergraduate students, not just techies and nerds who are willing to pay for the high tuition. In order to attract such tuition-paying students, KAIST's undergraduate programs would need to be responsive to the market demand. These are the reasons he wanted to privatize KAIST.

The proposal was not well received at all. Faculty did not like the change, and there were no key stakeholders who were willing to undergo such drastic change. The widespread dissatisfaction with Laughlin's leadership featured an open letter from 20 department heads threatening to resign if Laughlin remained. In 2007, the KAIST board did not renew Laughlin's contract.

Another issue of institutional reform is the privatization of public universities proposed by the Ministry of Education in 2007. The basic idea of this reform is to create an independent board for each national university along the lines of a Japanese law passed in 2003 that created an individual board of trustees responsible for the operation of each university. The law also establishes endowments from the government in the form of land, building, and other assets. The Korean Ministry of Education has been holding various focus group meetings, but the general reaction has been quite negative.

The current governance structure of national universities is highly bureaucratic. The faculty and administrative staffs are civil servants, and their personnel matters (appointment, promotion, salary, and so on) are managed by the government, not by the president of the university. In most cases, the president is elected by a popular vote by the faculty. Consequently,

their tenure is relatively short (typically 4 years), and they are not able to formulate or implement any measures of substance. The level of autonomy by individual university is rather limited. In this environment, it is difficult to expect universities to adopt innovative measures to make their institutions more efficient.

Since the late 1990s, several private universities started to introduce performance-based pay for faculty, a marked change from previous the practice in which salaries were rarely based on market rates across disciplines or individual performance within the department. The faculty reaction to this new pay system was decidedly mixed. Predictably, the faculty in humanities and social sciences objected, while those in medical schools, business schools, and other popular disciplines usually welcomed the new scheme, as did younger faculty. (Na 2000)

The Asian Financial Crisis of 1997-98 sounded a wake-up call to the Korean economy. In order to increase profitability, many private sector firms abandoned the life-time employment policy. After observing massive restructuring and wholesale lay-offs during the crisis, many Korean professionals no longer viewed the jobs in Korea as a life-time commitment. Realizing that they could lose their jobs at a whim unless they upgraded themselves continuously, workers started to view individual performance as more important than organizational harmony and company loyalty.

The changes in personnel policies in the private sector started to influence higher education institutions. Until the early 1990s, faculty positions had been rationed by the availability of the Ph.D.'s and the ranking of the university where the candidate received his/her Ph.D. Beginning in 2002, regulations regarding the personnel policy of professors shifted, allowing universities to have explicit contracts with individual professors similar to those in the U.S. Since then some professors were given tenure, some were given probationary contracts with

tenure evaluation (tenure-track), and other others were given temporary contracts (adjunct or part-time lecturers). In most universities, the tenure evaluation occurs some years after the faculty member is appointed as full professor. The new personnel policy change has been gradually taken seriously, particularly by top research universities. For example, in the 2007 tenure evaluation, KAIST dropped 15 out of 35 applicants (43%). Such a low success rate had been unheard of in Korea. However, the strict tenure evaluation policy pushed by the KAIST President Dr. Suh Nam-Pyo, a long-time MIT professor in mechanical engineering, has been reluctantly accepted by the faculty. However, his predecessor, a physics Nobel Laureate from Stanford, failed to be reappointed, owing to the opposition of the faculty when he tried to impose more selective faculty research support. Although the ultimate success of KAIST's stricter tenure policy remains to be seen, many top universities including SNU seem to be substantially tightening their tenure requirements.

Faculty mobility among universities in Korea is increasing, as universities are more willing to outbid others in order to attract better faculty members. According to Son (2007), among the 1,135 hires in the 182 universities in the fall 2005 semester, 213 (18.9%) were transfers from one university to the other. This type of lateral move had been very rare in the previous environment in which seniority and loyalty were regarded a more important consideration than the individual record of performance in the hiring process.

Government Programs

The Korean government's investment in higher education has been very minimal due to the historical legacy of ambitious universal primary education and secondary school equalization. These two previous initiatives in effect pre-committed the government's educational resources. Given the large number of primary and secondary students in the school system, the government

simply did not have enough resources available for the higher education sector. However, as the number of recent students in primary and secondary schools decreased, the government increasingly had more resources available for higher education. In addition, the need for a competitive higher education sector has become apparent for this country that does not have many natural resources. Thus the government has undertaken for the last two decades policy initiatives for upgrading the competitiveness of Korea's higher education sector. However, because Korean law bans successive five-year terms for the President, the government's policy often serves short term visibility at the expense of long-term capacity building, and even those attempts have been manipulated by powerful stakeholders to protect and further their interests.

Korea has a long tradition of government control over the economy, including the higher education sector. Although government regulations have been relaxed over time, it still maintains great control over the higher education sector by operating public universities, distributing resources, and enforcing regulations. The professors and administrative staffs in national universities are appointed by the government and regarded as civil servants. Therefore, the president of the university lack the power to hire and fire workers in the university, making, the personnel policy one of the most rigid aspects of the Korean public university system. Since the government provides substantial resources to public universities (about 30% of the total expenditure), its annual budget allocation substantially influences the fiscal capability of public universities. At the same time, the government successfully fended off the request of private universities to support their operational budget, and the government does not have any direct fiscal responsibility to support private universities. The only government funding to private universities is in the form of research support or special programs designed with specific policy objectives. Over the years, the government has instituted many higher education policies. The

following are the most noteworthy.

Brain Pool Program (1994 – present): Initiated in 1994 during the Kim Young-Sam (1992-1997) Administration, the Brain Pool program allows Korean researchers to invite foreign talents (mostly Korean expatriates) for short stays, rather than the longer visits supported by previous brain gain programs. Another characteristic of the program is its emphasis on established researchers, on the principle that brand-new Ph.D.'s, albeit their excellent training, are not particularly productive, owing to their relative inexperience in setting up independent cutting-edge research programs and their lack of familiarity with local research environments. Through the program, researchers at universities and research institutes invite foreign researchers (with at least 5 years of experience) for a fixed-time (3 months to 2 years) to carry out joint research. The program supports the invitee's salary, living and travel expenses. While the program aims for already established researchers, however, the level of support is small (e.g., up to \$2,000 per month salary) and host institutions have been reluctant to put in substantial cost sharing to invite established researchers. At the same time, an established researcher in the U.S. would be reluctant leave for Korea while sacrificing the progress of his/her ongoing research activities. Consequently, the program has not been able to attract active researchers who are in the middle of active research activities as intended. Instead, most of the invitees have been either young post-docs who would like to go back to Korea, but do not have firm employment prospects, or retirees who would like to spend some time in Korea. However, many Korean professors used this program for expanding their publication effort in international journals. Although the Program has changed somewhat and the level of funding has declined over the years, it is still being maintained.

Brain Korea 21 (1999 - 2012): During the next Kim Dae-Jung Administration (1998-

2002), an ambitious government initiative to promote research universities and graduate education was launched. The motivation of this program was the realization that the top Korean universities were losing their top students to top U.S. universities. Recognizing the prospect that obtaining a Ph.D. from a top Korean university will not generate a promising career, many talented Korean students either pursue lucrative non-academic careers (such as business management, medical, and legal profession) or go to the U.S. for their further study. By the early 1990s, the faculties in top Korean universities were filled with Ph.D.'s from top U.S. research universities.

The Brain Korea 21 (BK21) Program's major objective was to upgrade the Korean graduate education. The basic design of the program was to select a handful of research groups (3-6 depending on subjects) and support their graduate programs. During Phase I (1999 – 2005), BK21 allocated about US \$1.4 billion, and in Phase II (2006-2012) an additional US \$2.1 billion was allocated. The bulk of the funding went to graduate student tuition, stipends, travel, and research allowances, although the program also allows some limited funding for faculty. While the program's explicit objective was for education (i.e., graduate education), the selection criteria heavily rely on the participating faculty group's aggregated research output. The basic rationale for selecting research groups rather than individuals was to "concentrate" resources on "substantial size" programs.

Despite the opposition by many active research professors who work outside of the top research universities, the plan was implemented. Predictably, the main beneficiary of the Program was the small group of large top research universities such as Seoul National University, KAIST, POSTECH, Yonsei University, and Korea University. Approximately 500 programs, covering 25% of all graduate students in science and technology and 5% of those in humanities

and social sciences, were supported by the Program. SNU was awarded about 20% of the total allocation.

Dr. Zhang-Hee Cho, Professor of Radiological Science at the University of California – Irvine and a member of U.S. National Academy of Sciences heavily criticized the design of the program. While he had been involved substantially in the public policy formulation of the science and engineering policies in the previous administration, he argued that the government's initiative lacked the main ingredient of the research university: hiring talented researchers. In evaluating the BK21 program, Seong et al. (2008) suggested that although supporting the department as a unit may have some merits, individual graduate students should be the main beneficiaries so that they can take the fellowship and choose the university to attend rather than channel the resource to the university in order to attract students.

New University for Regional Innovation (NURI) Program (2004 – present): In 2004, during the next Roh Moo-Hyun Administration (2003-2007), NURI Program was launched. The Roh Administration's top policy agenda was balanced regional development. With about a quarter of Korea's population and more than a half of its GDP, the Seoul Metropolitan area dominates the country's economy. Because the Administration regarded the heavy concentration of higher education in the area as an impediment to the nation's healthy economic growth, the NURI Program was designed to strengthen the capability of universities located outside of this populous region so that they could be the pillar of regional innovation. The Program supports graduate students, faculty appointment, and cooperation with local government and industry. The NURI Program was operated jointly with BK21 so that all universities compete in BK21, and only the ones outside of the Seoul region compete in NURI.

World Class University: The new Lee Myung-Bak Administration (2008 – 2013) is

starting the World Class University (WCU) Program with a budget of \$850 million between 2008 and 2012. The objective of this Program is to recruit top-notch faculty members (Koreans as well as non-Koreans) permanently into Korean universities in the fields of emerging technologies and interdisciplinary programs. The Program subsidizes the salary of the recruit up to US \$200,000 per year for five years, after which the host university is expected to cover the full expense. The Program also allows these faculty members to be part-time or full-time. Since the Program has not yet started, its effects will remain to be seen.

Overall, the effects of these government initiatives have been mixed. On one hand they provide a strong medium for reform because they are considered major discretionary resources that universities can utilize. The incentives and evaluations that they provide gave institutions strong signals of the government's objectives. On the other hand, government programs have been driven by short term political objectives that are prone to change from administration to administration. Another major problem is that the government-led initiatives have been ill-targeted because they are designed and managed by bureaucrats who do not know exactly how research universities operate.

Aspiration to Become World Class Universities and the Global Brain Competition

During the past ten years, Korea's research output and capability have increased substantially. The number of published articles in SCI-indexed journals has jumped from 9,444 in 1998 to 23,515 in 2005. In terms of world ranking based on number of publications, Korea's rank has risen from 18th in 1998 to 12th in 2005. Kim (2007) reports that the research output of SNU, Korea's flagship research institution among comprehensive universities, has grown to become quite substantial and comparable to major U.S. public universities. According to him, the number of articles indexed in the Science Citation Index (SCI) by SNU professors ranked

75th in the world in 1999, and jumped to 31st in 2004 with 3,116 articles. In the same year, Harvard ranked no. 1 with 9,421 articles, followed by Tokyo University with 6,631, and UCLA with 5,232. SNU's total research funding in the same year reached US \$270 million, which is quite comparable to Harvard's \$648 million, Tokyo University's \$426 million, and UCLA's \$611 million. While the quality of its articles was not comparable to those universities, SNU's overall quality of publications has improved a great deal. Measured by the number of citations in SCI, SNU's quality was 35% of the "top three" universities in the U.S. and 53% of the "high-ranking (top 20 to 30)" U.S. universities in 1999. The measure in 2004 has also jumped to 74% of the "top three" and 137% of "high-ranking" universities.

While these measures of research quantity and quality are not perfect, they show a pattern of great progress for Korea's top universities. Although there exists a great deal of institutional rigidity and the fundamental governance structure is unlikely to change in the near future, the changed incentive system of faculty hiring, promotion, and salary setting have already generated a substantial shift toward more research orientation. While the bulk of those research products may not be creative and high-impact at the world's highest level, Korea's research capability has been improving greatly during the last ten years or so. Some authors like Leydesdorff and Zhou (2005) have predicted that China and Korea will become the new science and engineering research power house in the near future.

Certainly, the competition for top researchers has increased recently. Korean universities and research institutes are now willing (and able) to pay comparable (and higher) wages compared with top research universities in the U.S., thus intensifying the global competition for talents. However, as the domestic professorial market deteriorates over time, along with more stringent career prospects and tougher tenure evaluations and promotion, more and more U.S.-

trained Korean Ph.D.'s are opting to stay away from Korea, at least immediately after receiving the degree. Market salaries for fresh Ph.D.'s have plummeted, but those of the world-class researchers have gone up. Therefore, young Ph.D.'s are likely to start out their professional careers in the U.S. or any other place in the world that can sustain their research activities (Kim 2004, Jin et al. 2006). The percentage of Korean doctorates who intend to stay in the U.S. after the completion of their degree increased from 58.4% in 2000 to 63.0% in 2006 (Hoffer et al. 2007). Among the Korean Science and Engineering Ph.D.'s (including Social Sciences), the "intend to stay rate" has gradually increased from 32.7% in 1992 to 68.8% in 2005 (data provided by Michael Finn). The percentage of Korean S&E Ph.D.'s who have definite plans for US employment has increased from 3.0% in 1993 to 12.1% in 2005. The stay rate in the U.S. of Korean S&E Ph.D.'s 5 years after graduation for 1992-93 doctorate recipients was only 9%, and the proportion has increased to 42% for 2000 doctorate recipients.

Also, employment prospects of American-trained PhDs in third countries such as Singapore, Australia, Hong Kong, United Kingdom, Netherlands and other European countries are increasing. More and more universities in those countries are willing to hire professors without the local language expertise because English is or becomes the main medium in teaching. It is not totally clear who stays in the U.S., who goes to the third country, and who decides to go back. However, such decision will surely be dependent on personal as well as professional considerations.¹⁶ Regarding the former, the U.S. and Korea generally offer better environments than a third country. For most young doctorate recipients, Korea offers familiarity and

¹⁶ Unlike their older colleagues who had grown up in tougher economic situations, the new generation enjoyed more comfortable material lives, and tended to be more individualistic and to value quality of family life over a more fulfilling career. Many of these people viewed the high pressure working conditions in Korea less favorably than the U.S. situations.

opportunities to be close to relatives and friends, and the U.S. offers a better environment in which to educate their children. In terms of professional opportunities, it may be difficult to generalize, because it is not only the job itself, but the connectivity to the wider research community that is important. For some, Korea may offer better opportunities because of the future prospects. For others, the U.S. may offer better working environment by being able to be connect to the larger professional community (Miyagiwa 1991).

7. Conclusions: What Does It Mean for American Universities?

Despite its relatively small population size and substantial geographical distance to the U.S., Korea has been sending a large number of students to U.S. universities over the last few decades. How many and what kind of these students come to the U.S. and go back to Korea after their education and training? As many of the graduates, particularly Ph.D.'s, engage in research and teaching, these questions are very important in gauging the potential for the competitiveness of U.S. universities as well as of Korean universities.

Over the last decades, the number and the quality of these students changed quite dramatically. At the same time, the relationship between the graduates and U.S. universities has changed substantially depending on what is happening in Korea. When Korea was a low-income country and the potential for a successful professional career within Korea was bleak, most of the talents from Korea stayed in the U.S. after their higher education and training in the U.S. This pattern of brain drain is similar to the current situation of the students from China and India. However, when Korea began to actively recruit the talented expatriates to promote economic growth and the development of higher education sector and the career prospects of the returnees improved, the majority of the Korean expatriates started to return home. A pattern of active brain

gain by virtually outsourcing graduate education was established. Many talented and promising students came to the U.S. for graduate studies and returned home to work in Korea. Based on this experience, many Chinese and Indian talents educated and trained in the U.S. may start to go back to their home countries when the economic conditions of their homelands are more amenable to these U.S.-trained professionals.

While the full-scale outsourcing of graduate education will fade away as the quality of teaching and the research capacity of Korean universities improve, large-scale study abroad of Korean students to the American universities is likely to continue in the near future. As long as the top American universities maintain their worldwide reputations, they will continuously attract top Korean graduate students. In addition to the attraction represented by the great global reputation of the top American universities, a large number of Korean undergraduate and high school students will continue to come to the U.S. because of the continuing internationalization of higher education and the dissatisfaction with the Korean education system.

Recent changes are likely to encourage more Korean talents to seek employment opportunities in the U.S. after their education and training. Rapid increases in the supply of Ph.D.'s particularly within Korea have made job prospects in Korea less promising. As the seniority-based personnel policy gave way to a more merit-based system, Korean universities started to demand research output in the form of publications and patents rather than just the degrees from prestigious universities. In this environment, promising young Korean scholars and researchers favor more productive research environments, at least at the beginning of their careers. As long as the research environment of the American universities is more favorable than those of other nations, they will continuously attract top Korean researchers. Recently, with the government initiatives and increasing market pressure, Korean top universities have improved

their research output and working environment tremendously. While the quality and the impact of their research output may not yet reach the level of the top research universities in the U.S., the gap has narrowed quickly during the last decade.

As Korean professors become more active in the international scholarly community, the interaction between Korean and American universities will become more complex and frequent. In the brain drain phase, Korea simply provided talented students to the U.S. universities. In the brain gain phase, Korean students earned graduate degrees and returned home to work and teach there. In the new phase of brain competition, Korean academics will have more cooperation with their U.S. colleagues in joint research projects. To American universities, Korea will provide not only graduate students but undergraduate students and pot-docs. Also, there will be more lateral moves among Korean expatriates across the national border temporarily or permanently. More Korean professors will be incorporated into the wider U.S. and international community of scholars who compete and cooperate with one another at the same time.

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Table 1 Statistical Profiles of Korean Doctorates Received in the U.S.

	1975	1980	1985	1990	1995	2000
Total number of Ph.Ds earned	190	158	392	1,259	1,306	1,048
Natural Science and Engineering (%)	59.5	55.0	64.2	60.9	52.4	53.2
Social Science including Psychology (%)	21.6	28.5	18.7	16.9	24.6	18.0
Humanities, Education, and Professional (%)	18.9	16.5	17.1	22.2	23.0	28.8
Some personal financial support (%)	44.2	53.8	79.7	72.4	74.1	96.5
With permanent visa (%)	36.3	21.5	12.0	5.6	10.0	9.7
Intend to stay in the U.S. ^a (%)	46.8	48.5	33.5	31.5	38.7	64.1
Firm plans to stay in the U.S. ^a (%)	37.7	40.9	25.8	23.0	20.9	42.9
Number with firm plan to stay ^a	58	54	84	225	210	320
Number with firm employment ^a	35	21	31	68	35	115
Postdoc ^a	23	33	53	157	175	205
Educational Inst. ^a	13	6	12	30	18	29
Industry/business ^a	20	12	16	31	15	82

Source: Jean M. Johnson, *Statistical Profiles of Foreign Doctoral Recipients in Science and Engineering: Plans to Stay in the United States*, NSF-99304, Arlington, VA: National Science Foundation, 1998 and unpublished special tabulation.

Note: ^a Only for science and engineering (including social sciences).

Table 2 Earned Doctoral Degrees awarded in Korea

Year	Total	Humanities	Social Sciences	Natural S. & Engineering	Professional
Pre-1965	563	15	3	40	505
1965	117	2	0	8	107
1970	407	7	6	62	329.
1975	994	26	17	69	220
1980	528	54	50	168	300
1985	1,400	157	105	528	610
1990	2,747	439	340	1,137	831
1995	4,429	617	447	1,820	1,243
2000	6,555	746	679	3,148	1,982
2003	7,623	779	675	3,622	2,547
2006	9,314	952	858	4,320	3,184

Source: KMOE, *Education Statistics Yearbook*, various years.

Note: Humanities include literature, philosophy, theology; social sciences include economics, political science, business administration, and public administration; natural science and engineering includes agriculture and fishery as well; professional includes law, medicine, pharmacy, dentistry, oriental medicine, public health, nursing, home economics, and education.

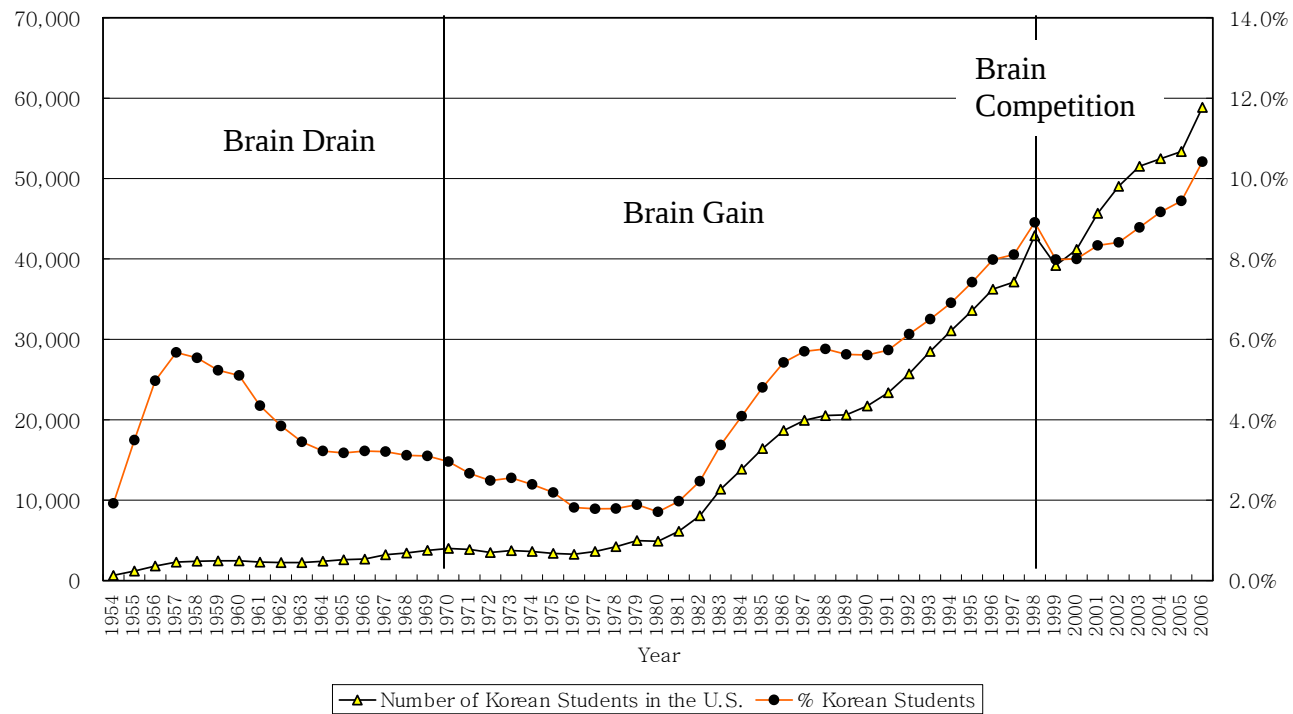
Table 3 Doctoral Degree Holders in Four-year Colleges and Universities in Korea

Year	Full Time Teaching Staff (A)	Doctorate Holders (B)	(B/A) in %
1970	7,944	1,440	18.1
1975	10,242	2,807	27.4
1980	14,696	4,835	32.9
1985	26,459	9,090	34.3
1990	33,340	16,055	48.5
1995	45,087	26,771	59.34
2000	41,943	34,666	82.7
2005	49,300	41,397	84.1
2006	51,859	43,362	83.6

Note: Full time teaching staff before 1997 includes teaching assistants.

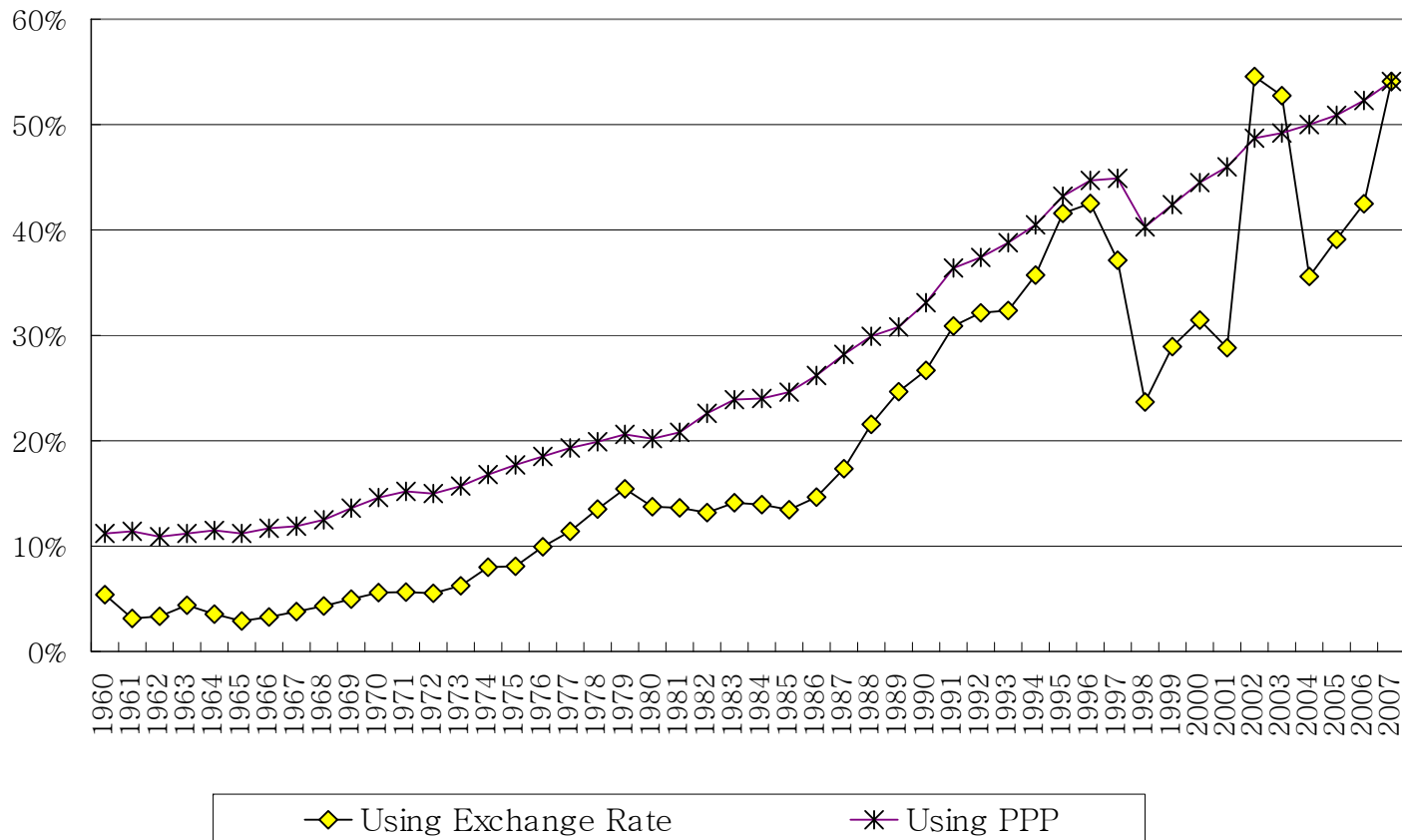
Figure 1

Korean Students in U.S. Higher Education



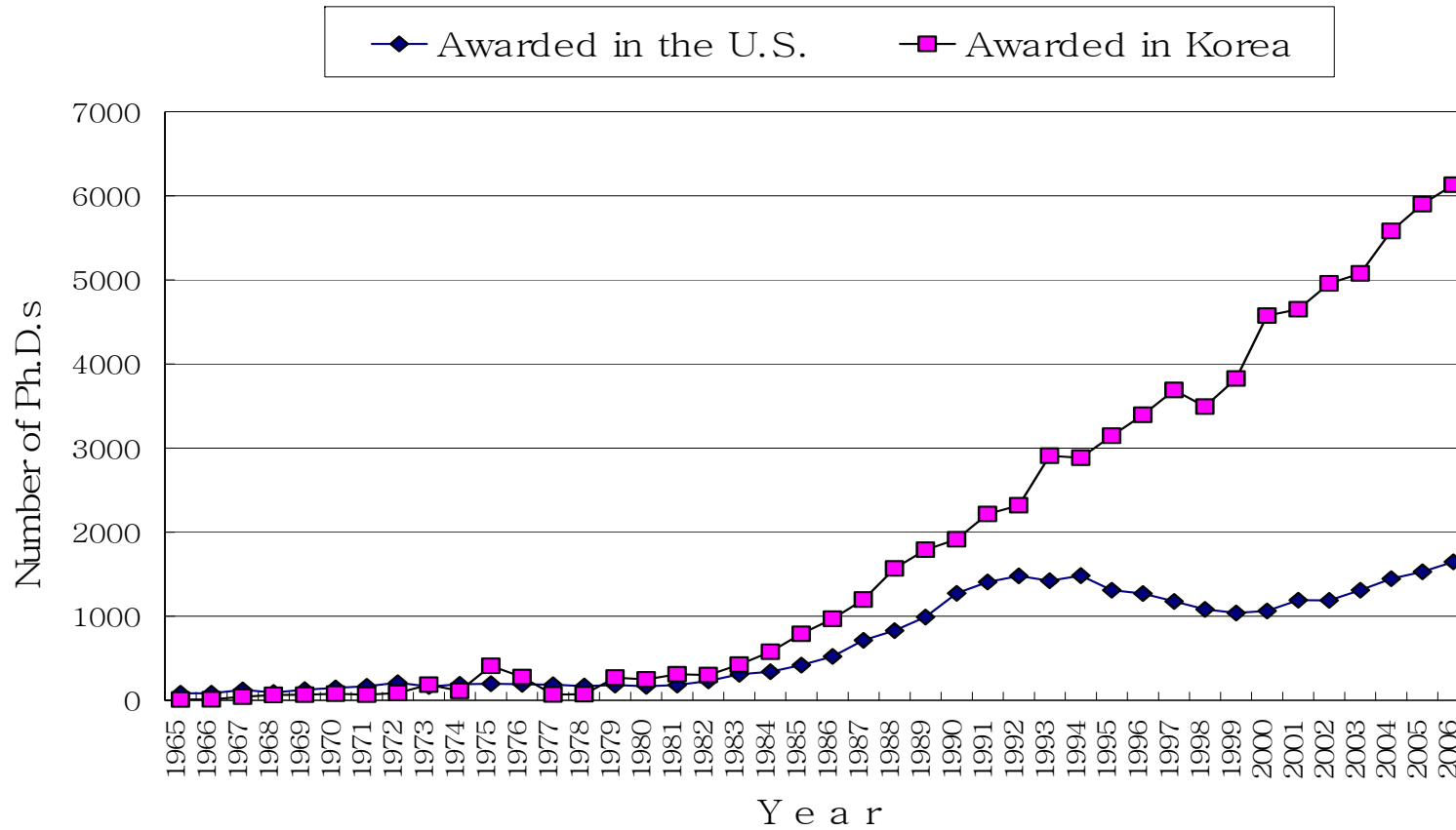
Source: IIE *Open Doors* (various years)

Figure 2 The Ratio of Per Capita GDP between Korea and the U.S.



Source: NationMaster.com and U.S. Bureau of Labor Statistics

Figure 3 Number of Doctorates Awarded to Koreans in the U.S. and in Korea



Source: *Survey of Earned Doctorate* (US) and Author's tabulation based on *Korean Education Statistics Yearbook*

Note: Korean statistics do not include professional doctorate degrees such as law and medicine.