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**Brain Drain, Brain Gain, and Brain Competition:
Changing Employment Opportunities and Career Pattern of
U.S.-trained Korean Academics**

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Abstract

South Korea is one of the top countries that have been sending large numbers of students to the U.S. The returned 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 particularly in the science and engineering field. The rapid economic development of Korea during a relatively short time period has changed the relative employment and living conditions in Korea. 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: brain drain (1950-1970), 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. The second period is 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 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.

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1. Introduction

It is widely recognized that the twenty-first century will have a worldwide knowledge-based economy. The share of knowledge intensive activities in manufacturing, services, exports, and value added in most advanced countries has been rising steadily since early 1970s (OECD, 1996). In order for any nation to continue the economic success in the twenty first century, therefore, it is imperative to think about the economic strategy of developing, attracting, and utilizing highly-skilled human resources. The higher education sector in general and research universities in particular are undoubtedly one of the most important elements in the formation and utilization of highly-skilled human resources.

Since the middle of the twentieth century, U.S. research universities are generally regarded as the most competitive and effective system in the world. Consequently, 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. Recently, more and more Ph.D.'s, particularly in science and engineering, are awarded to foreign nationals. The students from China, India, and some developing countries are becoming the major component of the research activities of the U.S. universities, and the majority of them intended to stay in the U.S. after their

graduation.¹ However, it is not clear the pattern will continue in the future, raising the question whether and how the U.S. research universities will continually maintain their preeminence.

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 to stay or return to the native country of those people 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 the graduation has changed significantly in part 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 professors.

Roughly speaking, three different periods with distinct pattern can be identified: brain drain (1950-1970), 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 to study abroad and stay there after the training for their career development by being de facto

¹ According to the 2006 Survey of Earned Doctorate, 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.

immigrants. The second period is a large number of Korean graduate students come to the U.S. for advanced degree and return to seek lucrative employment opportunities in the burgeoning Korean economy. During this period, Korea outsourced its graduate education to the U.S. with relative success. In the third period, Korean academic labor market becomes more competitive as a result of greater supply of Ph.D.'s and the adaptation of more merit-based personnel policies. Also, the competition among elite universities to seek world-class status became more evident. Consequently, the employment 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.

The paper is organized as follows. In the next section, we describe the large presence of Koreans in U.S. higher education, and the big influence of U.S.-trained academics in Korean higher education. In Section 3, a broader historical context of the close relationship between Korean and the U.S. higher education is provided. Then in the following Sections 4 and 5, the phases of brain drain and brain gain are discussed. In Section 6, we examine the professorial labor market in Korea during the period. In section 7, we discuss and analyze the consequence of the rapid increase of the supply of Ph.D.'s and internationalization of higher education to the institutional changes, particularly, reforms in higher education and the emerging global brain competition.

2. Koreans in the U.S. universities and U.S.-trained academics in Korean universities

According to the data provided by the U.S. Institute of International Education, there are 564,766 foreign students enrolled in higher education institutions in the U.S. in the academic year of 2005-06. (IIE 2006) There are 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 population size, 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 the English language training in the world, followed by Japan.

Korean presence in the U.S. higher education is also prominent at the doctorate level as well. According to the 2006 Survey of Earned Doctorate, among 45,596 doctorates awarded in the U.S., and about one third (15,916) were awarded to foreign nationals. Among them, the number of 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 faculty members is relatively small. The 2008 Directory of KAUPA (Korean American University Professor 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 market. 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 the Koreans 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% of the 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 the data is based on self reporting, and ignores the fact that the pattern of many U.S. Ph.D. don't 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 more 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, humanities, law, medicine, and nursing have lower proportions of U.S. Ph.D.s than management, social sciences, natural sciences, and engineering. 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 POSTTECH, 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) Not only in the sheer number, the U.S.-trained academics form the basic tenets and methodology of many academic disciplines (e.g., see Choi (1977) for the influence of U.S.-trained academics on Korean economics).

In the second-tier universities, the proportion of U.S.-trained Ph.D.s is smaller. In Hanyang University, a private university, whose overall ranking in Korea is around 5 or 6, 23 out of 56 (41.1%) professors in sciences and 114 out of 283 (40.3%) engineering are U.S. Ph.D.s. At Kyunghee University, another private university, whose overall ranking is around ten, 23 out of 53 (43.4%) in science and 60 out of 90 (33.3%) engineering professors are from the U.S. At Kyungbook University, a national university in Daegu (a major provincial city), 53 out of 103 science (51.5%) and 46 out of 165 (27.9%) engineering professors received their Ph.D.s from major U.S. universities.

It is natural to wonder why Korea, a relatively small country located far way 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 the 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 the World War II and the Korean War, Korean society in general and the nation's higher education system in particular was heavily influenced by the U.S.-trained academics (Lee 1989).

3. Historical legacy

During the period between 1880 and 1910 when Chosun Dynasty tried 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 to travel the long distance between the nations at that time. Most foreign cultural and intellectual influence was through the students studied either in Japan and China that are located next to Korea. However, Americans missionaries during the time period actively participated in the beginning of modern education in Korea by establishing higher education institutions. Many of them, such as Yonsei University, Soongsil Univerisy and Ewha Womans University, are still in existence today and they become a very important component of private university system in Korea.

Since the Japanese annexation of Korea in 1910, the development of modern education in Korea was severely suppressed by the colonial government. Until 25 year later, no universities were allowed and all institutions of higher learning were converted to technical colleges in order to provide technical manpower necessary in governing the colony. During the Japanese rule, most top Korean students who would like to further their study went to Japan for obvious reasons. First, Japan was the colonial power, and the elites who are attached to the colonial government are favored in Japan, and their children were welcome in Japanese higher education institutions. Second, as the economic and social relationship between Japan and its Korean territory increased, more information regarding the study in Japan was available to the potential students. Since 1910, there were only a few dozens of Koreans in the U.S. universities at a given time until 1940s, which was far smaller than the number of students studying in Japan.² However, the U.S. provided an alternative to Japan to those who overtly or covertly work 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

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 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.

The victory of the U.S. over Japan in the Pacific War 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, Yum Sang-Seop, Cheon Young-Take, Paik Nack-Jun, Helen Kim, Yun Chi-Young, Hong Nan-Pa, and so on) In particular, Rhee Syngman who mobilized Koreans in Hawaii for the nation's independence movement during the Japanese colonial period 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 the 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 substantially.

4. Brain drain

Figure 1 depicts the changes in the number of Korean students in the 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 setback during the Asian Financial Crisis of 1997-98. 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 is a typical brain drain that talented students come 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 number 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 who want 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. Some students were adopted or sponsored by American soldiers and missionaries. 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 abundant. The loss of Korean talents was due to two major reasons.

First, there was 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 influence of the return decision 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 was much inferior to the ones in the U.S. Even if the student is 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 the field that is 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 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).³

5. Brain gain (or reverse brain drain)

In explaining the Korea's successful economic development experience since early 1960s, economists usually point out several reasons. Rapid expansion of production capacity through

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)

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 economic development plan, Korea was already prepared with quite substantial human resource 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 mainly due to widespread corruption among its political elite. But, its legacy of expanding universal 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. As the U.S. was heavily in the Korean War and the

reconstruction efforts afterwards, many Korean brains went to the U.S. for advanced study with personal and religious affiliations, though the Korean government had not pursued a systematic policy of “learning from the West” that the Meiji government of Japan adopted in the middle of nineteenth century. As early as in 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. When the Park set the goal of economic development by recruiting the U.S. trained engineers and economists, there were already substantial number of Korean expatriate professionals in the U.S. See Kapur (2001) for more on using expatriates for technology transfer.

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 in the U.S., began. Korea Development Institute (KDI) was established in 1971 in order to advise the government for the active economic planning exercise. In the beginning of those institutions, the primary responsibility of their presidents was to recruit qualified scientists, engineers and economist who can lead the research groups in the institutions. They were created outside of the existing universities and other government agencies. Salaries were set much higher than the locals. Generous allowance for research equipment and assistants were provided. In addition, modern housing and educational allowance for their children were provided.

From the perspective of Korean talents in the U.S., such job offers were opportunities involving substantial risks. On one hand, it is a great opportunity to go back home and contribute to the homeland. Although the working condition and the material reward may not be comparable to the existing jobs in the U.S., the position offers more professional freedom because they were given wider and greater responsibility. There were 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 may not adjust well to the Korean society and be unhappy about the move back. Professionally, the move may lead to a dead-end career prospect, and lose valuable professional connections that exist in the U.S. Based on the obvious trade-off, not all expatriate would welcome such offer. But, some are willing to take the risk and come back to Korea in such environment.

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

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 of the risks mentioned above. At the same time, the success of the subsequent economic growth gave enough confidence to the potential returnees. Second, 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.

Figure 3 shows the dramatic increase in the number of Ph.D.s received by Korean students during the 1980s both in Korea and in the U.S. In 1980, only 218 Ph.D.'s in social sciences, natural sciences and engineering were awarded in Korea. In 1990 the number reached close to 1,500. In the U.S., the number of Ph.D. degrees awarded to Koreans in same fields increased from 132 to 980 during the same period. Notice that most of this increase is due to the increase of students with temporary visas (student or exchange scholar visa). The bonanza of obtaining 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 was awarded to Koreans. It is quite clear that more and more students are supported by personal means since 1985 (see Table 1).⁴ 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 has increased very rapidly since the late 1970s. Because of the burgeoning 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 Korean university system was about 278,000. The figure increased to 932,000

⁴ These figures include any partial supports by the University or the government.

in 1985. The sharp increase in the number of undergraduate degrees created higher demand for graduate degrees including Ph.D.

Second, the rate of return to Ph.D. was quite high. The as the number of Ph.D.'s was very small, and the higher education sector was expanding quite rapidly, the domestic demand for professoriate was quite high. Up until early 1990s, despite a large 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 with more responsibility. Korean jobs tend to be with more stress and longer hours, but they could be more fulfilling as they accompany 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 need highly educated manpower for its leadership positions. Most of the U.S. educated Ph.D. 's were able to take up such positions.

Most university students in the 1970s and 1980s recognized high rewards for U.S. Ph.D.s. Consequently, many bright Korean students came to the U.S. for higher degrees, and a majority of them returned to Korea. 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 are from the U.S. (Korean Council for University Education 2000). This ratio would undoubtedly be higher among younger faculty members.

Therefore, it is safe to conclude that up until mid-1990s, Korea did relatively well in minimizing brain drain (Yoon 1992, Song 1997). Compared to other Asian countries such as China and India, the percentage of Ph.D. recipients who intend to stay in the U.S. was substantially lower. In this regard, the large influx of Korean students during this period can be regarded as an effective mechanism for training high level human resources without much

domestic investment, and the strong alliance between the U.S. and Korea was one of the most important determinants of this success story.

The model of brain gain works like the following. With enough market signal and financial feasibility, 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 Korea provided high enough incentives, some of these talents decided to 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 outsourced its graduate education to the U.S. As long as the incentive existed, the process of brain gain continues. In 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 expecting to obtain a professorial position in Korea (Mountford 1997).

6. Rapid increase in the supply of Ph.D.'s

As the higher education in Korea expanded the return to college and post-graduate education started to decrease substantially (Choi 1996). In the Korean labor market during the period, an advanced degree has been regarded as more of a credential, and the credential has been more important than performance of an individual worker in determining the labor market outcome. Even in the private firms, loyalty and the length of the job tenure are regarded as more important in determining the fate of the worker. In the professorial market credentialism and rigid labor market is even stronger. As we shall discuss below, professors are granted *de facto* tenure when they are hired, and the determination of salaries and promotions are hardly affected

by their individual performances after the hire. Therefore, professorial positions were particularly more desirable. Their salaries were relatively high, and the job security was extremely high. 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 the U.S. norms (typically nine credit hours per semester in research universities and twelve credit hours in teaching schools), compared with workers in private sector their working lives were much more pleasant.⁵ However, such market structure was not sustainable because of the rapid increase in the supply of Ph.D.'s and the mass globalization of higher education that follows.

Until 1975, Korean professorial positions have been well protected. The Korean Constitution and higher education related laws guarantees the independence of higher education institutions, and academic staffs in those institutions enjoyed *de facto* tenure when they were appointed to the full-time lecturer, both in public and private universities.⁶ 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. The reappointment system was introduced. Professors and associate professors were supposed to be reappointed in every 6 to 10 years, and assistant professors and full-time lecturers in 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

⁵ Korea has by far the longest working hours among OECD countries.

⁶ 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.

vocal and influential social group against the dictatorship, professors. While some politically active professors failed to be reappointed, the number of them was relatively small. The number of professors who failed to be reappointed between 1975 and 1999 was only 226, and 115 universities did not have a single case of no reappointment (Lee and Im, 2000, Ham and Hong 2007, Seo et al. 2000).

During the Park Administration (1961-79), in an attempt to control the size of the university, explicit student quota for each department was established. While the departmental size limitation limited the expansion of higher education up until the late 1970s, the departmentalization bolstered the power and the security of faculty positions. Because there was excess demand for students, every department had enough students for their reason for existence, and faculty positions were insulated from market demand.

The successful of democratization movement against the military dictatorship in 1987 has created a legacy of strong participation of faculty in internal and external governance of the universities. In national universities, university presidents were elected by the direct votes of the full-time regular faculty members. In private universities, while the board of trustees still appoints the president, the faculty council has gained stronger voice against the administration. Although all the private universities in Korea are *de jure* non-profit institutions, many behave like for-profit institutions on behalf of the founder's family. In any case, some universities started a guaranteed employment until the mandatory retirement age of 65 (tenure) in late 1990s.

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 lecturer 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 tenure-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 was 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, average salary of full professor was \$40,422; associate professor, \$33,231; assistant professor, \$28,948; and instructor, \$24,305 (Lee 2003).

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

There were 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 failed or decided 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.

However, from the students' perspective, the competition to enter universities in Korea is extremely fierce. Korean universities have enjoyed freedom to choose students albeit the government's heavy regulations on the methods of student selection. Consequently, universities

have a well known pecking order.⁷ Because the university at the higher pecking order commands not only better students but larger resources, the professorial positions in those institutions are highly coveted. Therefore, the competition to obtain a job in those institutions was highly competitive. Since there is very little turnover among professors and there is little incentive for excellence in teaching and research, the competition for positions in high-ranking universities are mostly determined by credentials and the timing.

The lax professional discipline after the hire naturally created low performance in teaching and research. However, the market for professors gets much tighter over time. As the supply of qualified Ph.D.'s increased and many of them are with degrees from top-notch universities around the world, universities can afford to be choosier over time. Universities look for Ph.D.'s from higher ranking universities over time. As the supply of Ph.D.'s from top universities become plentiful, they consider not only which university that the candidate gets the degree from, but also her/his research output (particularly in the form of publications) after their graduation. Naturally, younger faculty members tended to be with better credentials and have stronger research capability.

During the late 1980s and early 1990s, it became evident that the job prospect for U.S. educated 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

⁷ 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) pay an important role.

attractiveness of pursuing a Ph.D. in Korea (vis-a-vis in the U.S.) increases substantially. At the same time, the Korean government provided military service exemptions to those who pursue graduate education in Korea. 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 Ph.D.s awarded in Korea was only about 400 in 1970. In 2006, the number of Ph.D.s awarded in Korea has increased to 9,314.

The glut of Ph.D.s made the job market for Ph.D.s extremely tight. It has been reported that one third of Ph.D.s do not have meaningful employment, and the situation is likely to become worse. A peculiar trap for 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.⁸ 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 the part-time lecturers, as 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. In the same year there were 11,543 full time staff and 22,180 part-time lectures. The 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).⁹

⁸ Most “part-time” instructors do not have other meaningful occupations, but teach several courses, sometimes in several schools simultaneously.

⁹ The issue of part-time instructors has been surfaced to a social problem by the suicide of

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 the foreign Ph.D.'s typically has a greater reputation. In the academic year 2007, 4,749 new faculty members were hired in 4-year 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%. Similar pattern is found in 2-year junior colleges. In 2007, 575 new hires in the colleges, 232 (28.7%) have foreign degrees. The proportion of foreign degree holders has increased from 19.2% in 2002.

In 2002, full-time-non-tenure-track instructors were introduced. In 2005, 53 universities adopted created this type of positions. Although there are only 557 of them, the system became more popular, and 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 salary (50-80% of the tenure-track counterpart), heavier teaching loads (the majority of them have more than 12 credit hours per semester)

Because the professorial positions have been coveted by most Ph.D.'s, exit from the professorial positions to other types of jobs were 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.

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.

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, Ph.D.s working in the field of Science and Engineering, 68.3% of those workers received their degrees outside of Korea. Among the foreign Ph.D.s, 64% are from the United States.

7. Reforms in higher education and global brain competition

The growing supply of Ph.D.'s and the mass internationalization of higher education create new forces of reform in the higher education sector from several directions. The first 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. The second force was created by individual Ph.D.'s and academic administrators who try to respond to the changing market environment. The latter want to create a better institution in order to attract better students and greater reputation in a more competitive higher education market. The former want to seek better professional and personal environment in determining where to work.

A. Government programs

The Korean government's investment in higher education has been very minimal. The reason for the low investment in higher education is mainly due to the historical legacy of ambitious universal primary education and secondary school equalization. These two previous initiatives pre-committed the government's educational resources. With a large number of

primary and secondary students in the school system, the government simply did not have any resources available to higher education sector. However, as the number of students in primary and secondary schools drastically decreased, the government has more resources available for higher education. Second, the need for competitive higher education sector has been called for a national strategy for a country that does not have much natural resource. For the last two decades, the government had started policy initiatives for upgrading the competitiveness of Korea's higher education sector. But, as the Korean law stipulates the term of the President by one term with five years, the government's policy is often for a short term visibility rather than a long-term capacity building measures. At the same time, 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 the government regulations have been relaxed over time, it still maintains a greater control over the higher education sector either by operating public universities, distribute resources, or regulations. The professors and administrative staffs in national universities are regarded as civil servants, and appointed by the government. Therefore, the president of the university does not have the power of hire and fire workers in the university. Naturally, the personnel policy has been one of the most rigid aspects of Korean public university system. The government provides substantial resources to public universities (about 30% of the total expenditure). Therefore, the government annual budget allocation may influence the fiscal capability of public universities, but as most of its funding is tied to salary the staff. The government successfully fended off the request of private universities to support their operational budget, and the government does not have any fiscal responsibility to support private universities. Any government funding to private universities take the form of research support or

special programs designed with specific policy objectives. Over the years, the government has started many policies. The following are the most noteworthy.

Brain Pool Program (1994 – present): The Brain Pool program was initiated in 1994 during the Kim Young-Sam (1992-1997) Administration. The idea was to invite foreign talents (mostly Korean expatriates) to contribute in the development of Korean science and engineering. The main difference between the Brain Pool Program from the previous brain gain programs was its support for the short term stay. Another main characteristic of the program was to invite established researchers (rather than brand new Ph.D.'s). The motivation of the Program was that the brand-new Ph.D.'s, albeit their excellent training, were not particularly productive because their relative inexperience of setting up an independent cutting-edge research program. At the same time, they are unfamiliar with the local research environment in order to carry out productive research projects. The basic design of the program was that 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) and carry out a joint research. The Program supports the invitee's salary, living and travel expenses. While the Program aims for already established researchers, the level of support was too small (e.g., up to \$2,000 per month salary). The host institutions were reluctant to put 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 was not able to attract active researchers who are in the middle of active research activities as intended. Most of the invitees were 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 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 the program was the realization that the top Korean universities are losing their top students to top U.S. universities. Recognizing the prospect that obtaining a Ph.D.' in 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. As early as in the early 1990s, the faculty in top Korean universities were filled Ph.D.'s from top U.S. research universities.

The Brain Korea 21 (BK21) Program's major objective was to upgrade the 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 program. During the Phase I (1999 – 2005), BK21 allocated about US \$1.4 billion. In the Phase II (2006-2012) additional US \$2.1 billion was allocated. Bulk of the funding was for graduate students' tuition, stipends, travel, and research allowance. However, the program allows some limited funding to faculty members. While the program's explicit objective was for education (i.e., graduate education), the selection criteria heavily relies on the participating faculty members' research output. The basic rationale for selecting research groups with the department was to "concentrate" resources on "substantial size" programs. This basic design excludes most of the departments, because they would lack substantial size.

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 large top research universities including Seoul National University, KAIST, POSTECH, Yonsei University, and Korea University. Approximately 500 programs, 25% of graduate students in science and technology, 5% 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 lacks the main ingredient of the research university, hiring of talented researchers. In evaluating the BK21 program, Seong et al. (2008) suggested that although supporting the Department as a unit may have some merit, individuals should be the main beneficiaries so that graduate students 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 the balanced regional development. Korea's spatial configuration is heavily concentrated in the Seoul Metropolitan area. The area has about a quarter of population and more than a half of the nation's GDP. The heavy concentration of higher education in the area was regarded as an impediment of the nation's healthy economic growth, and the Program's objective was to strengthen the capability of universities located outside of the regions so that they can be the pillar of regional innovation system. The Program supports graduate students, faculty appointment, and cooperation with the 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 the allocated 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 field 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 them to be part-time as well as full-time. Since the Program has not started yet, its effects will remain to be seen.

Overall, the effects of the government initiatives have been mixed. On one hand they are strong medium for reform, because they are considered major discretionary resources that universities can utilize. Also, the incentives and evaluations that they provide gave institutions strong signal to attune to the government's objectives and program design. 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 of the government-led initiatives are ill-targeted, because those programs are designed and managed by bureaucrats who do not know exactly how research universities operate.

B. Mass internationalization of higher education

Meanwhile market forces increase the competition among universities. Joong-Ang Daily, one of the leading daily newspapers now regularly publishes the Korean university ranking similar to the U.S. News and World Report. As the tuition fees of Korean universities, even the

public universities, became quite substantial, students and parents are quite sensitive to the education value of the universities. Also, the recent sharp decline of the age cohort of college going age also encourage many universities try to recruit students. Attractive academic programs and star faculty members in addition to better student service became the major tool for student recruitment.

Internationalization also increased the competition. While there has not yet credible foreign institutions that can effectively compete with top Korean universities in Korea, many top high school students opt to study at top U.S. universities for their undergraduate and graduate degrees. 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.¹⁰ 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 other English speaking countries, such as Canada and Australia, which take additional 30,000 students. Moreover, increasing number of primary and secondary school students are seeking study abroad.

In an attempt to reduce education deficit estimated between US \$3-10 billion, the government has been trying to attract world class universities and research institutions in the 52,000 acre Incheon Free Trade Zone by giving generous incentives such as rent-free building and tax-free lands. SUNY Stony Brook and North Carolina State University have signed agreement to offer degree programs and research projects, and USC, George Mason and George

¹⁰ Hankyoreh Daily Newspaper, www.hani.co.kr, February 19, 2003.

Washington University are reportedly in the process of negotiation. (Chronicles 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 program that sends student abroad regularly.

However, the Korean push for internationalization of its higher education institutions has not produced any remarkable results compared with its outbound internationalization. 2007 Ministry Survey, 23 public universities employed 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” with the great deal of advancement of internationalization of Korean higher education, the bureaucratic rules have not been updated. For example, the rule that only Korean scholars are allowed to receive research grants from Korea Research Foundation has been on the book until 2008. Cultural and bureaucratic exclusion of small number of foreign faculty members were common. Kim observed similar distinction between male and female faculty members.

C. Reform initiatives by universities

The massive outbound internationalization of students and increased competition among institutions encouraged some top academic administrators to implement a variety of reform

measures including more rigorous tenure evaluations, merit pay scheme, and large incentives for high visibility publications.

Since the late 1990s, several private universities started to introduce a performance-based pay. As was discussed earlier, the faculty salary was rarely based on market rate across disciplines or individual performances within the department. The new pay system was rarely welcomed by the faculty. Predictably, the faculty in humanities and social sciences object the system most. Medical schools, business schools, and other popular disciplines usually welcome the new scheme. Performance-based pay is generally favored by younger faculty members. (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-off during the crisis, many Korean professional viewed the jobs in Korea no longer a life-time commitment. Unless they upgraded themselves continuously, it is possible to lose jobs at a whim. The workers started to view individual performance is more important than organizational harmony and company loyalty.

The general trend in personnel policies in the private sector started to influence higher education institutions. Until the early 1990s, the professorial positions have been rationed with the timing and the ranking of the university where the candidate received his/her Ph.D. In 2002, there was major shift in the regulations regarding the personnel policy of professors. Universities are allowed to have explicit contracts with individual professors similar to the U.S. system. 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 to 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 low success rate was 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, its predecessor, a Physic Nobel Laureate from Stanford University failed to get his appointment renewed by the opposition of the faculty when he tried to impose more selective faculty support. So, the success of the stricter tenure policy will be remained to be seen.

Also, the professorial mobility from one university to another 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.

Major 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 recommendation to make SNU a world class university. The commission's recommendations (2001) were quite relevant in pointing out the malaise of the SNU and Korean public universities in general. The first set of recommendation was on the governance structure of SNU. Instead of having the university president elected through direct vote among faculty, it recommended the establishment of the independent board of directors and the board appoints the president for a longer (or indeterminate) term in the 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 were no effective program review. Without such reviews, it was natural to expect the quality of research and teaching at SNU has been mediocre. Third, it recommended the resource should be allocated based on the merit and scholarly excellence and creates proper incentive system to promote such activities.

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 rationale of establishing the institution was: 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 may be free of heavy regulation that other national universities have to satisfy imposed by the Ministry of Education. Its basic model of operation is heavy government subsidy toward elite students with the emphasis of graduate education, particularly Ph.D. In order to attract best students, KAIST charged no tuition. At the same time, the 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 load. 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 has no prior administrative experience was to provide credibility to the institution as a world class research university.

The hiring of non-Korean in order to seek the global prominence was reflected by the national sentiment that foreign experts would be better able to adopt revolutionary reform to improve the efficiency of the organization, because they not have the existing ties to the domestic stakeholders that may prevent them to adopt a reform that may jeopardize their interests. The success of Mr. Gus Hiddink, who led the Korean soccer team to the quarterfinals of the 2002 World Cup was the inspiration of the need for such bold recruiting at the executive level.

However, the rosy expectation of Hiddink-like institutional reform at KAIST did not happen. On the contrary, there was a tremendous backlash against the Laughlin's 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 rather economic. That is, KAIST model is not sustainable with the market force, 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 (money losing business), without compensating tuition revenues generated by the undergraduate students who are attracted by the prominent faculty members and the reputation of the institution will not be sustainable. 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 should be responsive to the market demand. In short, he wanted to privatize KAIST.

The proposal was not well received at all. MOST see the proposal by a renegade. Faculty did not like the change. There were no key stakeholders who would be willing to forego such drastic change. In 2007, KAIST board did not renew the President Laughlin's contract as

there was a widespread dissatisfaction against Laughlin's leadership. A few months earlier, 20 department heads of KAIST submitted a threatening letter saying that they will all resign if Laughlin did not resign.

Another issue of institutional reform is the privatization of public universities proposed by the Ministry of Education in 2007. The basic model of the privatization is to create an independent board for each national university following the Japan's law that passed in 2003. The law creates individual board of trustees that is responsible for the operation of the university. The law also establishes endowments established by 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 adopt innovative measures to make their institutions more efficient.

D. Aspiration to become world class universities and the global brain competition

During the past ten years, Korea's research output and capability has 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 of the number of publications, Korea's

rank has risen from 18th in 1998 to 12th in 2005. Kim (2007) reports that the flagship comprehensive research university in Korea, SNU's research output has grown to become quite substantial and comparable to major US public universities. According to him, the number of SCI-indexed articles by SNU professors was 75th in the world in 1999, and it 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 the articles was not comparable to those universities, SNU's overall quality of publication 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 the measures of research quantity and quality are not perfect, the statistics show a pattern of great progress of Korea's top universities. While there exists a great deal of institutional rigidity and the fundamental governance structure would be unlikely to change in the near future, the changed incentive system of faculty hiring, promotion, and salary have already generated substantial shift toward more research orientation. While 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) predicted that the emergence of China and Korea as the new power house in the near future may shift the center of gravity in science and engineering research.

Certainly, the competition for top researchers has increased recently. Korean universities

and research institutes now become willing (and able) to pay comparable (and higher) wages with top research universities in the U.S., the global competition for talents is likely to be intensified. However, with the domestic professorial market deteriorates over time, and more stringent career prospects with 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. Fresh Ph.D.'s market values have plummeted, but that of the world-class researchers have gone up. Therefore, young Ph.D.'s are likely to try their professional career in the U.S. or any other place in the world that can sustain their research activities (Kim 2004, Jin et al. 2006).

The percent of Korean doctorate 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 people who have definite plans to employment has increased from 3.0% in 1993 to 12.1% in 2005. The stay rate of Korean Science and Engineering 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 in third countries such as Singapore, Australia, Hong Kong, United Kingdom, Netherlands and other European countries are increasing, as more and more universities in those countries are willing to hire professor without the local language expertise, as 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 decide to go back. However, such decision will be

surely dependent on personal as well as professional environment.¹¹ In terms of personal consideration, generally, the U.S. and Korea would offer better environment than the third country. Korea offers familiarity and opportunities to be close to relatives and friends. The U.S. offers better environment to educate their children for most young doctorate recipients. Certainly, education for their children is an important personal consideration for young researchers. 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. 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).

¹¹ 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 value quality of family life over a more fulfilling career. Many of these people viewed the high pressure working conditions in Korea less favorable than the U.S. situations.

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

	1975	1980	1985	1990	1995	1996	1997	1998	1999	2000
Total number of Ph.Ds earned	190	158	392	1,259	1,306	1,251	1,108	1,042	1,017	1,048
Natural Science and Engineering (%)	59.5	55.0	64.2	60.9	52.4	55.1	52.0	53.0	50.9	53.2
Social Science including Psychology (%)	21.6	28.5	18.7	16.9	24.6	23.2	24.5	23.2	21.9	18.0
Humanities, Education, and Professional (%)	18.9	16.5	17.1	22.2	23.0	21.7	23.5	23.8	27.2	28.8
Some personal financial support (%)	44.2	53.8	79.7	72.4	74.1	79.9	84.6	93.1	95.8	96.5
With permanent visa (%)	36.3	21.5	12.0	5.6	10.0	11.1	10.6	10.9	11.9	9.7
Intend to stay in the U.S. ^a (%)	46.8	48.5	33.5	31.5	38.7	37.6	40.6	50.5	60.9	64.1
Firm plans to stay in the U.S. ^a (%)	37.7	40.9	25.8	23.0	20.9	24.2	28.4	31.2	38.8	42.9
Number with firm plan to stay ^a	58	54	84	225	210	237	241	248	287	320
Number with firm employment ^a	35	21	31	68	35	55	62	65	83	115
Postdoc ^a	23	33	53	157	175	182	179	183	204	205
Educational Inst. ^a	13	6	12	30	18	20	14	17	28	29
Industry/business ^a	20	12	16	31	15	32	35	40	51	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

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

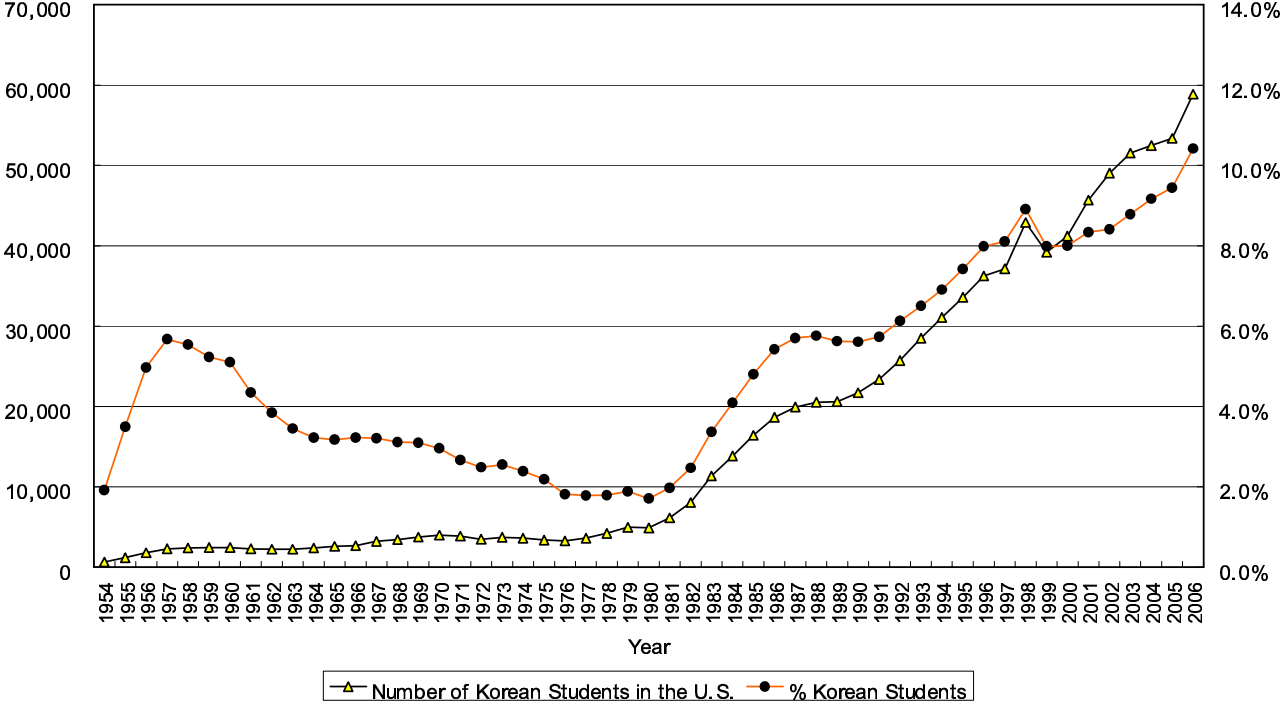
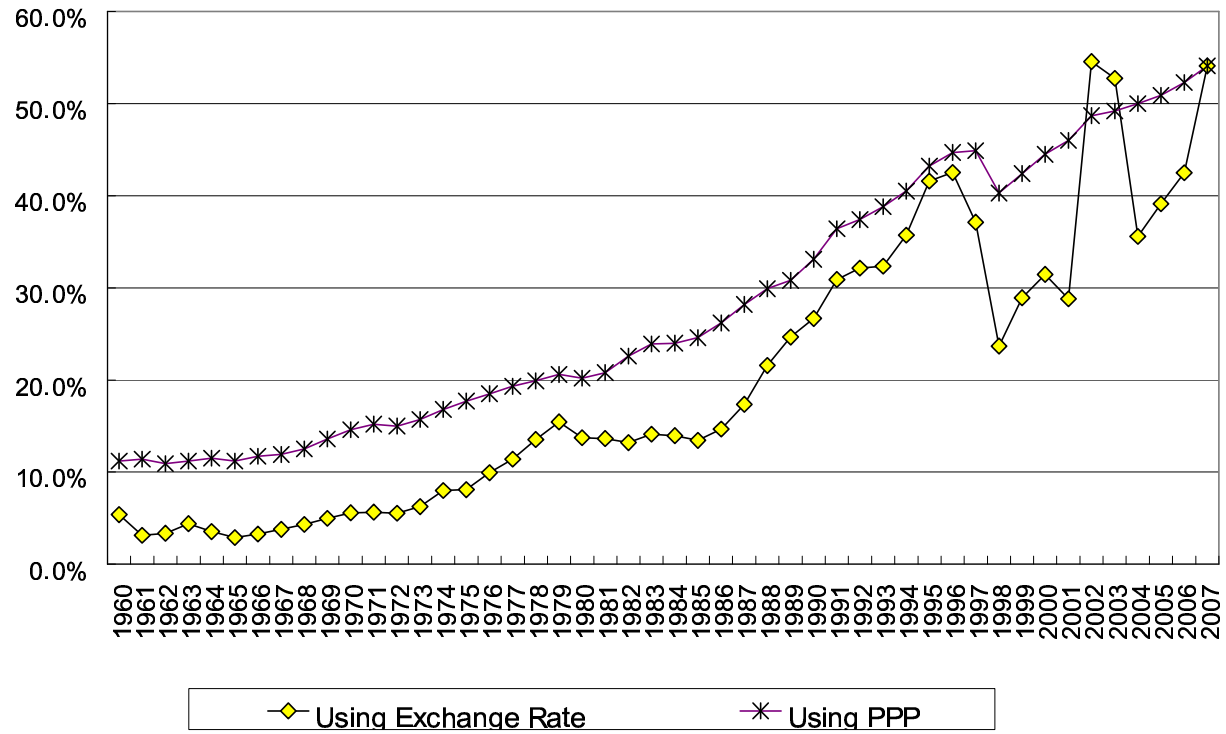


Figure 2

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



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

Figure 3

