

CHINA'S BRAIN DRAIN AT THE HIGH END

Why government policies have failed to attract first-rate academics to return

Cong Cao

Between 1978 and 2007, more than 1.21 million Chinese went abroad for study and research, of whom only about a quarter have returned. The Chinese government's policies of attracting first-rate overseas academics back have yielded mixed results at best. This article discusses why overseas Chinese academics hesitate to return at a time when China is in desperate need of talent to turn itself into an innovation-oriented society. Common reasons relate to low salaries, problems of education for children and jobs for spouses, and problems of separation if some family members still reside abroad. More important are institutional factors. Guanxi still matters. The opportunity costs in career development are too high. In social science research, there are still taboos. Rampant misconduct has also tainted the Chinese scientific community. The article concludes that unless the research culture becomes conducive to doing first-rate work and meritocracy is rewarded, China is unlikely to witness the return migration of first-rate academics.

KEYWORDS: brain drain; China; return migration; research; overseas academics

Introduction

Between 1978 and the end of 2007, more than 1.21 million Chinese went abroad for study and research, of whom only about a quarter have returned.¹ Among the overseas students and scholars (*liuxuesheng*), there has been an increasing return of seasoned entrepreneurs and professionals among overseas Chinese who take advantage of the vast opportunities created by rapid economic growth in China and who have responded positively to the preferential policies of the Chinese government toward them.

Similar efforts to attract first-rate overseas academics have had mixed results at best. As a whole, permanent academic returnees, mostly Chinese doctorate holders who have spent several years abroad, are those who are less likely to find decent, permanent positions and tenure abroad. Few of them are comparable to non-returnees in terms of quality, achievements, international reputation and prestige. Some may simply be taking advantage of the opportunities currently unavailable abroad. For example, in the case of stem cell research, some of the best Chinese scientists working in this area have returned from Stanford University and the National Institutes of Health because it is not endorsed in the US (Dennis 2002). Others may be taking time off from their permanent positions abroad to run laboratories in China. Yet others who have permanent positions overseas work in China to maximise benefits from both positions.

Although we cannot assume that all non-returnee academics of Chinese-origin are the best and brightest, there is little doubt that the best and the brightest have not returned. An important question to explore is why these top academics are hesitating to return at a time when China is in desperate need of talent to turn itself into an innovation-oriented society, in a context when innovation is often synonymous with talent.

This article begins with a discussion of China's policy toward overseas study in the reform and open-door era. Using statistics on students and returnees and by analysing the effectiveness of various government programmes targeting high-level academics, it argues that China has been experiencing a 'brain drain', especially at the high-end. The article then discusses some factors that have caused the reluctance of overseas Chinese academics to return on a permanent basis.

China's Post-1978 Policy toward Overseas Study²

The phenomenon of Chinese studying abroad dates back to the mid-nineteenth century. Most of the overseas students in the first hundred years returned without hesitation upon finishing their studies, bringing back with them the vision to develop a modern China and the hope to change China using scientific knowledge (Wang 2002). So did the students who were despatched abroad by government during the period between the establishment of the People's Republic of China and the onset of the Cultural Revolution (1947–1976) (Song 2003). It is fair to say that in its first 30 years of communist rule, China did not experience a shortage of high-quality personnel for its economic, educational and scientific enterprises. For example, 14 of the 23 most important contributors to China's strategic weapons programmes on atomic and hydrogen bombs, missiles and satellites (or the so-called '*liangdan yixing*') honoured by the state in 1999 had foreign doctorates granted by such institutions as Berlin (two), Caltech (two), Edinburgh (two), Michigan (two), Harvard, Yale and Paris; only two did not have foreign study and research experience. At that time, the main problem was that the country did not better utilise them and instead abused and prosecuted them during various political campaigns, including the Cultural Revolution.

With the opening up of China since 1978, more than one million Chinese have gone abroad to attend language preparation courses, pursue degrees, conduct post-doctoral research and engage in studies in various fields ranging from natural sciences to engineering, social sciences, humanities and business administration. This wave of Chinese nationals embarking on overseas study is historically unprecedented not only in terms of the number of students who have gone overseas, but also the number of returnees (319,700) which alone exceeds the total number of Chinese who studied abroad between 1847 and 1978.³

Immediately after the Cultural Revolution in 1976, the Chinese leadership realised the seriousness of lacking young and middle-aged scientists, engineers and other professionals who were well trained and who could meet the targets of the drive for modernisation in agriculture, industry, science and technology, and national defence. In addition to resuming formal higher education, the country put on its agenda the training of high-quality personnel overseas. As early as 1978, Chinese leader Deng Xiaoping, who himself had just been rehabilitated, proposed to send students abroad as one of the important ways to raise the level of Chinese science and education regardless of how much would be spent. He suggested sending students abroad by the thousands and even tens of thousands through every possible means. Regarding the possible 'brain drain', Deng said that even if 100 of the 1000 students sent did not return, there would still be 900 left (Jiang 2003).

Between 1978 and 1979, the Chinese government sent some 3000 students and scholars to various countries, including the US, Canada, the UK, France, Italy, Germany, Belgium, Switzerland, Austria, Holland, Denmark, Sweden, Finland, Yugoslavia, Romania, Australia, New Zealand and Japan. The first 52 visiting scholars departed for the US on 26 December 1978. This sending of *liuxuesheng* marked the beginning of the open-door policy (Zweig 2002, pp. 161–210). In 1981, self-sponsored (*zifei*) overseas study was permitted. In 1987, during a major debate over the lack of returnees, Zhao Ziyang, then general secretary of the Chinese Communist Party (CCP) Central Committee, argued that the so-called 'brain drain' was in reality to 'store brainpower abroad', which would be utilised eventually (Zweig & Chen 1995).

However, the 1989 Tiananmen Square crackdown on students and political dissidents became a watershed for overseas study as well as the return of Chinese *liuxuesheng*. In the US, the Bush Administration issued an executive order in 1990 and Congress passed the Chinese Student Protections Act in 1992, allowing Chinese nationals in the US, many of them government-sponsored *liuxuesheng*, to stay and work in the country and to obtain permanent resident status. Many of the Chinese *liuxuesheng* in other countries also changed their non-immigration status and stayed on permanently. This represents the first large unexpected 'exodus' of highly qualified Chinese students who were supposed to return to China to shoulder the important historical responsibility of contributing to its modernisation drive.

Immediately afterwards, China imposed restrictions on overseas study. A significant measure was to impose a service period (*fuwuqi*), that is, only those who fulfil a certain number of years of service to the country—five years for undergraduates and two more years for graduate students—would be allowed to go abroad as *zifei* students. The rationale behind this might be the view that after working several years in China, these graduates would lose interest in studying abroad, or that foreign universities would be reluctant to admit those who are not fresh out of schools. Those students with relatives residing abroad were allowed to be exempted from the service period if they paid back to the government the tuition cost of their education. As a result, both the number of students who went abroad and the number of returnees dropped.

At this juncture, in early 1992, the then Chinese leader Deng Xiaoping toured southern China, during which he reaffirmed the reform and open-door policy. With regard to overseas study, Deng pointed out that China should not stop sending students abroad just because few have returned, and that even if half of the overseas students do not return, the remaining half would help the country. It appeared that he had significantly lowered his 1978 expectation in which he had hoped for a return-rate of 90 per cent, as noted earlier. In the meantime, he also called for the return of all overseas students regardless of their previous political attitudes, and tried to convince them that it would be better for them to return home and to make contributions (Deng 1993). Here, Deng clearly intended to correct the negative impressions created by the Tiananmen Square crackdown in the minds of overseas Chinese students and of the world at large.

Later that year, a now well-known 12-character policy, 'supporting overseas studies, encouraging return and allowing students come and go as they will' (*zhichi liuxue, guli huiguo, laiqu ziyou*), was proposed. Later on, the emphasis was shifted from 'returning and serving the country' (*huiguo fuwu*) to 'serving the country' (*weiguo fuwu*). This laid the foundation for the new policy toward overseas study. The government also loosened the service period requirement in 1993; and starting from 2003, those who had not finished

their service period were not required to pay back tuition fees and those who wished to study abroad did not need to obtain prior approval to leave the country. Consequently, overseas study reached another peak. In 2000, in an interview published in the prestigious journal *Science*, the then CCP Central Committee General Secretary Jiang Zemin made another significant statement: '... for various reasons, quite a number of students have decided not to—at least for the moment—come back, which is understandable' (*Science* 2000). In general, it is increasingly recognised that it is not only impossible but also unnecessary for China to attract all of its overseas students back: *liuxuesheng* remaining overseas in universities, research laboratories and corporations is not an indication that China would lose them completely and permanently; quite on the contrary, they are among China's greatest assets, from which the nation may benefit in the long run.

Programmes Attracting Overseas Chinese Academics

Nonetheless, the Chinese government began to realise the seriousness of the brain drain and the need for talented scientists and professionals, especially at the high level. Thus, since the mid-1990s, it has adopted various measures to reverse the 'brain drain' trend. Major programmes put in place aimed aggressively at attracting the permanent return of *liuxuesheng* include the One Hundred Talent Programme at the Chinese Academy of Sciences (CAS); the Cheung Kong Scholar Programme at the Ministry of Education (MOE); the National Science Funds for Outstanding Young Scholars Programme at the National Natural Science Foundation of China (NSFC); and the Hundred, Thousand and Ten Thousand Talents Programme at the then Ministry of Personnel (MOP), which became the Ministry of Human Resources and Social Security after merging with the Ministry of Labor and Social Security in early 2008 (Table 1).

Hundred Talents Programme (bairén jìhuà)

This programme implemented at the CAS was set up in 1994 to recruit scientists mainly from abroad who are under the age of 45, with an offer of RMB2 million (US\$240,000) for three years, including money for research, a housing subsidy and a moderate salary.

TABLE 1

Programmes targeting returnees or attracting the return of overseas Chinese academics.

Programme	Year initiated	Agency in charge	Numbers successfully attained
Hundred Talents Programme	1994	CAS	800
The National Science Fund for Distinguished Young Scholars	1994	NSFC	1200
Hundred, Thousand and Ten Thousand Talents Programme	1995	MOP	10,000
Chunhui Programme	1996	MOE	10,000
Cheung Kong Scholar Programme	1998	MOE	800

Source: Author's collection.

Note: MOE, Ministry of Education and its precedent the State Education Commission; CAS, Chinese Academy of Sciences; NSFC, National Natural Science Foundation of China; MOP, Ministry of Personnel.

By September 2002, a total of 839 scholars had joined the programme, of whom over 95 per cent have foreign study experience, and 621 directly from abroad. This programme has become part of the academy's Knowledge Innovation Initiative since 1998.⁴

The Cheung Kong Scholar Programme (Changjiang xuezhe jihua)

Launched in August 1998 with an initial donation of HK\$70 million (US\$9.5 million) from Hong Kong business tycoon Li Kai-shing's Cheung Kong Holdings and matching funds from the MOE, the Cheung Kong Scholar Programme awards Cheung Kong professorships to outstanding middle and young scientists (usually under 45), especially those from abroad and who are active in the international research arena, appointing them at Chinese universities. Furthermore, Cheung Kong professors with distinguished achievements are given Cheung Kong Scholar Achievement Awards. Eight rounds of recruitment have thus far resulted in the endowment of 800 positions, with most of the appointees having studied or worked abroad.

The National Science Fund for Distinguished Young Scholars (guojia jiechu qinnian kexue jijin)

Launched in 1994, this national fund comes under the jurisdiction of the NSFC, a major agency funding peer-reviewed basic and mission-oriented (*yingyong jichu*) research projects established in 1986 following the model of the US National Science Foundation. The fund provides support to promising scientists under the age of 45 from seven scientific fields: mathematics and physics, chemistry, life science, earth science, engineering and materials science, information science and management science. Awardees are selected based on past performance and allowed to pursue research of their own interest. Awards were initially made for a three-year period, with awardees in experimental and technological sciences getting RMB600,000 (US\$72,000), and half that amount going to those engaged in theoretical research. On the occasion of the Fund's fifth anniversary in 1999 and in recognition of its achievements, then Premier Zhu Rongji approved a significant increase in the Fund's budget from RMB70 million (US\$8.4 million) in 1998 to RMB180 million (US\$21.7 million) in 1999. The grant tenure has also been extended to four years, with funding for experimental and theoretical research increased to RMB800,000 (US\$96,000) and RMB550,000 (US\$66,000), respectively. The total number of awardees in each year has also been increased since then. The Fund has made awards to 1200 young scientists, of whom more than 80 per cent have foreign study and/or research experience (Cao & Suttmeier 2001).

Hundred, Thousand and Ten Thousand Talents Programme (bai, qian, wan gongcheng)

This MOP administered programme was initiated in 1995, with participating agencies including the Ministries of Science and Technology, Education and Finance; the then State Development and Planning Commission; the NSFC; and the China Association of Science and Technology. It is intended to produce outstanding Chinese researchers by the year 2010: 100 will be active at the research frontier of world science and technology, 1000 will have the advanced knowledge to lead the development of academic

disciplines, and 10,000 will be disciplinary leaders in reserve with high academic attainments. About 10,000, including many returnees, have been identified thus far.⁵

In general, these programmes usually select the same group of outstanding returnees. For example, the grantees of the National Science Fund for Distinguished Young Scholars are most likely to be also named as the Cheung Kong scholars at universities and included into the One Hundred Talent Programme at the CAS. These are also targeted by the One Hundred, One Thousand and Ten Thousands Programme.

The Chinese government has also put aside special funds to accommodate the interests of expatriate Chinese who desire to contribute to their homeland but cannot work full-time in Chinese institutions of learning. The Cheung Kong Professor Programme, for example, has appointed 300 special professors for those able to work at least four months in China. The Chunhui Programme (*chunhui jihua*), launched by the MOE in 1996, has supported more than 10,000 outstanding overseas students working short-term, attending conferences or conducting site visits in China.

Brain Drain at the High End

Collecting data on *liuxuesheng* and returnees is highly challenging as each of the government agencies involved such as the MOE, the MOP and the Ministry of Public Security (MOPS) compile data according to its own purposes, making the data irreconcilable. There also has been underreporting of such statistics in most circumstances as self-supported students do not have to register their *liuxuesheng* status with overseas Chinese embassies and consulates (as well as over-reporting due to the inclusion of high school students at one point). As a result, the exact number of Chinese *liuxuesheng* and returnees is unknown. Statistics cited may also vary. For example, according to the *China Statistical Yearbook* which presumably uses MOE flow data, 917,012 Chinese went abroad with 230,045 returning between 1978 and 2006 (Table 2). However, the most recent MOE stock statistics (also official but not in any statistical yearbook) indicate that during the same period, the total number of Chinese studying abroad was 1.07 million and the number of returnees reached only 275,000 (by 2007, the numbers were 1.21 million and 319,700, respectively) (Table 3). Given such variations in the statistics on Chinese *liuxuesheng* and returnees from the same source (MOE), it is very difficult to reconcile them to gain an accurate picture. All that can be said is that both numbers are likely to be significant.⁶

While it is genuinely difficult to track down the actual numbers of Chinese who have gone overseas to study, the data from recipient countries seem to confirm that the numbers tend to be huge. For each of the past 17 years, for example, Chinese had accounted for some 10 per cent of the international student body in the US, with more than 80 per cent in graduate programmes and constituting 15 to 20 per cent of the total international scholars on different types of visas (Table 4). It was only in the 2001/2002 academic year that India replaced China as the leading country of origin for international students in the US.

China's leadership had earlier hoped for a fairly higher rate of return. As discussed earlier, in 1978 Deng Xiaoping expected 90 per cent of the *liuxuesheng* to return. It is now recognised that quite a number of them have decided not to come back, at least for the time being. The statistics from Chinese sources on the return of *liuxuesheng*, despite differences among sources, all point to disappointingly low rates of return, which are

TABLE 2

Chinese students leaving for and returning from overseas destinations each year, 1978–2006.

Year	Number of students leaving for overseas destinations	Number of students returning long-term from overseas	Ratio of returnees to departing students (%)
1978	860	248	28.84
1979	1777	231	18.16
1980	2124	162	13.46
1981	2922	1143	23.22
1982	2326	2116	38.96
1983	2633	2303	49.07
1984	3073	2290	54.04
1985	4888	1424	48.13
1986	4676	1388	44.72
1987	4703	1605	43.06
1988	3786	3000	47.12
1989	3329	1753	47.61
1990	2950	1593	48.08
1991	2900	2069	49.65
1992	6540	3611	50.39
1993	10,742	5128	49.92
1994	19,071	4230	43.25
1995	20,381	5750	40.17
1996	20,905	6570	38.66
1997	22,410	7130	37.58
1998	17,622	7379	38.05
1999	23,749	7748	37.36
2000	38,989	9121	34.92
2001	83,973	12,243	29.36
2002	125,179	17,945	25.01
2003	117,307	20,152	23.34
2004	114,682	24,726	23.03
2005	118,515	34,987	24.02
2006	134,000	42,000	25.09

Source: National Bureau of Statistics (NBS) (various years).

calculated by dividing the total number of returnees by the total number of overseas Chinese students in a particular year (see Table 2 and 3).⁷ *China Statistical Yearbook* gives a net rate of return of 25 per cent for the period between 1985 and 2006. Similarly and consistently, the rate of return from the MOE stock data also has been around 25 per cent in recent years. The actual rate of return and the five-year and 10-year smoothing rates of return all show that the year 1993 seems to be the turning point, when the rates of return changed from increasing to decreasing (Figure 1). In other words, judging by the rates of return, one can at least tentatively conclude that China has been experiencing a serious 'brain drain' especially since 1993.

Moreover, brain drain is most evident for the more rigorously trained overseas Chinese with doctorates among whom many if not most have not returned, and efforts to turn around this category of China's brain drain have not been as successful as expected.⁸ For example, although most of the awardees in the government sanctioned programmes described earlier—the National Science Funds for Distinguished Young Scholars, the Cheung Kong Scholars Programme, and the One Hundred Talent

TABLE 3

Cumulative totals of Chinese students overseas and back in China each year, 1985–2007.

Year	Total number of students overseas	Total number of students returned	Ratio of returnees to total Chinese overseas in year (%)
1985	40,000	16,500	41.25
1986	40,000	17,000	42.50
1987	64,000	22,000	34.38
1988	70,000	n.a.	n.a.
1989	80,000	33,000	41.25
1990	n.a.	n.a.	n.a.
1991	170,000	50,000	29.41
1992	190,000	60,000	31.58
1993	210,000	70,000	33.33
1994	230,000	75,000	32.61
1995	250,000	81,000	32.40
1996	270,000	90,000	33.33
1997	300,000	96,000	32.00
1998	300,000	100,000	33.33
1999	320,000	110,000	34.38
2000	340,000	140,000	41.18
2001	420,000	140,000	33.33
2002	583,000	153,000	26.24
2003	700,200	172,800	24.68
2004	815,000	198,000	24.29
2005	933,400	232,900	24.95
2006	1,067,000	275,000	25.77
2007	1,211,700	319,700	26.38

Source: Author's collection.*Note:* n.a.: not available.

Programme—have foreign experience, only one-third to one-half of them received their doctorates from abroad (Table 5). The new National Institute of Biological Sciences (NIBS) that was set up amidst much fanfare and backed by the Ministry of Science and Technology and the Beijing municipal government, offers competitive salaries and benefits that are set halfway between typical levels in the US and in China, with principal investigators (PIs) earning around RMB400,000 after tax, outdoing China's entire research community elsewhere in China. PIs are also promised a significant level of autonomy in research and administration. Even so, only half of the current 18 PIs have foreign doctorates. The other half received PhDs from Chinese institutions of learning with several-year overseas post-doctoral research experience, mostly in the US. If such high-profile programmes with significant incentives and backed by enormous resources have thus far failed to attract more high-quality talent home, it can hardly be claimed that the effort of turning around the 'brain drain' has been successful. On the contrary, according to recent statistics from the US National Science Foundation, there were some 62,500 Chinese PhD level personnel in the science and engineering workforce in the US, roughly half of whom have become US citizens and another 17,000 have permanent residency status (NSB 2006). Presumably, Chinese-origin professionals with doctorates remain in other technologically advanced countries as well.

TABLE 4
Chinese students and scholars in the US.

Year	Number of students from China (Rank)	Percentage of total international students in the US	Number of scholars from China	Percentage of total international scholars in the US
1990/1991	39,600 (1)	9.7	n.a.	n.a.
1991/1992	42,910 (1)	10.2	n.a.	n.a.
1992/1993	45,130 (1)	10.3	n.a.	n.a.
1993/1994	44,380 (1)	9.9	11,156	18.6
1994/1995	39,403 (2)	8.7	9866	17.0
1995/1996	39,613 (2)	8.7	9228	15.5
1996/1997	42,503 (2)	7.8	9724	15.6
1997/1998	46,958 (2)	9.8	10,709	16.4
1998/1999	51,001 (1)	10.4	11,854	16.8
1999/2000	54,466 (1)	10.6	13,229	17.7
2000/2001	59,939 (1)	10.9	14,772	18.5
2001/2002	63,211 (2)	10.8	15,624	18.2
2002/2003	64,757 (2)	11.0	15,171	18.0
2003/2004	61,765 (2)	10.8	14,871	18.0
2004/2005	62,523 (2)	11.1	17,035	19.0
2005/2006	62,582 (2)	11.1	19,017	19.6
2006/2007	67,723 (2)	11.6	20,149	20.5

Source: Institute of International Education (IIE) (various years).
Note: n.a.: not available.

Not all of those who have studied abroad, including those who have been awarded science and engineering doctoral degrees in the US and who have stayed on, are equally talented. For example, large proportions of Chinese nationals who studied abroad have received their doctorates from low-ranking and unranked departments: 63.2 per cent for biochemistry, 58.6 per cent for chemistry, 51.3 per cent for physics, to 37.8 per cent for economics (Bound *et al.* 2006, p. 47, Table 2). However, it is clear that a significantly higher number of non-returnees are outstanding. According to Yigong Shi, who recently resigned

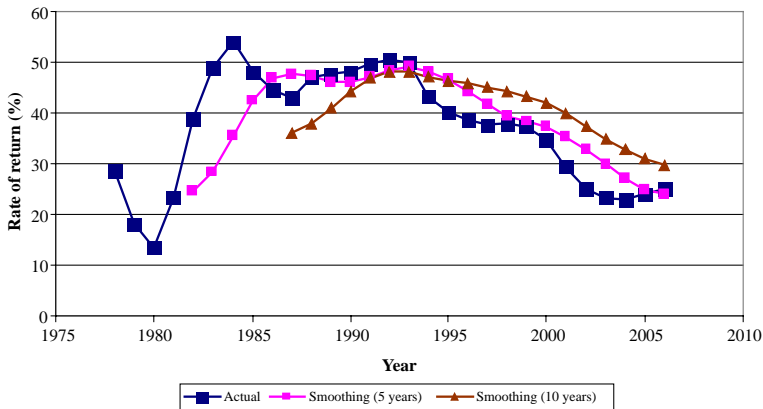


FIGURE 1
Rates of return of overseas Chinese students. Source: NBS (2007, p. 790).

TABLE 5

Effectiveness of the programmes attracting the return of high quality overseas *liuxuesheng*.

	Total number	Percentage of foreign experience	Percentage of foreign PhDs
NSFC Distinguished Scholars (1994–2004)	1176	98.5	32.8
MOE Cheung Kong Scholars (1999–2004)	537	90	37.2
CAS One Hundred Talent (1999–2004)	899	86.5	43.6

Source: Author's collection.

Note: MOE, Ministry of Education and its precedent the State Education Commission; CAS, Chinese Academy of Sciences; NSFC, National Natural Science Foundation of China.

from his professorship of molecular biology at Princeton University to join Qinghua University in Beijing, in 2007, more than 2500 Chinese-origin life scientists were working at the assistant professor level and above in the US, most likely in tenured (or tenure track) positions. This is a significant increase in number from around 100 in 1997.⁹ According to an early assessment of the One Hundred Talent Programme by the CAS Executive Vice President Bai Chunli, out of the 570 or so high-level talented people who have been brought into the CAS since 1994, 466 were returnees from abroad but only 11.6 per cent among them were professors or associate professors, another 10 per cent were assistant professors, while the remainder were researchers, visiting scholars and post-doctoral fellows. According to another assessment, the best of the post-1990s academic returnees would be in the fifty percentile (Zweig 2006).

Why Have First-rate Academics Not Returned?

There are several reasons why first-rate academics have not returned to China. Compared with professionals, salary for academics tends to be low. Even a Cheung Kong professorship carries a stipend of only RMB100,000. Additionally there are problems of education for their children as many academics cannot afford a bilingual education that may cost several times that of their salary, and finding suitable jobs for their spouses who in many instances are also professionals. Furthermore, if family members of the returnees still reside abroad, they not only have to travel back and forth but also risk facing difficulties in discharging family responsibilities and even in their marriages due to geographical separation.

However, more important factors as to why first-rate academics have not returned to China are institutional ones. First, China is still more or less a *guanxi* based society. That is, the success in a career may well depend upon whom one knows rather than just how one performs. As those with doctorates have spent between five to 10 years overseas, it is likely that their connections with local institutions have weakened and their former advisors have retired or are no longer actively involved in academic activities. In other words, they are not likely to have any professional or social networks that can help and support them if they returned, at least during the initial adjustment period. For returnees, having foreign credentials is necessary but not sufficient; *guanxi* is at least equally important, and only those with close relations with government officials and those having access to other resources can be successful in their adjustments upon returning.

Second, because many local Chinese scientists are not engaged in research at the international frontiers of knowledge, returnees are likely to experience another culture shock at work: they may not find members of the 'invisible college' in which scholars who share common paradigms exchange information and ideas to advance scientific knowledge, on how to conduct research and to seek help when needed. The work culture shock also arises from the fact that in China, preference is usually given to quick and instant results and failure is not tolerated, while longer term visions are often not part of the research culture. This is likely to be in contrast to returnees' experiences overseas in which the pursuit of a significant breakthrough is valued over incremental improvements. Moreover, it is very difficult for their research to be judged on an equal footing with those of scholars who have not recently spent their time overseas.

Third, academic returnees have to indulge in political ritual in a context where engagement in local politics is still important in the success of an academic. One example is that of an Australian doctorate holder who had spent several years at a prestigious university in the UK before returning to China in the late 1990s. When his group published a paper in a highly respected life science journal which publishes research of unusual significance—one of the first to do so among mainland scientists in 25 years of research work conducted in China—he indicated that it was a 'gift' from an ordinary CCP member to the Party on its birthday.¹⁰ There may be no connection, but in May 2006, this returnee was appointed to the highest ranking position of a well-known university in China.

Fourth, the rampant misconduct in science, including plagiarism, falsification and fabrication of data, exaggeration of research findings, conflict of interests in research, and the promotion of commercial products of questionable quality—some of which involving returnees—has tarnished the image of the Chinese scientific community as a whole and of returnees in particular. Recent high-profile fraudulent cases have prompted Chinese institutions to have second thoughts about recruiting academics from overseas. For example, in the widely reported so-called 'China chip' case, US returnee Chen Jin of Shanghai Jiaotong University claimed to have designed a new digital signal processing (DSP) chip called Hanxin in 2003; it was exposed later on that Hanxin was just a chip purchased from Motorola with his own company's logo added and Chen was expelled from the university in 2006 (Hao 2006).

Fifth, there are still restrictions for research in the social sciences. This is despite the fact that in utilising the services and knowledge of expatriate Chinese, especially high-level talent, the government is more accommodating and even tolerant. Even political activists are not discriminated against. For example, Fu Xinyuan, an associate professor at Yale Medical School and now professor with Indiana University School of Medicine, who used to sit on the board of the US-based anti-Chinese government Human Rights in China, was permitted to run two laboratories in China (one at his Alma Mater Nanjing Normal University and the other at Qinghua University) in as early as 2000. It is also not a secret that most of the returnees are scientists in the natural sciences and those with technical and managerial know-how, because they are the targets of the programmes mentioned. The Cheung Kong Scholar Programme had indicated its interest in appointing social scientists when it was first launched. However, in terms of actual numbers, scientists in the natural sciences far outnumber their social science colleagues. In general, expatriate social scientists, except economists, have not returned, although some may have visiting appointments at Chinese institutions of learning.

While a small number of expatriate social scientists are political activists, most are scholars who do not have any political agenda in carrying out research. They try to observe the problems that China has been encountering in its economic and social development with objectivity and their candid criticisms of the government and its officials are in many cases constructive. They also understand that China cannot afford to grow its economy without the participation of social thinkers and public intellectuals. However, they are cautious about working even part-time in China, not only because of the uncertainties and vicissitudes of China's political environment, but also because of the treatment that their colleagues have received when conducting research in China. For example, in recent years, several social scientists were arrested while they were in China conducting research on sensitive issues.

Finally, while the government calls for the return of the best and the brightest, leaders of various institutes of learning may not necessarily welcome those who are more capable, as they are viewed by such leaders as threats to their positions and leadership. In some extreme cases, they may not even want the return of outstanding scientists to other institutions. Wang Xiaodong, the first among the post-open-door era Chinese *liuxuesheng* to be elected to the US National Academy of Sciences and the director of NIBS, was said to be interested in moving back to China permanently. Upon learning this, the Howard Hughes Medical Institute (HHMI) wanted to award 10 fellowships to those Chinese working with Wang (who is also an HHMI investigator). However, when the HHMI solicited opinion in China, no one spoke positively about NIBS.¹¹

In general, besides taking several years to set up a laboratory, form a team, recruit students, apply and secure grants, and start the research, returnees would also have to adapt and adjust to a 'different' research environment and be involved in various activities unimaginable when they were abroad. In some cases, they might not even survive because they just do not know the rules of the game played in China (there may be no rules at all in the case of dealing with misconduct in scientific research). They also may have no one to turn to for help since they do not have *guanxi*. From the perspective of career development, the opportunity cost for the best and the brightest scientists to work in China is just too high as barriers such as low efficiency, personal conflict and loss of close contacts with the international scientific community can be substantial. As such, young scientists still on their upward mobility curves and scientists without tenure would most likely prefer not to return if they can find opportunities abroad. They also might not bother to return to China even on a temporary basis. Additionally, they may face institutionalised barriers of work in China concerning intellectual property rights. Thus, they would rather wait until they have established themselves abroad and thus more likely to be treated well if they return.

Nevertheless, this does not necessarily mean that first-rate Chinese researchers do not want to return. Some scientists have expressed the wish to return permanently to China while they are most active academically and are able to conduct first rate research in China. In addition to the case of Yigong Shi mentioned above, in one such case, neuroscientist Yi Rao resigned from his chair professorship at Northwestern University in the US to become dean of life science at Beijing University. Often, whether returnees will stay on in China depends on whether China can provide or develop a good research environment; in the meantime, they can at best only test the waters through offering to work concurrently in China and abroad. This provides them with the safe option of staying abroad should they not find research conditions in China conducive enough.

Conclusion

This article has discussed various issues involved in the attraction of first-rate Chinese academics from overseas. China has started to see a small but growing return migration of its overseas professionals and researchers and the emergence of the 'brain circulation' phenomenon. However, as noted, 'brain drain' has been serious in China in terms of both the low rate of return (about 25 per cent) as a whole and the non-return of highly qualified academics. Unless China's research culture becomes conducive to doing first-rate work and meritocracy is put in place, it may be very difficult for the nation to witness the return migration of first-rate Chinese-origin academics from overseas.

Career advancement in China, to some extent, still depends on *guanxi* and political affiliation rather than pure merit. This continues to be one of the reasons why China loses its bright people to societies where talent is mainly what counts. Because of this, many of the returnees retain their foreign passports or permanent resident status or choose not to give up their positions abroad. There also is the worry about top-down interference in science, education and business, not to mention the rampant corruption. Finally, unease over the protection of property rights, especially intellectual property rights, also prevents some Chinese from returning. In a nutshell, political stability, the rule of law and a competitive but fair environment are more critical factors than pure economic opportunity in encouraging many of those who would otherwise leave to remain in China and in luring back some of those who have left.

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NOTES

1. A returnee is a Chinese native who was born in China, who has left to study overseas as a student or visiting scholar for more than one year, and has returned to China to work on a temporary or permanent basis (Li 2005). This article assumes that this same definition has been used in the official reporting of the statistics on returnees.
2. This section draws much information from the website China Scholars Abroad (2003).

3. See http://news.xinhuanet.com/weekend/2003-10/05/content_1110988.htm (accessed 6 October 2003).
4. Funding of RMB2 million (US\$240,000) is significant even by international comparison. For example, the Canadian government established research chairs for 'rising stars' or young faculty members at universities, which carry a funding of US\$70,000 a year (Kondro 1999).
5. See <http://www.mop.gov.cn> and <http://rsc.nenu.edu.cn/news/article/193.html> (accessed 30 December 2003).
6. In his presentation at a conference convened by the China Association for Science and Technology in September 2005, Bai Chunli, the CAS executive vice president, mentioned that close to a million have gone abroad to study, with more than 200,000 returning (see <http://www.cas.cn/html/Dir/2005/09/27/13/47/32.htm>, accessed 27 September 2005). Wang Huiyao, who is in charge of the Entrepreneur Alliance of the Western Returned Scholars Association, a returnee organisation, also estimated in May 2005 that the number of Chinese *liuxuesheng* already should be one million and that of returnees between 300,000 and 400,000, http://www.chisa.edu.cn/chisa/article/20050513/20050513004455_1.xml (accessed 13 May 2005).
7. The lower rate of return is apparently due to the fact that some of the non-returnees are still pursuing their studies. Without such information, however, this article has to use rate of return in its current formula to measure 'brain drain'.
8. Given that China started to provide doctoral level education only in the late 1970s, it is fair to say that its doctoral education is incomparable to its counterparts in advanced countries.
9. See <http://www.sciencenet.cn/sbhtmlnews/200786234744428186299.html> (accessed 10 August 2007).
10. See http://www.ibp.ac.cn/c/msg/info/archive/2005/07/20050701_01.html (accessed 5 July 2005).
11. Personal communication with an insider source on 4 December 2004.

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Cong Cao, Neil D. Levin Graduate Institute of International Relations and Commerce, State University of New York, 116 East 55th Street, New York, NY 10022, USA. Tel: +1 (212)317-3508; Fax: +1 (212) 521-5200; E-mail: cong.cao@levininstitute.org