

Chapter 3: Strategic Issues

The purpose of this chapter is to discuss the ability of Chile's human capital formation system to build capacity and foster innovation, and recommend ways in which BCP can further complement it.

The labour market in Chile is short of high quality graduates, and it is likely that demand for higher education will further increase. This will require enlargement and diversification of programmes and portfolio of the Chilean Universities while raising quality, and coping with challenges related to the ageing of academic staff, lack of incentives for improving the quality of teaching, low academic staff levels, etc.

The chapter recommends addressing the quality demand through the introduction of BCP sub-programmes for visiting professors, for attracting foreign students, and for training of personnel from enterprises. Particular attention should be given to the challenge of attracting and reinserting scholarship recipient graduates into the country. The chapter offers recommendations and looks at the strategies similar programmes in other countries have used to address the issue.

Building capacity throughout the Chilean human capital formation system

Building a knowledge-based economy and society requires, *inter alia*, integrating higher education policy with science, technology and innovation policy. Chile's ambition includes strengthening its own capacity to generate, adapt and apply knowledge and technologies in private and public sector institutions, as a basis for productivity increases and export competitiveness. Consequently, tertiary education institutions need the capacity to train considerable numbers of the required specialists. This capacity needs to be built up alongside efforts to strengthen the innovation system. In fact, it sets

in motion a virtuous cycle, for much of this capacity in tertiary education institutions will be integral part to enhanced innovation, especially where there are strong linkages between tertiary institutions and enterprises and government agencies.

Chile's advanced human capital formation requirements

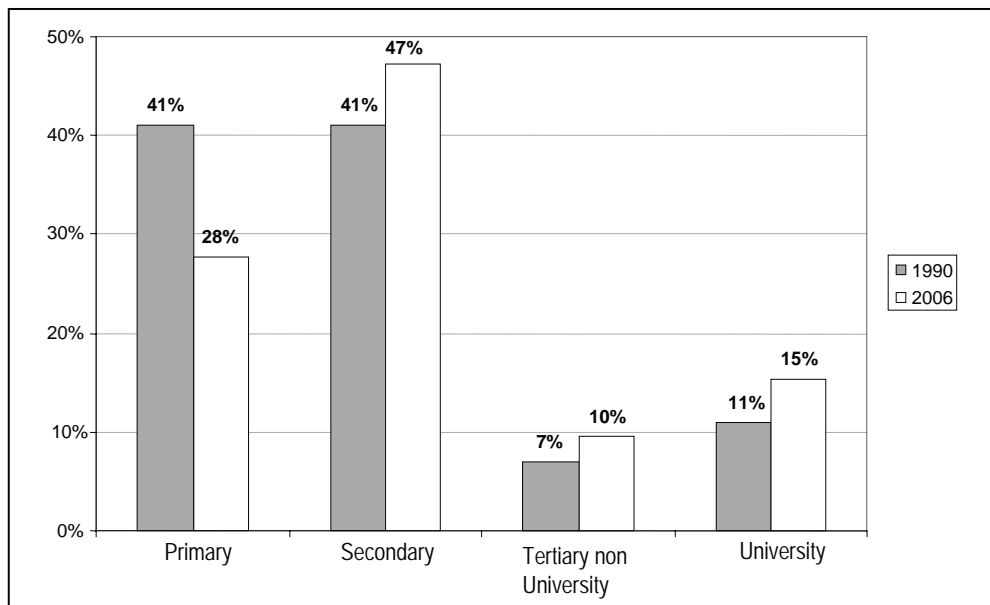
Enterprises, along with public sector organisations, increasingly need employees trained at tertiary level. It is not easy to come up with economic estimates of underperformance of the economy due to the lack of skills and training at tertiary level. The OECD/World Bank Review of Tertiary Education in Chile, using a survey and a series of interviews, acknowledges that the quantity and quality of professionals and technicians are indeed a problem.

A Meller and Rappoport study suggests a 10% deficit in the number of professionals and technicians needed for Chile's economic development (Meller and Rappoport, 2004). The International Adult Literacy Survey suggests that in the areas tested, skills of professionals and technicians in Chile are no higher than those of young people who have completed secondary education in advanced economies (quoted in MINEDUC, 2007). Both of these studies, along with repeated statements by employer organisations and the CNIC, indicate that the labour market continues to ask for more people with tertiary education of a higher quality.

For example, the Confederation of Employers informed the OECD/World Bank review team for the general review of tertiary education that all productive sectors in Chile have vacancies for skilled labour that cannot be filled, because the education system has not been able to keep pace with the changing requirements of the labour market. Data given by the Confederation suggest that 30% of young people are unemployed because their education and skills are not relevant to the labour market, while a further 55% of those who are employed are not using their skills and education.¹

Figure 3.1 illustrates the development of the educational profile of the labour population. OECD experience suggests that this trend towards higher education will continue.

Figure 3.1 Educational profile for the labour force

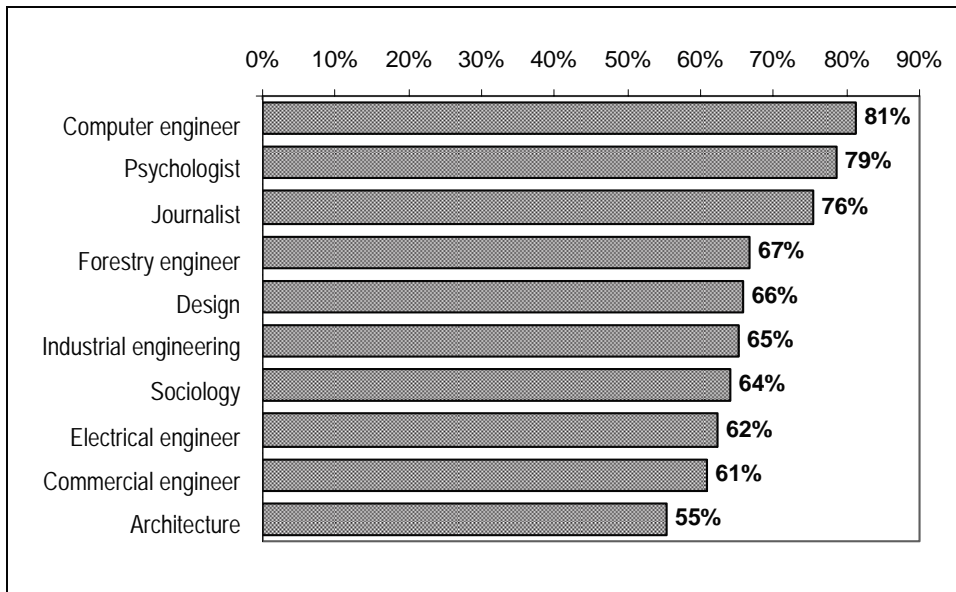


Source: MINEDUC (2007), Country Background Report of Chile, prepared for the OECD/World Bank Report, *Reviews of National Policies for Education: Tertiary Education in Chile*; authors' calculations from CASEN surveys 1990 and 2006.

Indeed, several occupations, as shown in Figure 3.2, already contain a high percentage of young professionals (people between 25 and 34 years of age with degrees). In the case of computer engineers, for instance, 81% of employed persons are in that young age group. As the share of such occupations in the labour force increases (e.g. computer engineers, designers, architects, psychologists) the labour demand for tertiary trained personnel will continue to grow.

Quantifying future labour requirements is a notoriously fraught exercise, the more so in rapidly developing economies with a diversifying economic base. Supply and demand balances with respect to advanced human capital are discussed below. Here consideration is given to the scale of inputs that might be needed for Chile to realise its broad economic development goals.

Figure 3.2 **Professions with greater participation of young professionals (25-34 years)**



Source: www.futuro laboral.cl cited in MINEDUC (2007), Country Background Report of Chile, prepared for the OECD/World Bank Report, *Reviews of National Policies for Education: Tertiary Education in Chile*.

Staffing the tertiary education sector

Although participation in tertiary education is already quite high in Chile (higher even than in Switzerland), demand for it can be expected to increase as income levels and social expectations rise further. The Chilean government aims to have 50% of the age cohort of 18-24 years in higher education by 2012. That compares to the estimate of MINEDUC of 34% in 2006/7, quoted in the OECD/World Bank Review of Tertiary Education in Chile.

Accommodating the envisaged growth in student enrolments will require enlargement and diversification of Chile's higher education capacity alongside measures to raise the quality of academic offerings. There will be particular challenges in staffing the tertiary education sector. Although the BCP will contribute to this end by enlarging capacity and improving quality, at least half of future staff will likely be domestically trained. Table 3.1 shows the academic staff numbers at all Chilean universities (2006 data). Clearly, the numbers would be much larger if staff of IPs and CFTs were added.

Table 3.1 **Academic staff numbers and full time equivalents (FTE) by academic degree**

		Academic degree					
		PhD	MA	Other	Total	% PhD	% PhD + MA
CRUCH universities	No	3 656	4 676	13 632	21 964	16.6	37.9
	FTE	3 085	3 272	5 729	12 086	25.5	52.6
Private Accredited Universities participating in CAE loan scheme	No	1 280	3 026	7 300	11 606	11.0	37.1
	FTE	507	937	1 692	3 136	16.2	46.1

Source: MINEDUC (2007), Country Background Report of Chile, prepared for the OECD/World Bank Report, *Reviews of National Policies for Education: Tertiary Education in Chile*.

The OECD/World Bank Review of Tertiary Education in Chile identified three major issues with regard to the academic staff at tertiary education institutions. The first problem is that many universities and almost all IPs and CFTs work with large numbers of contract staff who are paid by the hour. It is difficult in such a situation to raise the quality of teaching significantly.

The second problem is the ageing of the staff at higher education institutions with an average age of 54 years mentioned in the Tertiary Review. Professors and other academic staff may at that age have fewer incentives to try and obtain a higher degree or immerse themselves deeply in newer teaching methods. Additionally, institutions may consider that it is more efficient to invest in additional training for younger staff members. The challenges of an ageing workforce are compounded by the lack of incentives for older academic staff to retire. The new regulations of 2009 increase staffing flexibility at least for public institutions but that does not obviate the need to create positions for younger staff members.

The third problem is that the academic level of university staff members, measured in terms of the highest degree obtained, is lower than in the average OECD higher education institution (which reflects the normal expectation that university staff would have a PhD or equivalent degree). The Chilean government's goal is to have 50% of university academic staff with a PhD or equivalent degree by 2015, up from the less than 20% currently existing. The OECD/World Bank Review of Tertiary Education in Chile found that several universities have embarked on a determined path to raise the qualifications of academic staff in their institutions. The requirement for most teaching staff members to have a PhD degree of course does not apply to IPs and CFTs, though they would benefit also from having at least part of their teaching staff trained at the PhD level.

The review team proposes several additions be made to the BCP in order to more rapidly increase the number and academic level of tertiary education staff. Straight-forward suggestions include increasing the opportunities for post doctorates to study abroad for periods of less than a year, and expanding short-cycle programmes abroad for teacher development, technical skills development, and TVET programmes for training of trainers. More complex suggestions such as setting up sub-programmes for institutional scholarships and visiting professors are explained below.

Institutional scholarships sub-programme

The current design of the BCP, which allows only for applications from individuals and does not permit applications from institutions, is not sufficient in its scale or flexibility for assisting universities, IPs and CTFs to address their varying staffing needs and circumstances. Sending staff members abroad for four or five years to obtain a PhD may well be an option for some institutions and individuals, but many may prefer more intensive sandwich programmes or post-doctoral placements of shorter duration. There might be a joint interest on the part of higher education institutions and the government to identify a number of areas for increasing staff qualifications and thereby the quality of training in the country.

A proportion (perhaps around 25%) of PhD and post-doctoral scholarships, sandwich programmes and co-supervised programmes, might be set aside and dedicated to strengthening the academic staffing capabilities at individual tertiary education institutions. Eligible institutions could be accredited universities, consortia of universities, or consortia of enterprises, technical colleges and universities. These institutions might be offered the opportunity to propose a range of development opportunities for their academic staff, with a high proportion explicitly linked to their missions and strategic plans. A similar allocation could also be made in respect of Master's studies for professional and administrative staff. A university would be required to show how the investment would increase its capacity and performance, consistent with its MECESUP performance contract if it has one. Linking the initiative to the MECESUP framework will be important in enabling opportunities to be available to emerging as well as established universities, while containing too wide a spread of resources that could dilute Chile's process towards building an internationally competitive set of research universities.

A tertiary institution would also be required to commit to employ the graduates upon their return, and/or give access to laboratories and facilities necessary for continuation of research or R&D. Institutions or consortia

could perhaps undertake to provide a partial salary to students while studying, paid into a trust account that may be accessed by individuals upon return (or returned to the institutions otherwise).

Applications to the institutional scholarship sub-programme could be assessed by a separate Panel Committee. The average quality of awardees should be similar to that for the student-driven scholarships, with institutions being able to include some participants (fewer than 50%) who might not win scholarships on points alone but have other strategic value to the institution. Special arrangements might be established for the purpose of evaluating and negotiating a tailored package with each participating institution. Provisions could also be made for consortia of universities, and joint university-enterprise partnerships, to access this element of the enhanced programme.

Visiting professor sub-programme

Another way to increase the number and quality of tertiary education staff is to invite visiting professors to Chilean institutions, whether it be standalone or in the context of international exchange programmes. The government might discuss with the tertiary education institutions whether facilitating a medium-term programme of visiting professors could constitute an effective way to expose large numbers of students to international state-of-the-art knowledge, and to help to modernise methods of teaching and research. An added benefit would be the strengthening of ties between Chilean institutions and foreign ones.

Visiting professors might come to Chile for different periods; some could come for three to six months, others would be willing to come for two or three years. A government-supported programme of visiting professors would involve clarifying the conditions of appointment, such as teaching duties expected from a visiting professor, the participation in research in the department where he/she would be placed or giving seminars. Such a programme could be extended to technicians working in companies. Special courses taught by a visiting professor under such a programme at a university, IP or CFT could be open at no cost to such persons, and one might consider giving special outreach courses for technicians or other professionals in companies.

Visiting professors are more expensive on a per-unit of cost basis than students, but there would be many Chilean students and staff exposed to the expertise of each visiting professor. A programme that would support, perhaps, between 100 and 200 visiting professors annually, might be a very cost-effective component of an integrated approach to the formation of advanced human capital.

Examples of successful models may be found in South Africa and the Basque region of Spain (see Box 3.1). The research institutions in those instances, including the universities, have been positioned within a well-developed network of institutions and within the context of a clearly articulated innovation policy framework. The latter includes priority sectors and clusters, substantial long-term funding commitments, and institutions both for carrying out research and for public-private sector co-operation to match.

Box 3.1 Examples of visiting professor initiatives

The South African Research Chairs Initiative (SARCHI) set up in South Africa is a programme of ZAR 20 million (~USD 2.7 million) per year that is advertised worldwide. Professors are invited to apply for a five-year minimum contract to work at a university in South Africa to train students, mentor staff, set up research and so on.

The Basque Country has established the Basque Foundation for Science (IKERBASQUE) with the special task of attracting researchers from abroad (who may be Basque scientists returning) to strengthen and internationalise the Basque research institutions. The research centres of the Basque innovation system define the profile of researchers needed, and IKERBASQUE organises on an internationally competitive basis the selection process for hiring them and ensuring they are well integrated into the Basque system.

Source: From South African Research Chairs Initiative (SARCHI) – (www.nrf.ac.za/sarchi/index.stm) and Basque Foundation for Science (IKERBASQUE) – (www.ikerbasque.net/).

Attracting foreign students and ensuring the quality of domestic programmes

The symmetrical equivalent of inviting visiting professors is attracting many more students from abroad. That is a strategy the government evidently has in mind, with Chile as the future educational hub in Latin America. Undoubtedly this can be an effective way to increase the international orientation of tertiary education. It can also be cost-effective, given that students are prepared to pay the price it takes to get a good tertiary education, as illustrated in Australia and the United Kingdom. However, if Chile is not able to offer high-quality tertiary education, such foreign students simply will not come.

Although the BCP can be instrumental in realising this plan, it can also thwart it in the short and medium term. By attracting a large number of talented people to study outside Chile, there is a possibility the BCP might erode the local talent pool that sustains a gradual build-up of local human capital formation and thereby undermine the agenda to develop systemic capacity in Chile. Although in the immediate term there is no sign of this problem emerging, for the medium term vigilance is needed.

Between 2008 and 2009, applications for domestic Doctoral and Master's programmes actually increased from 1 782 to 2 125, and the cut-off point (a proxy for the quality of the last admitted students) rose from 20.85 to 21.5. Additionally, there appeared to be no current reduction in student demand for post-graduate study at the more prestigious universities in Chile as a result of the increased study abroad opportunities provided through the BCP. Since this additionality may reflect some level of pent-up demand which may wane after a period, there may be some internal cross-region substitution effects in the medium-term.

Going forward, it will be prudent to monitor changes in student demand patterns, especially in regional tertiary education institutions which may be less attractive to prospective students. As the BCP expands the opportunities for Chileans to access quality post-graduate education and professional training abroad, it will be important not to compromise on quality domestically. In this sense, the BCP can be an effective transitional mechanism for building local systemic capacity in Chile, through a step-change in the formation of highly qualified, internationally networked personnel.

Staffing the private sector: enterprise-based scholarships sub-programme

Another proposed addition to the BCP is an enterprise-based scholarship sub-programme, as it is not only universities that need government support to build up their research capacity and foster innovation. While innovations are largely realised by companies, a successful innovation climate has to do with institutional factors such as economic openness, a sound financial system, good governance and regulation, and interactions and networks among companies, universities and other bodies. Governments can play a key role in establishing such linkages and networks and facilitating their functioning.

The review team was advised that without government co-funding there would be little company uptake of a programme for enterprise-based scholarships despite the importance for national innovation of accelerating the hiring of individuals with advanced tertiary training.

Foreign experience suggests that such co-funding is a useful and effective government intervention, if the arrangements are appropriate. France has experience with a successful programme that works on the basis of a contract between a small- and medium-sized company and a university. A PhD student does his/her PhD work partly in the company under joint supervision of a university professor and a senior company researcher. The programme pays, in some cases half the costs. Some 75% of the PhD students that have participated in such programmes have been hired by the companies afterwards. Another such example comes from The Netherlands, where there is valuable experience with a similar scheme directed at technicians trained at tertiary level. Chile has itself small programmes operated by CONICYT and CORFO (see Box 1.1) with similar goals with the difference that a company that hires a newly trained PhD sees a reduced share of the person's salary paid by the programme.

It would be important to set up such an enterprise-based scholarship programme not on *ad hoc* basis, but in a determined attempt to raise the skills level in industry in Chile over a period of five to ten years. The government may wish to discuss with the employers' organisations the prospects for a longer-term and large-scale arrangement whereby the government provides support, and companies and their organisations commit to co-funding, perhaps through a dedicated trust fund, as well as through undertakings to employ returning graduates. Additional arrangements could include selective scholarships for MBA students in Chilean SMEs, as a means of enhancing management capacity and scope for productivity improvements. These stakeholders could become members of a specific Panel Committee for the evaluation of enterprise-based scholarships.

With regards to the MBA scholarships, the current blanket ban on them is a concern. Sensibly, the government wants to avoid a situation where BCP scholarships substitute for company payment of the costs of employee development. Foreign corporations, in the industrial and financial sectors, as well as consulting firms, typically have extensive programmes for the professional development of their personnel. At the same time, there are Chilean SMEs that could benefit from the development of the business and management skills and perspectives of their staff, as Chilean innovation depends on more than researchers, technicians and academics. Some provision ought to be made through modification to the BCP guidelines to accommodate their needs, at least on a cost-sharing basis.

The challenge of attracting and reinserting graduates into the Chilean system

With the introduction of the BCP, an important step in the human capital development strategy of Chile has been taken. However, it is only one step in what is necessarily a cycle of human capital building: students need to be trained, but they also have to be attracted to return to their country, bringing their skills with them. Once returned, they should be reinserted into the labour market in positions that are relevant and challenging. Although these steps are seemingly self-evident, the risks are significant; without such a strategy, the money spent on scholarships could very well be lost as the top talent is snapped up by other countries with more attractive offers. In the global knowledge economy, there is intense international competition for intellectual talent.

The risk is as clear as the motivation. In terms of science and technology, study abroad makes a difference and can be a highly effective way of producing the best scientists and researchers. In a recent study of Chinese graduates, Zweig *et al.* (2004) studied 467 foreign and domestic PhDs in academia and concluded that the former were more likely to:

- get foreign grants;
- use the fruits of their international exchange in their teaching;
- establish new courses when they returned;
- import foreign technology and foreign capital;
- import foreign information and materials; and
- have established an international collaborative project.

Given the importance of attracting and reinserting graduates back into the workforce, it is imperative that these components are incorporated into the next planning phase of the BCP. At the present time the BCP is structured such that it requires students to return to Chile upon the completion of their studies. Failure to do so would result in students having to repay the funds that were granted to them through the BCP. This approach is coercive in that it focuses on punishing students who choose not to return rather than rewarding those who do. At the present time the BCP does not offer incentives for returning, nor does it make provisions for aiding their job search or easing their integration into the labour market. This section of the report looks in depth at the steps post-scholarship – that is, the challenge of attracting and successfully reinserting graduates into the Chilean labour market.

This need for a long-term sustainable vision will not come as a surprise. The 2008 advisory report from the US National Academy of Sciences (NAS) has already highlighted the importance of reintegration of international scholarship recipients, urging that: “Care must be taken to provide for the means, including infrastructure, to ensure the return and proper utilisation of scientists after completion of post-doctoral fellowships, graduate programmes, or other opportunities abroad created by the Bicentennial Fund. Such infrastructure means both employment and research and development capabilities.” (National Academy of Sciences, 2008).

The NAS report (2008) goes on to outline a number of concrete suggestions for achieving this, with an emphasis on the sustainability of the initiatives and strategy. Their recommendations include:

- transforming and improving the standards in Chilean institutions and industry through the encouragement of innovation, creativity and ingenuity;
- using the funds of Becas Chile to assist specifically with the reintegration of BCP recipients into the labour market, *e.g.* by providing start-up funds for returning PhDs;
- creating incentives for industry and employers to participate in the scheme, by providing, for example, matching funds and/or seed-funds to employers and industry.

The recommendations of the NAS report are taken as a starting point in the development of a sustainable, long-term policy framework for funding, promoting and implementing a coherent human capital development strategy.

Attracting students back to Chile: coercive measures or incentives?

As stated above, BCP scholarship recipients are expected to return to Chile after graduation. They may work in either the private or public sectors, or be self employed. If they return to work in the Metropolitan Region they are required to work for twice the period of their absence abroad. Their work obligation is reduced to one year for each year abroad where they take up employment in a region other than the Metropolitan Region. These policies are considered coercive measures in that they effectively punish non-compliers rather than rewarding those that do choose to return. As there has been mixed experience with similar programmes from other countries, it is worth carefully exploring the lessons learned from international approaches for the insight that they can provide to the Chilean situation.

Coercive measures

Internationally, a number of different penalties, tariffs and other coercive mechanisms have been used to “encourage” students to return to their home countries. The most common one is the requirement that beneficiaries of loans or scholarships must return and stay in the home country for some amount of time after their studies are completed in order to repay the financial commitment. This has been put into place by Colombia’s COLFUTURO, where recipients of loans must return and stay in the country for two times the length of their programme plus one year to be entitled to forgiveness of 50% of loans (business studies beneficiaries receive only 25% forgiveness, while an additional 10% forgiveness is given to those who work in the public sector or who teach or research in an educational institution).

China has also conditioned scholarships to beneficiaries’ return; the latter must pay back their tuition fees or work in China for five years before leaving the country. Similar measures exist in Mexico (see Table 2.6 for details). However the question arises as to how well these coercive measures serve their intended purpose. There is mixed experience in the countries above. China, for example, has chosen NOT to support certain areas of study and geographical destinations, even with the penalties for non-return, the return rates of such students was too low. More specifically, they will not sponsor students going to Australia, Canada or the United States, nor will they regularly sponsor undergraduates – in 2004, 90% of the state-sponsored students were either scholars or teachers. Korea also implemented these coercive measures at one point, but this policy was eventually discarded as it was found that it was not always effective at getting the students to return. And while Mexico’s official policy requires students to return or face repayment, in practice this policy is not enforced due to the difficulties of tracking and monitoring the large numbers of students involved (Marmolejo, 2009).

Given these mixed experiences, it is worth considering whether the coercive mechanisms are worth including in upcoming phases of the BCP. Although the experiences of the comparator countries above suggest that it is not, there is little clear data on the effectiveness (or ineffectiveness) of coercive measures. What work is available has focused primarily on doctoral students.

A look at return rates for doctoral students

It is difficult to tell precisely how effective the measures to attract students to return to their home country are. According to Chinese Ministry of Education statistics, 1 067 million students and researchers left the

country to study abroad between 1978 and 2006, and 25.8% of them have returned (Le Bail and Shen, 2008). Other estimates put the stay rate (*i.e.* those that stay in the country of study) of Chinese students at 90% (in 2003), compared to India (86%), Chinese Taipei (47%), and Korea (34%) (Nangung, 2008). Compare these rates to the numbers reported in other countries, and drawing lessons between systems becomes nearly impossible. In Colombia, return rates are only given for one of the three major lending bodies: COLFUTURO (Foundation for the Future of Colombia). Although COLFUTURO reports a return rate of above 80% for their scholarship recipients, there is reason to suspect that this is not sustainable, as between 1992-2006 the total number of COLFUTURO recipients was 1 542. They have recently substantially increased the number of scholarship recipients, with 854 students announced as beneficiaries in 2009 alone. It will remain to be seen whether they can maintain the high level of return with these increased numbers. In addition, of course, the number of students involved in the Colombian programmes is dramatically less than those of countries such as China and India, with resulting differences for issues of reinsertion and absorption.

In addition to the scale of programmes, another difficulty in determining precise figures is the accuracy and definitions involved in counting those students. Without more precise tracking and monitoring data, the number of students that return to countries is perhaps not the best way to evaluate or measure the success of attraction schemes. Another approach is to look at the number of students who choose to stay in their country of study for a number of years post-study. The United States, for example, tightly monitors the holders of temporary visas during and after their studies. Table 3.2 provides stay rates for PhD holders in the years directly following the receipt of their degree.

There is a wide range of return rates among the countries on the list. Although economic considerations are obviously important in the choices of Chinese and Indian scholars, they cannot explain the relatively high stay rates of United Kingdom and Canadian students, or the low stay rate of Brazilian students. Cultural factors may play a large role, and may explain why so many students from Japan, Korea and Chinese Taipei return home. The figures in Table 3.2 suggest there is room to play with the policy measures designed to optimise the return rate.

Table 3.2 Percentage of foreign students on temporary visas receiving doctorates who were in the United States 4 to 5 years after graduation, selected years, 1992-2001

Country of origin	1987-88 Doctorate recipients in 1992	1990-91 Doctorate recipients in 1995	1992-93 Doctorate recipients in 1997	1994-95 Doctorate recipients in 1999	1996 Doctorate recipients in 2001
China	65	88	92	91	96
India	72	79	83	87	86
United Kingdom	na	59	56	60	53
Canada	32	46	48	55	62
Greece	44	41	46	49	53
Germany	na	35	38	53	48
Chinese Taipei	47	42	36	42	40
Japan	17	13	21	27	24
Brazil	13	25	15	21	25
Korea	17	11	9	15	51
Average percentages, all countries	41	47	53	51	56

Source: Finn, M. G. (2003), “Stay Rates of Foreign Doctorate Recipients from US Universities, 2001”, Science & Engineering Education Program, Oak Ridge Institute for Science and Education, p. 10.

Recommendations

The international experiences outlined suggest that attracting BCP graduates back to Chile and achieving their cost-effective reinsertion into the labour market may not be easy. Chilean authorities appear rather confident on this matter, and base their assumptions on the high return rates of former programmes. For example, over 90% of MIDEPLAN graduates returned, the Ford Foundation’s programme for teachers had a return rate of 84%, and only 1 of 150 graduates of the DIVESUP technician programme stayed abroad. Except for the case of MIDEPLAN, these rates are from programmes that did not require participants to repay their scholarship if they stayed abroad. As the international competition for top talent intensifies and more opportunities around the world for highly qualified personnel become available, Chilean authorities should anticipate more leakage from the BCP than from its predecessors. Planning for graduate return and reinsertion should be done carefully, with consideration to the different characteristics and propensities of the various scholarship groups (*i.e.* Master’s, PhDs and technicians).

Given the current state of data and tracking information available on the Chilean system, it would seem unlikely that the calculations and follow-up required for “paying back” the scholarship could be made with any amount of certainty for all students. This is particularly true given the sheer numbers involved in the BCP and the complexity in the types of scholarships awarded. In the absence of clear information on the effectiveness of coercive “payback” measures, and the mixed international experience in implementing similar policies, it seems unnecessary to insist on what is likely to prove a difficult, expensive and labour-intensive tracking system. Instead, the introduction of positive incentives to attract students back seems to be preferred by a number of countries with relevant experience, and would be certainly more realistic for Chile. The following section provides examples of incentives that have been used by other countries to successfully increase the proportion of graduates that return to their country.

Incentives to return: international examples

A number of different mechanisms could be used in order to attract BCP recipients to return to work in Chile after they have completed their course of studies. These incentives could be both financial and non-financial, and may be introduced at any point in the course of study, including before the student leaves to go abroad, while s/he is away, or upon his/her return.

Building Networks

One way of increasing the return rate relies on the strength of networks and personal and professional ties to bring the student home. The government of Korea, for example, seeks actively to build international networks through supporting Korean scientist and engineering organisations in North America, Japan and Europe. By dint of scrupulous tracking and monitoring, it was found that the students studying abroad who maintained good contacts with Korea were more likely to return. Not only did they feel connected and useful, they also felt wanted. And it was not just a feeling: these professional organisations have served to connect domestic demand and students with needed expertise, as well as keeping ties and information in various fields fresh and accessible. Similar strategies have been employed by China, which seeks to keep Chinese students connected through international education offices designed to supervise and serve overseas students. In 2004, fifty-five education offices had been established in the Chinese embassies of 38 countries, and more than 2 000 Chinese overseas scholars’ and students’ associations had been set up with the help of the education offices of Chinese embassies worldwide. Mexico and Colombia have also aimed to support their students while they are studying abroad.

Other examples of using personal and professional ties to attract students to return come from local good practice. The Chilean arms of the Fulbright, Ford Foundation and British Council scholarships have experienced very high rates of return which they attribute in part to their efforts to build cohesion and support their students through the study experience. The Ford Foundation International Fellowship Program (IFP) for example, has awarded 280 scholarships to study abroad since 2000, with another 30 granted in 2009. They have an 84% return rate, despite the lack of any specific coercive or punitive measures if students do not choose to return. They attribute this partially to the care they take to create a community of scholars, with pre-training and orientation of each cohort before they depart, as well as regular interactions during and after their course of study. The simple fact of having someone from their home country checking in on them while they were away, for example, helped students feel connected and valued by their country. This is especially important when dealing with those from rural, indigenous and lower income contexts, as the study experience was likely to be their first time abroad. Feeling connected and valued in turn supported their decision making when they were choosing between post-study options, and helped encourage them to return to Chile and their local communities.

As the incorporation of technical and teacher sub-speciality scholarships is an innovative feature of the BCP, it is difficult to find international experience that could shed light on possible expected outcomes. However, building networks and supporting students to return could be reasonably expected to increase the return rates for all graduates.

Financial and non-financial incentives

In addition to building networks and communities, there have been a number of other government policies proposed to attract students who have gone abroad to study back home. During the 1990s and 2000s, China offered returnees significant incentives, both financial and non-financial. These include:

- support for research labs and high salaries;
- tax-free construction materials for building homes and offices;
- tax-free international money transfers;
- fiscal incentives for investments; and
- economic opportunities.

These policies are published widely on government websites in order to attract the scholars to return. The Chinese Service Centre for Scholarly Exchange (CSCSE) also keeps careful track of students abroad (including those who are self-financed) and provides personnel file management and residency registration service to scholars while they are studying abroad.

Other countries have chosen similar strategies. COLFUTURO in Colombia lists as one of its goals the intention to facilitate beneficiaries' return to the country by helping them search for employment upon graduation. Vietnam, a country where almost 5% of the population lives and works abroad, has employed various mechanisms to encourage overseas Vietnamese to return or, at least, participate in building the country. In 2007 the Nationality Law was amended such that a greater number of overseas Vietnamese were able to hold dual citizenship. A visa exemption scheme also came into law, making it easier for Vietnamese to purchase houses in their adopted countries. Government offices were established abroad to support citizens and maintain their links to the country. More recently, the State Committee for Overseas Vietnamese sponsored a conference in Hanoi aimed at persuading the diaspora to return (Down, 2009).

Korea's policy efforts were also notable. They included: (i) the creation of a conducive domestic environment (*i.e.* government-sponsored strategic R&D institution-building, legal and administrative reforms, etc.), and (ii) the empowerment of returnees (*e.g.* exceptionally good material benefits, guarantees of research autonomy). Korea's long experience in fighting "brain drain" provides good examples of policies that had double-sided outcomes (see Box 3.2). From 1968, for example, the Korean government covered moving expenses for returning scholars and living costs for temporary visitors. Although these financial incentives were helpful, they did not serve to convince internationally-trained Koreans to stay, as most visiting scholars returned to their country of study (most often the United States) just after their temporary Korean stints. Moving expenses were eventually removed from the benefits provided to returning scholars and re-directed to pay for temporary placements and secondments, which were felt to be more effective.

Box 3.2 Attracting students to return: the case of Korea (1960-1990)

Between the 1960s and the 1980s, the choice of whether to stay or return to their home country for Koreans that studied abroad changed dramatically. While over 80% of those who received PhDs in the 1960s chose to stay in the United States where they had studied, by 1987 two thirds of Korean scientists and engineers who received their PhDs in the 1980s returned (Song, 1996).

Why the change? According to Song (1996), the two most important factors were the difference in economic conditions between Korea and their host country and the likelihood of securing an adequate post upon their return. Although reported income in the United States in 1988 was two to three times larger than in Korea, this was a substantial improvement over 1960 (when the differential was ten times). In making their choices, the returnees did not insist on equivalency of salary or economic benefit, but rather factored in familial and cultural incentives. Intangible benefits in returning to the country of origin, being close to family and social networks, and cultural values all play a role in making the return attractive for the student.

The capacity of Chile's labour market to absorb returning graduates

Once scholarship recipients are encouraged to return, they must be reintegrated into the workforce in order for them to remain in Chile. Reintegration needs to occur within a reasonable period, in a position that is related to their course of study, and with acceptable remuneration. In considering possible scenarios upon the return of BCP recipients, the following eventualities could occur concurrently, depending upon field of training and graduate competence, with the balance between these eventualities representing an optimal or minimally acceptable or unacceptable outcome for Chile:

- Graduates readily find satisfying, well-remunerated employment in their field of expertise;
- After a period of job search, graduates find satisfying, well-remunerated employment in their field of expertise;
- After a period of job search, graduates find employment in their preferred field;

- Graduates find employment with acceptable remuneration but not in their preferred field;
- Graduates find employment outside their preferred field but not with acceptable remuneration;
- Graduates do not find employment.

Alongside the above scenarios, insufficient absorptive capacity could lead to displacement of existing (non-BCP) workers by BCP graduates. At the top end, outstanding BCP graduates take up positions at the expense of mediocre incumbents and help to renew as well as build-up quality and capacity. At the bottom end, one scenario is that BCP graduates shunt domestic workers with lower qualifications from their positions, even where the BCP graduates contribute no value added. Another scenario, which could co-exist with the foregoing, is that some graduates prefer to take up employment opportunities outside Chile. A mix of these outcomes can be expected, given the counter-acting incentives for Chilean employers to seek high quality graduates on the one hand and the higher costs of quality graduates on the other hand, within an international market of intensifying competition for intellectual talent and technical competence.

The range of BCP reinsertion outcomes, and associated effects on workforce transformation, will depend to a large extent on the direction of Chile's economic development. A diversified path to greater knowledge-based growth can be considered more likely than a more narrow trajectory, such as one based primarily on the exploitation of natural resources, to require a higher proportion of the workforce with higher-order skills. However, even were Chile, as a country rich in natural resources, to concentrate on developing its economic base predominantly from its primary industry advantages, its progress would give rise to increasing levels of demand for advanced skills in the expanding service sector of its more prosperous society. The Chilean government's preferred orientation is to a diversified economic base, including transformed manufactures as well as commodities, supported by and generating a dynamic services sector. Hence, the returning graduates of the BCP can be considered not only in the passive mode as needing to be absorbed by the Chilean economy but also as driving its future capacity for innovation and development.

The Chilean experience can be examined with the lessons of countries like South Korea in mind (see Box 3.3).

Box 3.3 Graduate saturation of the Korean labour market (2000 to present)

An interesting example of a system surpassing its absorptive capacity comes again from Korea. Once the initial heady phase of the 1980s and early 1990s had passed, and as the supply of higher education in Korea and of foreign PhDs grew, the return to college and post-graduate education decreased substantially. In 1999, 80% of 40 000 full time faculty members in Korean universities had doctoral degrees, and about half of them had earned their PhDs abroad (Kim, 2006).

This effectively saturated the market and from the late 1990s onwards, not all Koreans with foreign PhDs received full-time job offers from universities. Many started their careers with a part-time position at modest universities, or a research job at a research centre (Nangung, unpublished, 2008). The number of part-time instructors in 2003 was estimated at more than 50 000, larger than the number of full time instructors. After investing so many years in schooling, part-time instructors struggle with low earnings for many years hoping to secure full time teaching positions. Because of the slow turnover of the regular professorial positions and the sluggish expansion of new positions, the wait becomes longer every year (Kim, 2006). This raises the question of whether Korea's high return rate is sustainable in the medium and long-term.

The importance of practical skills

The above discussion has centred on the return of PhD and Master's degree recipients who will seek to enter universities or knowledge-rich occupations. However the BCP provides a number of different types of scholarships, each of which pose different issues for reinsertion. For the teaching scholarships, for example, the requirement that the recipient hold a job and that job be held for them by their employer will do much to lessen the impact of a large number of returnees, as will the bonus points awarded to health recipients with positions that they can return to. The key area where there is a foreseeable capacity and reinsertion problem is with the students who have gone abroad for technical training. Just as it might be more difficult to attract those students back to Chile if wages and opportunities are markedly reduced from their country of studies, reinsertion will also be a problem if the participating companies do not commit to bringing them back.

The next phase of planning for the BCP should have regard to the special nature of these students, both in terms of their particular needs and also in terms of their particular strengths. How will the cross-disciplinary skills of technical students be recognised and integrated into reinsertion strategies? How will specific competencies that are not currently counted

(e.g. being fluent in an indigenous language is not currently counted as a language skill) be measured such that the value of their skills can be accurately evaluated? As one of the key connections to the private sector, the experiences of these students can be considered to have two strategic benefits: (i) a short-term (and continuing) development of needed skills and competencies; and (ii) a longer-term mechanism to build connections with the private sector and continue its help and support for the BCP.

Current mechanisms to improve absorptive capacity

There are a number of different policy mechanisms currently in place that are expected to help with the reinsertion of professionals into the labour force upon their return to Chile. The new once-off incentive for early retirement in the public universities is expected to go some way to increasing the number of places available for returning scholars, but it will not be enough and it does not address the structural drivers of an ongoing problem. There is also the CONICYT instrument for insertion, which currently operates at a very successful rate (after three years 90% employability). However, even if the CONICYT reinsertion scheme were to be expanded, it would struggle to cope with the numbers that will be emerging from the BCP initiative.

Another area where demand for higher academic training could reasonably be expected to grow is in private universities in Chile. As they continue to seek to raise their prestige relative to other private universities in Chile, they may choose to bring in higher profile staff. As many teachers currently working in private universities have honours or Master's degrees, there is room for PhDs to replace them, particularly PhDs from higher prestige international schools. However in this situation the higher costs associated with these new staff members must also be calculated into assumptions about the rate and type of growth possible.

The traditional routes of employment for PhDs and post-doctoral returnees will need to be augmented by newer and more diverse paths to employment and professional development. To this end it will be necessary to encourage further growth of industry R&D. In this context the tax exemption for R&D projects is an example of a mechanism that appears to be having a positive effect. These tax exemptions are part of an articulate system with innovation, education and human capital advancement combined to promote R&D in industry. This is a potentially strong mechanism to encourage the growth and use of R&D in industry and the private sector, and, if developed appropriately, should help raise the absorptive capacity of the labour market for returning PhDs and post doctorates. It remains to be seen at what speed, and to what extent, these changes are made.

Possible mechanisms to explore to improve absorptive capacity

In addition to the current mechanisms already outlined above, there are a number of possible mechanisms that can be explored to increase the absorptive capacity of the system and help the reinsertion of returning scholars into the labour market. The first is the possibility of revamping Chile's pension systems to make retirement a more attractive option for a greater number of people in all sectors. Chile currently does not have a "culture of retirement", which results in low turnover in existing positions. Revamping the pension system such that retirement, or reduction of work hours in a more systematic manner, might serve to increase the number of positions available. This is clearly the intention with the new once-off voluntary retirement offer to staff of public universities, but it would be useful to explore where and when this could be expanded.

On a more logistical level, there are a number of initiatives used by other countries to help their returned scholars find professional positions. The Chinese Service Centre for Scholarly Exchange (CSCSE), for example, helps with both relocation and the settlement of returned scholars, as well as providing services for job seeking and skills matching, investment, technology transfer and internet-related information.

In addition to these possible mechanisms, consideration must also be given to the unpredictable effects of the growth of a knowledge economy. If efforts to increase the absorptive capacity of the system are successful, Chile will experience not only growth and renewal in traditional research domains but also the creation of new industries based on knowledge mobilisation and brokerage. As a consequence Chile will become attractive to long-time expatriates who have been previously unable to find a suitable position in their home country, despite a desire to return home. An unanticipated level of return of highly qualified persons needs to be factored into the planning and development of a co-ordinated policy approach.

Brain drain versus brain circulation: diaspora as a positive

The discussion of the attraction and reinsertion of international students must first consider the most fundamental question: what are the desired thresholds for return and reinsertion to the Chilean labour market, and why? Although it is tempting to plan with an assumption that all international experience is best brought back to Chile, it is important to keep in mind that not all graduates that study internationally need return, nor is it advisable to insist on this.

Part of this is a quality argument: although in theory the best and the brightest have received scholarships and should thus be encouraged to return, in reality the pathways of students can change over time. Students who have emerged as mediocre in an international setting are simply not as important to retain as the outstanding talent present in Chile. In addition, there is a question of thresholds: how much new talent can the labour market absorb, what is the optimal growth of particular sectors, and what is the balance between national, regional and local economic priorities?

At a minimum, there should be a more systematic approach to monitoring the balance of graduate supply and demand, including by tracking the employment destinations and incomes of graduates.

Trends towards higher levels of graduate unemployment and under-employment, alongside declines in the relative returns to higher education graduates, can signal imbalances in the structure of graduate supply and give rise to changes in incentives for students to undertake different study programmes.

In addition to the quality and threshold arguments, there is immense benefit to be gained from having a diaspora of talented Chilean professionals dispersed around the globe. Such professionals can serve as funnels for emerging disciplines, research, and knowledge between their host country and their home country. There are in fact a large number of highly trained Chileans currently abroad, but there appears to be no formal programme to create a network that could serve as an important source of information for both professional and policy-making purposes. This is at odds with other countries, which have specifically chosen to see the presence of their nationals abroad as a strength to be maintained and nurtured. An important explicit component of Korea's scientific and technological development, for example, is the presence of foreign-trained PhDs who stay employed in the most innovative research centres in the United States and serve to transfer that information back to Korea. Korea has developed an explicit policy that takes into account both the benefits of professionals abroad and the importance of luring those most talented back to the country. In order to do this they have been recruiting the most qualified and needed Korean professionals and letting the remainder decide for themselves for over two decades. Some of the policy mechanisms they use to accomplish this include (Song, 1996):

- **Giving emphasis to temporary visitors** including both Korean and foreign professionals. As previously mentioned, these funds replaced the support for moving expenses for returning Korean professionals, considered to be ineffective in attracting the return of scholars. Instead,

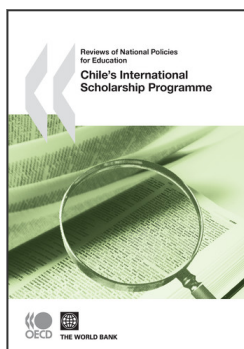
the support for temporary visitors was aimed at encouraging Koreans to return and share their knowledge as well as supporting foreign visitors at the top of their fields.

- **Introduction of the “Brain Pool”**, aimed at enabling local universities and government sponsored research institutes to hire internationally trained Korean researchers for short periods. Introduced in 1994, these professionals teach or research for a minimum of one year, with the possibility of renewal for up to three years. These temporary positions are intended for mid-career scholars and allow the university to benefit from the experience and knowledge they have gained while abroad. They may also serve to tempt Koreans to return by giving them a temporary way to reintegrate without committing themselves immediately to a long-term position.
- **Allowing research institutes to establish independent graduate schools**, thus increasing the number of possible teaching and research positions available at desirable employers. The higher status associated with professorships had been observed to be a more important factor in job decisions than better economic incentives offered by the private sector, and was important to Koreans in choosing their professional paths.
- **Post doctorates**, including measures to support international post-doctoral studies for Koreans who completed their PhDs in Korea. This has served not only to increase international collaboration and co-operation, it has also allowed the system to retain high quality PhD students in Korea and strengthen their ties with the national system before they leave the country. This is also important for them when they return as candidates in the national labour market.

China is also currently engaging in many of the same initiatives, including sponsoring sabbaticals and exchange trips for Chinese scholars educated and employed abroad. However Korea is an interesting example due to the sheer speed and scope of the growth of their knowledge economy in the last several decades. As such, it could be an important comparison point for the emerging programmes of Chile. Despite their very different regional and cultural contexts, the respective decisions to explicitly encourage the development of national R&D and international competitiveness in a market economy contain similarities that are well worth examining. In particular, the length of time that Korea has had to learn and adjust their policy instruments provides a rich set of data that could be very helpful in avoiding costly missteps along the way.

Note

1. SOFOFA (*Sociedad de Fomento Fabril*) and CPC (*Confederación de la Producción y del Comercio*).



From:
Chile's International Scholarship Programme

Access the complete publication at:
<https://doi.org/10.1787/9789264086425-en>

Please cite this chapter as:

OECD/The World Bank (2010), "Strategic Issues", in *Chile's International Scholarship Programme*, OECD Publishing, Paris.

DOI: <https://doi.org/10.1787/9789264086425-7-en>

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