

Reversal of Korean Brain Drain: 1960s - 1980s

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Introduction

Recent years has seen a large influx into Korea of U.S. trained Korean scientists and engineers. Data show that more than three quarters of Korean scientists and engineers who earned PhDs in the U.S. in the 1980s have returned to Korea within three years after graduation. Since the US is the major destination of Korean students for graduate works abroad, Korea has come to enjoy a 'reverse brain-drain' or 'brain-gain' - an inflow of high-quality human resources. Now at an important juncture in its course of development, Korea needs technological sophistication to maintain the momentum of further progress. And a corps of scientists and engineers who were educated and trained in advanced countries constitute an invaluable source to this end. Their contributions in education, research and development areas are also significant.

During the brain-drain controversy of the 1960s, some analysts believed that social and economic incentives would drive talented people out from developing countries for advanced countries. Given resource shortages of then developing countries, this problem seemed unlikely to be solved soon. Today, many third world countries still lose their best talents to advanced countries. The case of Korea, however, exhibits that once a brain-drain curse might turn into a blessing. Taiwan also experiences a similar rush of returning expatriates. This phenomenon can be attributed primarily to the booming economy in both countries.

But, it goes beyond economy : brains are returning despite their countries are still relatively weak in the economic structures and living conditions compared to advanced countries. Psychological and emotional factors are also identified to play an important role, once economic conditions of the country reach a certain level. It is in this regard that government policies may be a help for some developing countries to increase the number of returning expatriates. For those countries, policies to utilize the repatriated talents should be carefully designed and implemented.

This paper examines the experience of Korea : from brain-drain to reverse brain-drain over a three-decade period (1960-1988). Although the Korean case is rather an exception than the rule, it should shed light on the issue and policy directions for other developing countries. This paper consists of two parts. The first part examines the changing trends in the residence choice of Korean scientists and engineers (hereinafter KSEs). Factors to affect individual's residence choice are analyzed. The analysis is based on a survey of two groups of Korean scientists and engineers : those who decided to stay in America, and those who have returned to Korea. The second part describes government policies of Korea to cope with the brain drain problems in the 1960s through 1980s.

Residence Choice of Korean Scientists and Engineers ¹

Korean students in America

The number of Korean students going abroad for higher education increased sharply in the 1980s. While the increase was backed by strong economic performances of the country, it was attributed mainly to the changes in Korean government's policies on study abroad. Throughout the 1960s, Korean government maintained highly restrictive policies on allowing students to study abroad. Minor changes were made in the regulation of study abroad during the late 1970s, followed by a major liberalization in 1981.

As Table 1 shows, Korea's liberalization of the rules governing studies in foreign countries was followed by large increases in the number of Korean students in America in the 1980s. The number of Koreans receiving U.S. PhDs also increased rapidly. In 1993, there were a total of 31,080 Korean students enrolled in U.S. institutions and 1,118 received science and engineering PhD degrees.

Table 1. Korean students and PhD recipients in America, 1960-87

Years	Korean students in America	Korean PhD recipients in nat sci and engineering for the year*
1960	2,310	28
1965	2,666	66
1970	3,857	107
1975	3,260	105
1980	6,150	87
1981	8,070	104
1982	11,360	123
1983	13,860	183
1984	16,430	204
1985	18,660	251
1986	19,940	309
1987	20,520	450

* For years prior to 1980, the number shown is the average for the five years following the years in question (e.g., 1960-1964 for 1960).

Source : Institute of International Education, New York, Open Doors, 1960-88. National Science Foundation.

Changing trend in KSEs' residence choice

Survey results show that the prevailing residence choice of KSEs has shifted from America to Korea over the last three decades. Most KSEs who received PhDs in the 1960s chose to stay in America, with less than 20% of them returning to Korea as of 1987. In contrast, about two-thirds of KSEs who received their PhDs in the 1980s returned to Korea by 1987. A substantial proportion of the PhDs of the 1980s returned after a short stay in America, mainly under post-doctoral appointments. Table 2 shows this trend.

When KSEs first arrived in America, a majority of them expected to return to Korea after receiving their PhDs. A higher proportion of the 1960s PhDs changed their minds and stayed in America, whereas a smaller proportion of the 1980s PhDs changed their minds.

Table 2. Changing trend in KSEs' residence choice of 790 survey respondents

PhD year	Total number	Stay in USA	Return to Korea	
			Just After PhD	After work in USA
Before 1970	118	83.90%	3.40%	12.70%
1970-79	276	67.80%	10.10%	22.10%
1980-87	396	31.60%	39.40%	29.10%
Total	790	411	188	191

Factors to affect individual KSE's choice

Over the thirty-year span, no significant differences existed in the personal conditions and perceptions of the KSEs when they first came to America. The backgrounds of the KSEs who received PhDs in the 1960s are similar to that of the KSEs who received PhDs in the 1980s when they first came to America : their average age was about 27 ; 52 % was single ; 86 % came to America as students ; 62 % had worked in Korea for four years on average before coming to America ; and more than 60 % intended to return to Korea upon receiving degrees. However, their experience and changes in personal situations during and after graduate work seem to have played a major role in their residence decisions. Aside from changes in personal situations, the most important factor to affect KSEs' choice appeared to be the difference of economic conditions between America and Korea at the time of making decisions.

But with the improvement of Korea's economic conditions, as was the case in the 1980s, the value framework stemming from cultural differences of the two countries became more apparent as a determinant of return-rate. A high prestige attached to teaching jobs in Korea is a major factor to influence KSEs' decisions. Under the Confucian hierarchical value structure of Korean society, teaching jobs have traditionally carried a very high level of prestige and, thus, a most preferred occupation of an educated elite. Whether the KSEs have major family related responsibilities (either in Korea or America) appear to be another critical decision factor.

Job and career

When KSEs receive the PhD, their need for training/experience and desire for accomplishment are the primary reason for staying in America. Also if KSEs find good jobs in America, they are more likely to stay. If they have been sent by Korean organizations, especially educational institutions, their obligations seem to prompt their immediate return.

While the need for experience naturally decreases as they stay longer, many KSEs in America find that the opportunity for career growth in their present jobs is lower than they originally expected, and they expect better career prospects if they return to Korea. However, a majority of them express difficulties in finding desirable jobs in Korea. This is reflected in their identification of having a good job in America as a major reason for staying in America. More than half of the KSEs in America are willing to accept Korean jobs, if they are their preferred ones, mostly teaching jobs. A slightly lower but still substantial proportion of KSEs in America responded favorably to accepting temporary Korean jobs.

Among the KSEs who worked in America after their PhDs, more KSEs returned to Korea when they felt their further career development was blocked. Although their self-evaluation of accomplishment in America did not differ from that of KSEs in America, more KSEs who returned to Korea than KSEs who stayed in America report that they felt that their career prospects in America were unfavorable. In addition, race or national origin was more commonly identified as a serious disadvantage by KSEs who returned to Korea than those in America.

Among KSEs who returned to Korea, a significant pattern of job change is observed in favor of teaching jobs. A high proportion of KSEs in Korea with teaching jobs (84 percent) do not want to change their jobs. On the other hand, corporate research jobs that have the opposite characteristics of teaching jobs have more defectors than other jobs. Social prestige and job security are strong points of teaching jobs, while corporate research jobs are paid higher (about 50 percent more than teaching jobs) but have less security and much less social prestige or honor. The same preference for teaching jobs and their merits are identified by KSEs in America in describing their preferred jobs in Korea.

KSEs' reported income in America in 1988 was two to three times more than that in Korea. Since their reported income in America was ten times larger than that of Koreans in 1960, KSEs' income in Korea has improved considerably over the three decades. Differences in prevailing salaries for an individual's present job in America and Korea do not appear to be a major factor in KSEs' residence choice. Besides differently identified job characteristics among Korean jobs, other personal considerations seem to offset the income difference between the two countries.

While KSEs in America reported diverse job types and work activities, more than 90 percent of KSEs in Korea are engaged in teaching and R & D jobs. Private companies' recruitment of KSEs is gaining in recent years, with higher income as the major attraction.

Family, personal situation and children's education

KSEs in America regard their family situation as another major reason to stay in America. However, for KSEs who returned to Korea, rejoining family and friends in Korea was a major motivation for their return. Because most KSEs in Korea lived in America for a relatively short period, their concerns about family in Korea (e.g., parents) are serious considerations. When KSEs stay longer, family's adjustment and assimilation to American lives are likely to make them shift their family concerns from Korea to America.

This family situation of KSEs who stayed longer is especially represented by the problem of children's Korean language proficiency. In particular, when KSEs' children are of middle school or high school age (11 to 18), the problem of their Korean language ability is a serious concern in KSEs' return decision. About one-third of KSEs in America would expect their children to have serious adjustment difficulties if they returned to Korea. A high proportion of KSEs who actually returned to Korea in spite of their children's Korean language problem want their children to live in America.

Few KSEs are female. This reflects the bias of Korean society that discourages women from pursuing professional careers in science and engineering. Surprisingly, there is no significant difference in residence choice among eldest sons. As eldest sons are primarily responsible for taking care of their parents and family, we expected more eldest sons to return to Korea.

KSEs spent on average five years for their PhD work and received degrees at the median age of 32. Reflecting the increasing tendency for recent graduates to return, KSEs in America are seven years older on average than those in Korea. There is no noticeable difference in the quality of KSEs' PhD awarding institutions between KSEs in America and Korea.

KSEs finance their graduate study mainly through university-related support. In recent years, more KSEs have received financial support from Korea. If they are financially supported by Korean institutions, they are more likely to return to Korea.

Many KSEs who came to America as students changed their immigration status to permanent residents over the PhD work period, and they are likely to stay in America. This tendency is stronger among KSEs who married during their graduate work period.

Perception and attitude

Both groups of KSEs, in America and Korea, evaluated America more favorably than Korea in various aspects : work attitude, education system, trustworthiness of people, fair evaluation of job performance, work environment, and resources for work. However, they agree that Korean “ personal relationships ” are better, while each group favors the way of life of their present residence. This implies that KSEs preserve their intrinsic emotional framework regardless of their assimilation to American lives.

Both groups of KSEs expressed a belief in American dominance as a political power in the world and a leader in science and engineering. They are doubtful, however, about the future improvement of the American economy and social situation. Prospects for improvement in the Korean social situation have received a mixed review ; KSEs in Korea have a considerably more positive attitude than KSEs in America have. Both groups are strongly optimistic that economic and political development of Korea will continue in the next ten years. Although Korean science and engineering is not expected to be a major contender for world leadership, a small but significant proportion of KSEs think Korea has the potential to be a major player at the world level. They take a reserved position as to the possibility of Japanese emergence as a new leader in science and engineering.

KSEs in America generally view their friends in Korea as satisfied with their return, and evaluate their friends’ accomplishments in Korea more favorably than KSEs in Korea evaluate themselves. By contrast, a lower proportion of KSEs in Korea think that their friends in America are satisfied with their lives in America.

In recent years, many KSEs in America have visited Korea to see their family or friends or do business. Before they returned, most KSEs maintained contacts with their friends in Korea. As a group, the KSEs remaining in America do not maintain as much contact their friends in Korea as the returnees did. The information KSEs in America have about Korea is mostly acquired from American sources.

Simulated probability assessment of factors on KSEs’residence choice ²

Simulated probabilities of KSEs’ return to Korea exhibit a significant role of economic situations. At the time of the reception of PhDs, the probabilities of KSEs’ return to Korea were quite low : 1 % for 1963 condition (Korea’s per capita GNP was 5 % of America’s) and 19 % for 1983 condition (Korea’s per capita GNP was 12 % of America’s). But, three years after they received PhDs, the probabilities of the two groups of KSEs’ return to Korea differed greatly : only 7 % among the 1963 PhDs, and 47 % among the 1983 PhDs. This contrast seems to indicate the effect on KSEs’ choices of changing economic conditions of Korea.

Korea’s poor economic condition during the 1960s might have forced most KSEs to stay in America after they earned PhDs. Moreover, KSEs who decided to stay temporarily in America might have found it difficult to return to Korea after the originally intended stay : they either changed their minds or expected to remain in America for a long time. Among those who received their PhDs in recent years and decided to stay temporarily in America, however, there is a growing tendency that they would return only after a short period of time. Although most KSEs do not return home immediately after their PhD awards, the improvement of Korea’s situation seems to work against an extended stay in America.

The effects of personal conditions are different, depending on the economic situations of the decision time. At the time of PhD awards, job availability and concern for career development made 14 % difference in the probability of return to Korea for 1963 cohorts, but 58 % for 1983 cohorts. The KSEs who perceived some kinds of obligation to their home country and regar-

ded lifestyle an important aspect in their lives were more likely to return to Korea : by 7 % among the 1963 cohorts, and 37 % among the 1983 cohorts. Whether the KSEs strongly identified personal or family matters in Korea made 2 % difference for 1963 cohorts, and 22 % for 1983 cohorts. Other personal attributes showed similar patterns of differences between the two cohorts of 1963 and 1983. These results and analyses at other decision points exhibit two major points in explaining KSEs' choice behavior. First, when KSEs receive their PhDs, economic conditions and career-related concerns are main factors to affect their residence choices. In fact, Korea's poor economy in the 1960s was a dominant inducement of KSEs' stay in America. Second, as Korea's economy achieved substantial improvements, KSEs' choices are significantly affected by their personal characteristics or perceptions.

Government policies: underlying assumptions and policy leverages

Maximize benefit generated by KSEs in Korea: Korean policies in earlier period

The innovation and improvement of production are mostly carried out by those with formal education. Therefore, training and education is an indispensable factor to enhance the capacity of those talented human beings. Government policies in the 1960s and 1970s were directed to "repatriate as many KSEs as possible in the earlier period of their careers." Government devised and applied various incentives to this end. But, they were effective only in a limited sense.

One of the measures taken by Korean government to counter the brain drain was to provide financial supports to KSEs. From 1968, Korean government supported moving expenses for those KSEs who were about to return to Korea and living costs for temporary visitors. Even though these financial incentives were helpful to KSEs, they failed to significantly affect the KSEs' residence choice itself : Most KSEs who temporarily visited Korea returned to America just after their stints. Another measure taken by Korean government against brain drain was to provide strings-attached financial aids to those going abroad for studies. But that obligation was occasionally disregarded by the aid-recipients. Lack of effectiveness of the past incentives cannot be attributed to the Korean government's ineptness. Rather, the reason must be traced to a fundamental problem — their reluctance to return to then economically unpreferable Korea. Facing this situation, all what Korean government could effectively do at that time was to impose rather stringent qualification requirements for Korean students to go abroad.

Value of not having all KSEs return: policy direction in the 1980s and on

If Korea's economy maintains its current pace of expansion, the gap with American economy will be steadily narrowed. In addition, if the present momentum of Korea's political development sustains, the proportion of KSEs who intend to return to Korea should grow. In spite of this favorable trends, however, some KSEs will still prefer to remain in America for a variety of reasons : some may find it better to stay in America for professional career development ; others might like American lifestyle better ; and still some others may find it economically more prosperous to stay in America. Thus, as long as America's science and engineering sec-

tors continue to recruit foreign students, some proportion of KSEs will choose to remain in America. It is neither desirable nor realistic for all Korean students to return immediately upon completion of their degrees. Since the pro-stay KSEs can serve as a well-placed channel to funnel the advances of American science and technology to Korea, they can be considered an important component of Korea's overall scientific and technological development.

The reversal of the trend in the 1980s suggests both the increasing leverage of government incentives and the importance of government role in "controlling" the flow. The investigation indicates that KSEs' choices are no longer dominated by economic matters alone. Their choices are also affected by numerous other concerns, including family, personal compatibility, and career prospects. Some of these concerns are susceptible to policy incentives. Thus, Korean government at this point has important levers to control KSEs' decisions. From mid-1980s and on, Korean government policies over KSEs has been changing under this line of logic: scout the most needed among experienced KSEs and let the remainder decide by themselves.

Giving emphasis on temporary visitors

In 1990, the program to support the moving expenses for returning KSEs ended. It was recognized that travel expenses did not work as a significant factor in residence decisions. On the contrary, the policy to support living expenses for temporary visitors was expanded. This policy applies not only to prominent KSEs but also to foreigners, expecting their contribution in international cooperation of R & D activities.

Introduction of " Brain Pool "

In 1994, Korean government introduced so-called " Brain Pool " program. This program is aimed at enabling local universities and government sponsored research institutes to hire overseas trained KSEs for a short stint. Invited KSEs, funded by government, are supposed to teach or engage in R & D for one year and may renew the contract up to three years. These temporary positions are intended for mid-career scholars with research or teaching experiences (presumably more than five years). During their stay in Korea, they have opportunities to experience Korean situations and may seek permanent appointments.

Allowing research institutes to establish independent graduate schools

Beginning 1997, government-funded research institutes will be allowed to establish their own education branches (at graduate level). Surveys show that most KSEs prefer domestic university positions to that of private companies or research institutions. In fact, each year a substantial proportion of the KSEs who have appointments with research institutes, public or private, quit to take university positions. They certainly choose high prestige and social status attached to professorship over better economic incentives of private sector jobs. The market mechanism and changing public perception may eventually cure this imbalance — but only after a considerable period of time. Education branch of research institutes will give KSEs the title of a professor and researcher at the same time. This will help KSEs enjoy both the prestige of professorship and the opportunity for career development in research.

Post doctoral appointment for junior KSEs

Korean institutions are encouraged to offer post-doctoral appointment to the KSEs who want a job in Korea. While enhancing their competency, KSEs under this arrangement are believed to have better chances to find permanent positions. The policy also includes measures to support overseas post-doctoral appointments for the KSEs who received PhDs in Korea. These measures are believed to be helpful in building up a ground for international exchange and cooperation among junior scientists and engineers.

Helping KSEs organizations' activities and networking

Korean government is reinforcing the support for Korean scientists and engineers' organizations abroad. Certain activities of associations in America, Japan, and Europe are sponsored by Korean government. It was found that the KSEs who maintained good contacts with Korea were more likely to return to Korea. A useful information channel have been effectively constructed through these professional organizations. Database collected through these organizations serves to connect domestic demand and the KSEs with the needed expertise. These organizations also disperse information about Korea's progress in the members' fields as well as general changes in the country's situation. More complete information about Korea will help KSEs make choices properly by removing sources of misjudgment and bias. An established channel also enables Korean industry or academia to keep track of experts in various fields and to recruit them when specific needs arise.

Policy shift over three decades

As indicated by the fact that the above mentioned policies were introduced mostly in the 1990s, it was not until recently when Korean government's shift on the position regarding brain drain has become a reality. Even though the need for change was recognized during the 1980s, government took time in implementing specific policy measures. New policies are basically designed to help KSEs decide by themselves, but let them have enough information and chance for choice. This line of policies are based on somewhat different ideas from that of the 1960s, i.e., that of nationalist's. While nationalist's view is supported by the countries suffering from brain drain, Korea's new policies may have been formulated encompassing the reverse brain drain phenomenon.

Concluding remarks

It should be noted once again that economic factors are central to the understanding of the brain drain phenomenon. Differences in the structure and level of economy between host and home countries are the initial point of the problem. In the case of several newly industrialized countries (NICs), the return of expatriate scientists and engineers seems to be due in large part to the establishment of science and engineering infrastructure, accompanied by substantial progress in their economies. But given the fact that, even though there still exist substantial discrepancies in living standards and social infrastructure between advanced countries and NICs, a large proportion of overseas-trained brains return to their home countries, the effect of non-economic factors cannot be ignored. It must be stressed that cultural background that shapes the frame of reference was found to be particularly important an aspect in KSEs' choices.

Both traditional brain drain and the unanticipated return of long-time expatriates ("reverse brain drain ") pose some complex policy issues. Although developing countries are trying to retrieve the talent educated abroad, it is difficult for these countries to ensure proper jobs for returning expatriates. Instead of focusing simply on potential losses of the talent, discussions of brain drain must consider another aspect of the issue : how to optimize the expertise of available human resources to meet the goals of national advancement. To the extent that policies are designed to maximize the number of returning students, they must rely on incentives rather than command-and-control approaches. As we saw in the Korean experience in the 1960s, however, incentives are effective only in a limited sense. It will not be until overall economic

conditions of the country reach a certain level — not necessarily equivalent to that of advanced countries — when well designed incentives may work as useful policy leverages. It is from that point on when policies reflecting country-specific aspects (culture, lifestyle, family relations, etc.) may begin to work effectively. In order to be able to design such policies, a comprehensive investigation should be conducted on related matters.

The Korean case shows a significant role of culture specific aspect in KSEs' decisions. This may be the case in the countries with similar cultural background, e. g., Far Eastern countries. Many students-turned-immigrants from Asia assumed professional jobs in America over the last three decades, constituting a substantial portion of foreign scientists and engineers in America currently. Despite their stable social and economic status, their assimilation into the American society and their attitudes toward their native countries seem to differ significantly from those of European immigrants. Because many aspects of the underlying orientation of KSEs will not be much different from other Asian scientists and engineers (especially those from Confucian influenced countries), the findings from this study should be pertinent to them.

A particularly relevant group to which we can apply the findings in this study is Chinese students in America. Presently, the number of Chinese students in America are far greater than those from most other countries (44,380 in 1994). Many Chinese students who earned their doctoral degrees express their intention to stay in America. They face a comparable dilemma to that of KSEs in the 1960s and 1970s. Although they want to return to China, poor living standard and inappropriate work environment in China lead many Chinese students to stay in America. In addition, political concerns seem to make them choose to stay in America. Their comparison of option would involve many aspects that are identified in KSEs' decisions in earlier years. If so, the Chinese government could utilize information from the present study in establishing incentives to repatriate their students back home.

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¹ Data presented here are obtained through a survey conducted by myself. Samples were drawn from a population of 3,242 U.S. trained Korean scientists and engineers (KSEs)-those who identify themselves as a Korean or being of Korean-origin, earned their PhDs in the U.S. in the fields of natural sciences and engineering between 1960 and 1987. According to US National Science Foundation data, there were 3,242 such Koreans. At the time of the survey (1988), 1,545 of them were identified living in America and 1,411 in Korea. I distributed through mail 998 questionnaires in America and 983 in Korea. Among them, 432 and 406 questionnaires were returned. I personally interviewed 87 KSEs to supplement the mail survey. While the survey data provide information on individual KSE's family situation, job and career, and perception and attitude, indicators of the external situation (economic, social, and political) on America and Korea are taken from published statistics. I analyzed the collected data adopting several complementary approaches — descriptive comparison of KSEs who returned to Korea and stayed in America, analysis of an observed discrepancy between intention and action, and discrete choice analysis

² To assess the effect of each factor on the residence choice of KSEs, I performed a discrete choice analysis using maximum likelihood estimation. I assumed that KSEs' choice depended upon both personal conditions and external situations. Indicators for external conditions were selected to represent the political-economic conditions, and science and technology activities of both Korea and America. Most variables on personal characteristics were constructed using KSEs' responses to survey questionnaires. I ran probit regressions for KSEs' choices at the time of KSEs' reception of PhD, and three years after receiving PhDs.