Reviews of National Policies for Education

Chile's International Scholarship Programme



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Foreword

This report reviews Chile's scholarship abroad scheme – the Becas Chile Programme – and its interaction with other available scholarships, and provides an overview of best practices for scholarship programmes at the international level and their impact. In addition it analyses the design and institutional framework of the Chilean programme and recommends ways to maintain and improve the scheme.

In 2009 the OECD and the World Bank published *Reviews of National Policies for Education: Tertiary Education in Chile*; it both describes a tertiary education sector that has been and remains dynamic and demonstrates how Chile has successfully moved from an elite to a mass tertiary education system, while maintaining education quality. As a follow-up to that review, the Chilean Ministry of Finance requested a review of Becas Chile.

This review of the Becas Chile Programme was undertaken within the programme of work of the OECD Directorate for Education, and in partnership with the World Bank. The government of Chile and the World Bank financed the review.

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Acronyms and Abbreviations

	Spanish	English
AFD	Aporte Fiscal Directo	Direct public grant
AFI	Aporte Fiscal Indirecto	Indirect public grant
AGCI	Agencia de Cooperación Internacional	Agency for International Co-operation
BB	Becas Bicentenario	Bicentenary scholarships
BCP	Sistema Bicentenario de Formación de Capital Humano Avanzado en el Extranjero, Programa Becas Chile	Bicentennial Fund for the Training Abroad of Advanced Human Capital or Becas Chile Programme
BEA	Beca de Excelencia Académica	Academic Excellence scholarship
BJGM	Becas Juan Gómez Millas	Juan Gómez Millas scholarships
BNM	Beca Nuevo Milenio	New Millennium scholarship
CAE	Crédito con Aval del Estado	State guaranteed loan system
CAPES	Coordinación de Mejoramiento del Personal de Nível Superior (Ministerio de Educación, Brasil)	Co-ordination for the Improvement of Higher Education Personnel (Ministry of Education, Brazil)
CEPAL	Comisión Económica para América Latina y el Caribe	Economic Commission for Latin America and the Caribbean (ECLAC)
CFT	Centro de Formación Técnica	Technical Training Centre
CNA	Comisión Nacional de Acreditación	National Accreditation Commission
CNCA	Consejo Nacional de la Cultura y las Artes	National Council for Culture and the Arts
CNIC	Consejo Nacional de Innovación para la Competitividad	National Innovation Council for Competitiveness
COLCIENCIAS	Departamento Administrativo de Ciencia, Tecnología e Innovación (Colombia)	Administrative Department of Science, Technology and Innovation (Colombia)
COLFUTURO	Fundación para el Futuro de Colombia	Foundation for the Future of Colombia
CONACYT	Consejo Nacional de Ciencia y Tecnología (México)	National Council for Science and Technology (Mexico)
CONICYT	Comisión Nacional de Investigación Científica y Tecnológica	National Commission for Scientific and Technological Research
CORFO	Corporación de Fomento de la Producción	Chilean Economic Development Agency
CPEIP	Centro de Perfeccionamiento, Experimentación e Investigaciones Pedagógicas	Centre for Pedagogical Improvement, Experimentation and Research
CPC	Confederación de la Producción y del Comercio	Production and Commerce Confederation
CRUCH	Consejo de Rectores de las Universidades Chilenas	Council of Rectors of Chilean Universities

CSE	Consejo Superior de Educación	Higher Council of Education
CSCSE	Centro de Servicios Chino para el Intercambio Escolar	Chinese Service Centre for Scholarly Exchange
DICOEX	Dirección para la Comunidad de Chilenos en el Exterior	Direction of Chilean Communities Living Abroad
DIVESUP	División de Educación Superior del Ministerio de Educación	Higher Education Division of the Ministry of Education
FIAC	Fondo de Innovación Académica	Academic Innovation Fund
FONDAP	Fondo de Investigación Avanzada en Áreas Prioritarias (Centros de Excelencia FONDAP)	Fund for Advanced Research in Priority Areas (Centres of Excellence FONDAP)
FONDECYT	Fondo Nacional de Desarrollo Científico y Tecnológico	National Fund for Scientific and Technological Development
FONDEF	Fondo de Fomento al Desarrollo Científico y Tecnológico	Fund for the Promotion of Scientific and Technological Development
FSCU	Fondo Solidario de Crédito Universitario	University Credit Solidarity Fund
ICETEX	Instituto Colombiano de Crédito y Estudios Técnicos en el Exterior	Colombian Institute for Education Loans and Technical Studies Abroad
ICT	Tecnología de la Información y la Comunicación (TIC)	Information and Communication Technology
IFP	Programa Internacional de Becas de la Fundación Ford	Ford Foundation International Fellowship Programme
IKERBASQUE	Fundación Vasca para la Ciencia	Basque Foundation for Science
INGRESA	Comisión Administradora del Sistema de Créditos para la Educación Superior	Commission for the Administration of Higher Education Credits
IP	Instituto Profesional	Professional institute
ISCED	Clasificación Internacional Normalizada de la Educación (CINE)	International Standard Classification of Education
ISI	Índices de la ciencia internacional	International science index
JCE	Jornada completa equivalente	Full time equivalent (FTE)
JUNAEB	Junta Nacional de Auxilio Escolar y Becas	National Committee for Student Support and Scholarships
MECESUP	Programa de Mejoramiento de la Calidad y Equidad de la Educación Superior	Programme for Improvement of Quality and Equity in Higher Education
MIDEPLAN	Ministerio de Planificación y Cooperación	Ministry of Planning and Co-operation
MINECON	Ministerio de Economía	Ministry of Economy
MINEDUC	Ministerio de Educación	Ministry of Education
MINREL	Ministerio de Relaciones Exteriores	Ministry of Foreign Affairs
MOF	Ministerio de Hacienda (HACIENDA)	Ministry of Finance
NAS	Academia Nacional de Ciencias de los Estados Unidos	US National Academy of Sciences
OECD	Organización para la Cooperación y el Desarrollo Económicos (OCDE)	Organisation for Economic Co-operation and Development (OECD)
PIAP	Programa Idiomas Abren Puertas	Languages Open Doors

PISA	Programa Internacional de Evaluación de Estudiantes (OCDE)	OECD Programme of International Student Assessment
PPP	Paridad de poder adquisitivo	Purchasing power parity
PSU	Prueba de Selección Universitaria	University Entry Test
R&D	Investigación y desarrollo	Research and development
RICYT	Red Iberoamericana de Indicadores de Ciencia y Tecnología	Ibero-American Network of Science and Technology Indicators
SARCHI	Iniciativa de Cátedras de Investigación Sudafricana	South African Research Chairs Initiative
SES	Estatus socioeconomic	Socioeconomic status
SIES	Sistema de Información de la Educación Superior	Higher Education Information System
SMEs	Pequeña y mediana empresa	Small- and medium-sized enterprises
SOFOFA	Sociedad de Fomento Fabril	The Chilean Federation of Industry
SSSAP	Programas de Becas Gubernamentales para Estudiar en el Extranjero (China)	State Sponsored Study Abroad Programmes (China)
STI	Ciencia, tecnología e innovación (CTI)	Science, technology and innovation
TESOL	Profesores de Inglés para hablantes de otras lenguas (EE.UU.)	Teachers of English to Speakers of Other Languages, Inc. (USA)
TESOL CHILE	Asociación de Profesores de Inglés – Chile, Filial de TESOL	TESOL Chile is an affiliate of TESOL
TVET	Educación y Formación Técnica y Vocacional	Technical and Vocational Education and Training

Executive Summary

In April 2009, the OECD and the World Bank published a comprehensive review of national tertiary education policy in Chile. That publication – *Reviews of National Policies for Education: Tertiary Education in Chile* – provides an overview and recommendations for the medium and longer term development of tertiary education in Chile. As a follow on, the government of Chile requested the joint review team to conduct a specific analysis of the Becas Chile Programme (BCP) which provides scholarships for study abroad. The purpose of the analysis was to help the government take stock of the experience to date, identify strengths and weaknesses of the policy process and consider options for taking the initiative forward in the future. This report is the result.

Main findings

The BCP is a big and bold initiative. It is planned to finance it through the interest earned on a USD 6 billion fund maintained abroad and sourced with revenues generated by copper exports. The BCP seeks to catalyse a significant leap forward for the quantity and quality of human capital in Chile through an out-of-country investment in technical, professional and graduate education. When the programme reaches a steady state of 3 300 students approved per year, projected participation will represent around 20% of Chile's overall graduate degree enrolments. The programme also offers an extensive range of professional and technician development opportunities. Significantly, the BCP involves a doubling of Chile's PhD enrolments, as a step to strengthening the tertiary education workforce and the research capacity of the Chilean economy.

As a complement to in-country measures the BCP offers value by:

- drawing on resources of other countries to fill gaps in local capacity for human capital formation;
- injecting a demand-side stimulus to reform of an insular system of higher education supply; and
- stimulating productivity improvement by further opening up Chilean thinking to international best practices, internationalising the Chilean workforce and connecting the next generation of Chilean leaders to international networks.

The BCP is innovative in several ways. It offers a much wider coverage (eleven scholarship types) than previous programmes (five scholarship types). For the first time, technicians and educators are included and there is parity of treatment of employees in the private and public sectors. Deliberate efforts have been made to expand the participation of people from less advantaged backgrounds, including women, indigenous Chileans, people with a disability, people from regions other than the Metropolitan Region and people who have not had the opportunity to learn a foreign language. Steps have been taken to provide an integrated framework for participants, including through a one-stop-shop approach. A concerted communications campaign alerted and informed potential participants to the new range of opportunities, including through regional information fairs and promotional visits, a single Becas Chile website and a call centre. Finally, several international agreements with governments or tertiary institutions have been struck to reduce the cost of the programme (through tuition reduction) and to increase the access of students to foreign institutions (through free language courses abroad, covered by the recipient foreign institutions).

The review team commends the Chilean authorities for the BCP initiative. It is impressive in concept, design and scope. It provides a sound foundation for advanced human capital formation and innovation in Chile. Well implemented, it will help to accelerate Chile's move up towards internationally competitive levels of knowledge capability.

Nevertheless, as indicated below, there are several areas in which the positive impact of the BCP could be increased by modifications to the programme design and improvements to operational processes. Many of the current deficiencies in the BCP reflect rushed implementation. It is the intent of the review team to suggest ways by which the positive features of the BCP may be built upon so that it can produce optimal outcomes for Chile in the future.

This executive summary is organised as follows: first, the size and scope of the BCP is compared to similar initiatives in other countries. Four areas for improvement are then highlighted, and the review team's recommendations for each are laid out. These areas, discussed thoroughly in Chapters 3 and 4, are: the strategic integration to national priorities; the attraction and reinsertion of BCP graduates to Chile; the operational integrity and efficiency of the programme as a whole; and the policy changes and institutional restructurings that best further the development of advanced human capital in Chile.

International comparisons

Countries across the world have undertaken similar efforts for decades, and their experience provides useful points of comparison. Chile has drawn upon these lessons in designing the range and provisions of BCP scholarships. The review team draws further upon those experiences in suggesting improvements to the implementation of the programme.

In 1996, China established the China Scholarship Council to manage the State Sponsored Study Abroad Programmes (SSSAP) and to develop China's exchanges with other countries in the field of education, science and technology. It also established the Chinese Service Centre for Scholarly Exchange to provide information and services for those Chinese students and scholars going abroad and for those returning to China. Over a million students and researchers left the country to study abroad between 1978 and 2006. In 2008, 179 800 students left, 12 957 of which were state sponsored.

The internationalisation of Korea's student body has also been a prevalent theme for decades. Despite the difference in population size between China and Korea, more Koreans left for study abroad in 2007 (218 000 students) than did Chinese in 2008 (179 800 students). Two decades prior, in 1987, there were already 20 520 Korean students studying in the United States and that year alone, 450 of them had graduated with PhDs in science and engineering.

Although much more modest in scope and size than Korea or China, Colombia has had a long history of state-facilitated study abroad. Between ICETEX, the Colombian Institute for Education Loans and Technical Studies Abroad, COLCIENCIAS, the Colombian Institute for the Development of Science and Technology, and COLFUTURO, the Foundation for the Future of Colombia, the number of Colombian students who studied abroad between 1992 and 2006 increased to approximately 24 400. Although this is roughly equivalent to 1 750 students per year, today the number is likely at or above the BCP's steady state target of 3 300 students per year.

Regardless of the above comparisons, the BCP is a large programme in absolute terms by any measure. As shown in the table, Chile will be providing three to seven times more scholarships per enrolled tertiary student than a group of comparator countries. Although the programme's size is not disproportionate relative to Chile's need to expand its advanced human capital base, its scale presents a number of management challenges.

	Programme or institution	Students sponsored		As a % of total student enrolment at the tertiary level
Chile before Becas Programme	MIDEPLAN, MECESUP, CONICYT, ACGI, CNCA	Year 2007	200	0.03
Chile after Becas Programme	Becas Chile	Year 2010	3 300	0.36
Mexico	CONACYT	Year 2005	2 645	0.11
Brazil	CAPES	Year 2007	4 043	0.08
China	SSSAP	Year 2007	12 402	0.05

Source: Review team compilation, via the website of each programme.

Areas for improvement in BCP design

The BCP will undoubtedly have a significant impact in Chile, and it is important to prepare for it accordingly. As the BCP is a recent initiative, it is necessary to continue developing its design and articulation with the national tertiary system, and improving its initial implementation to ensure a coherent and positive long run impact.

Strategic integration to national priorities

For the BCP to be as effective as possible in growing Chile's productive capacity and in furthering the country's economic and social development, it needs to sharpen its focus on national priorities in the selection of applicants. These priorities were suggested to the government by the National Innovation Council for Competitiviness of Chile (CNIC), and currently about half of the BCP scholarships awarded – represented by technician, teacher education and medical sub-specialisation programmes – are tightly linked to them. In the remaining half of the scholarships, this link could be strengthened.

In the case of graduate studies such as post doctorate, doctoral studies and sandwich programmes, the BCP guidelines require applicants to identify the relevance of their proposed studies to national priorities. Extra points are assigned accordingly. Although the policy intention is to discriminate positively in favour of applicants addressing national priorities, the connections are loose, the priorities broad and the additional points marginal. Without sufficient alignment, Chile may fail to gain the human capital it needs in important economic sectors and a larger than acceptable number of BCP graduates may have difficulty finding gainful employment in Chile.

In the case of graduate studies such as Master's degrees, scholarships are deliberately not closely linked with national priorities. This is a defensible approach in that some Master's programmes, such as project management and engineering, cut across various priority areas and it could be limiting in scope to confine them unduly.

Attraction and reinsertion of BCP graduates

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 review team believes more purposeful efforts will be needed to maximise the re-integration of BCP graduates, especially in several fields where the country has limited scale and scope. At the very least, Chile should ensure there are adequate facilities, research funds and start-up grants for graduates to continue advanced work in the areas in which they have developed specialised skills. In this regard, while beyond the scope of the BCP, it is important that the national innovation system continues to grow in a way that complements the enlargement of advanced human capital supply.

Operational integrity and efficiency of the programme as a whole

In seeking to understand the impact of the BCP and its operational features, it is important to recognise that its administrative arrangements are quite new and that policies and procedures are still being developed. There are also concerns about the implementation of the BCP. The main operational concerns are that the assessment processes related to student selection for scholarships are insufficiently clear and/or permit unwarranted variability. Insufficient information, particularly about the capacities of foreign institutions in particular fields, may have led to less than adequately informed decision making by applicants and evaluators.

Efforts have been made in the programme design to balance the exercise of personal discretion and objective criteria in the evaluation of outcomes. Nevertheless, in some cases there appear to be wide discrepancies in the exercise of evaluator judgement and some of the available "objective" measures are less than adequate. The resulting outcomes can be not only sub-optimal for some participants but also contribute to low levels of community confidence in the programme. This report makes specific recommendations to improve this aspect of the BCP.

Institutional arrangement for advanced human capital

Although the BCP has integrated a number of separately run scholarship schemes for study abroad, contention about the roles and responsibilities of different arms of government in the early stages of BCP implementation caused confusion. Additionally, insuffient inclusion of the academic community and enterprises in BCP design and development, particularly in the formative stages when broader "ownership" was needed, has resulted in low levels of commitment from people whose input is critical to the success of the programme. These problems seem to result from the rush to make the BCP operational as quickly as possible.

Operational problems have resulted not only from deficiencies in organisational capacities and procedures, however, but also from insufficient integration of the BCP with other incentives for human capital development and innovation, such as those supported by the Higher Education Division of the Ministry of Education (DIVESUP), the Programme for Improvement of Quality and Equity in Higher Education (MECESUP) and the National Commission for Scientific and Technological Research (CONICYT). The latter highlights the need to better articulate Chile's national advanced human capital strategy, co-ordinating efforts both at home and abroad.

Recommendations

The review team is confident that the BCP offers great potential advantages for Chile's future development, and that the impressive progress to date can be built on to even greater effect. Accordingly the report makes recommendations on a number of key areas outlined below.

Institutional arrangement for advanced human capital

To optimise the effectiveness of the BCP, the government of Chile could give consideration to integrating the programme more purposefully with its national human capital development strategy. Particular consideration could

be given to balancing the BCP with Chile's other initiatives, within a five-pronged long-term approach:

- Training people inside Chile. Although local sources have confirmed that the quality of the local Master's and PhD applicant pool has not declined despite the introduction of the BCP, it should be closely monitored to maintain quality and avoid cannibalisation of the domestic system.
- Sending people for training outside Chile.
- Bringing foreigners into Chile to supplement local capacity and enlarge options for Chilean students to access new fields of learning.
- Repatriating highly qualified Chileans abroad.
- Utilising Chileans staying abroad.

Achieving the integration of the five elements outlined above will require co-ordination of Chile's overall efforts to develop human capital by a capable and effective policy agency. Chile should consider creating a Vice Minister for Higher Education and Research within the Ministry of Education. An administrative corollary of this approach is that all domestic and international scholarships be administered by a new Human Capital Development Agency, with semi-autonomous status. There may be further advantage in a single, high-level national advisory board across this new agency, the Chilean Economic Development Agency (CORFO) and CONICYT with a view to integrating the national productivity and innovation agendas. In the interim, the Division of Higher Education within the Ministry of Education needs to be strengthened urgently.

Strategic integration to national priorities

Chile's national priorities include clusters (mining, aquaculture, food industry, tourism and global services), cross-cutting platforms (energy, environment, ICT and biotechnology) and social areas (education, health, housing, public safety and public policy). To increase the BCP's emphasis on these, greater weights could be assigned in the assessment of applications. In addition, the BCP could be leveraged to build domestic capacity in specific areas through three targeted programmes.

- A special component for funding institutional scholarships at Chilean tertiary education institutions could help develop and upgrade the professional skills and qualifications of teaching and research staff. A proportion of BCP post-graduate studies scholarships, perhaps 25%, might be so dedicated.

- A special component for funding an increase in the number of international staff in domestic tertiary education institutions, whether on a permanent or temporary basis, as well as the number of foreign students in Chile, could strengthen ties between local and foreign institutions.
- A specific component for funding enterprise fellowships in private firms, public sector enterprises and research centres, for employees to study abroad, could raise skills levels in industry and research. The government might discuss suitable cost-sharing arrangements with corporations and employer organisations.

Attraction and reinsertion of BCP graduates

Today, BCP scholarships are conditional upon the recipients' commitment to return to Chile. Recipients may stay abroad after graduation for half the number of years for which they were given a scholarship, but must repay the scholarship if they choose to remain beyond that. Upon their return, recipients must stay in Chile for twice the number of years for which they were given a scholarship. The number of years decreases for work outside the capital. To attract BCP participants back to Chile and re-insert them into the Chilean labour market, explicit strategies could be adopted. Such specific measures could include:

- Incentives for encouraging recipients to return in preference to coercive or punitive measures.
- A more systematic approach to the monitoring of graduate supply and demand, through tracking of graduate employment destinations and incomes, as a guide to discussions about thresholds for BCP participant return and reinsertion to the Chilean labour market.
- Targeted actions to improve retention, return and re-insertion:
  - *Before participants leave:* orientation and training in cohorts to establish groups of scholars and build a support network for them;
  - *While participants are away:* provide support, assistance and relevant information for recipients abroad such that they are aware of career opportunities, and feel connected and welcome to return;
  - *After participants return:* linking these cohorts to non-BCP scholarship recipients (*e.g.* through seminars, or bringing them back to speak to their communities) to help disseminate the knowledge and skills gained while abroad, as well as reach a broader audience to publicise the BCP itself.

- Special attention to "young researchers" whose career progress depends not only on professional employment but also on guidance of senior researchers and on access to research infrastructure, such as laboratories and scientific and technological equipment.

Consideration might be given to investing a proportion of funds in the provision or upgrading of scientific infrastructure to support R&D. Whether the funding is provided by the BCP, CONICYT, MECESUP or some other source is not the main concern; what is important is that complementary infrastructure be made available to allow a return on Chile's investments in specialised human capital for research. Close attention needs to be paid to the growth of Chile's overall investment in R&D as a key condition for successful use of the human capital being trained abroad.

Operational integrity and efficiency of the programme as a whole

Consideration should be given to a set of reforms to BCP implementation, specifically with a view to underpinning process integrity and efficiency.

With respect to the organisation of the system for evaluation proposals, it is recommended that:

- Individual, discipline-based "panel committees" be established according to a structure that reflects the needs of the BCP. One subset of panel committees might handle technician scholarships and other education scholarships. For Master's, PHD, sandwich, co-advised theses and post doctorates, the panel committees might reflect broad disciplinary divisions such as life sciences, mathematics & engineering sciences, social sciences, etc.
- The panel committees be given the *ex-ante* responsibilities to rank the institutions and programmes for their applicant pool prior to specific feedback from reviewers on specific applications. This will ensure a single, collective judgment on institution and programme quality.
- A revitalised Oversight Committee[1] give guidance to panel committees and evaluators. This Committee would be responsible for:
  - Ensuring that evaluation procedures were clearly defined for each type of scholarship;
  - Providing guidance to panel committees on rating programme and institutional quality;
  - Ensuring the point system adequately and uniformly addresses national priorities;

- Providing guidance on whether and how to undertake a first "cull" of applications;
- Providing guidance on the number of reviewers per scholarship type and monitoring the number of applicants assessed by each reviewer;
- Overseeing the collection of feedback and identifying areas for further improvement.

With respect to the specifics of the evaluation process itself, it is recommended that:

- All applications be assessed by at least two evaluators independently, with the ranking of applications based on the average of their assessments.
- The number of evaluators for PhDs be expanded, including through the involvement of international evaluators, as a means of improving the quality of assessments.
- Evaluators be provided with structured training and guidance on the relative quality of international programmes and institutions, and illustrations of applications that are outstanding, adequate and inadequate.
- Information about the education and training systems of study abroad countries be made available for applicants and evaluators, including indications of qualifications equivalences.
- Students be allowed to attach supporting information, in more depth than they can currently, about the institutions to which they intend to apply.

Finally, it would be important for the government to develop an explicit framework and capacity to evaluate the effectiveness of its advanced human capital formation strategies. Evaluative exercises undertaken within this framework should be conducted professionally, involve multiple stakeholders and explicitly address the broad objectives of the BCP and its integration with Chile's strategies for advanced human capital development and innovation.

Note

1. The report describes a role of an active, dynamic and engaged Oversight Committee. The latter would receive general policy guidance on major issues from the Inter-Ministerial Committee and, subsequently, work with the BCP Executive Secretariat to develop detailed policies and guidelines as described here. If this more active role for the Oversight Committee is accepted, it may be necessary to review both the terms of reference and the composition of the Committee to ensure compatibility with this expanded role.

Introduction

> *"In 2005, 172 young Chileans received scholarships to study abroad. This year it will be more than a thousand; next year it will be 2 500, and in 2010 we will reach 3 300. Thus, over the course of a decade we will have contributed to the specialised education and training of more than 30 000 people."*
>
> President Michelle Bachelet,
> Presentation of the Chile Bicentennial Scholarships, Santiago, 2008

The BCP (*Bicentennial Fund for the Training Abroad of Advanced Human Capital* or Becas Chile Programme) is a bold policy initiative providing scholarships to outstanding students in a wide variety of levels and subject areas. President Michelle Bachelet unveiled the initiative in 2008, and the policy has been rapidly implemented subsequently. The government now seeks to take stock of the experience to date, identify strengths and weaknesses of the policy process, and consider options for taking the initiative forward in the future.

A joint OECD-World Bank mission on Human Capital Formation Abroad was assigned to assist the government in assessing the Becas Chile initiative. The mission was provided with detailed information about the operation of the policy and had the opportunity to interview a range of individuals and agencies involved in the programme. This introduction summarises the terms of reference for this review and explains how the report is organised.

Terms of reference

Objective

The objective of the review is three-fold:

First, it sets out to obtain an overview of relevant best practices at the international level, through the analysis of similar initiatives in different countries, their impacts and the lessons that can be drawn from them. Emphasis is placed on the objectives and results of each particular programme.

Second, the review assesses the design of the Human Capital Formation Abroad policies established in Chile under Becas Chile and its articulation with other important national scholarship programmes, contrasting them with international best practice analysis. There is an assessment of the objectives, type and number of scholarships offered, prioritised areas, benefits included in the scholarships granted, international strategy and affirmative actions towards the inclusion of least favoured students. Additionally, an in-depth analysis of the institutional framework of the BCP is provided.

Third, the review provides recommendations for the improvement of this policy, pointing out which aspects of these recommendations should be prioritised.

Scope

The scope of this review for international experiences is best practices considered relevant by the OECD and the World Bank in terms of Human Capital Formation Abroad. The scope of Chilean policy includes Becas Chile as well as a revision of national scholarship programmes that complement it, in the fields of post-graduate studies, vocational and teacher training.

Operation

A joint OECD-World Bank review team visited Chile in August 2009 to review the BCP as an instrument to help Chile reach its goals for human capital development. The review team was co-led by Ian Whitman, (OECD) and Michael Crawford (World Bank) and included Tracey Burns (OECD), Michael Gallagher (Consultant-OECD and Rapporteur), Francisco Marmolejo (Consultant-OECD), Peter Tindemans (Consultant-World Bank), and Maria Paulina Mogollon (Consultant-World Bank).

The review report has drawn on the review team's collective knowledge of the Chilean tertiary education system, acquired in part from the production of the 2008 OECD-World Bank *Review of National Policies for Education: Tertiary Education in Chile*. The review team also included specific references to successful programmes and policies for human capital development used in a variety of OECD member and non-member countries.

The operational counterpart within the Chilean government has been the Office of the Undersecretary of Finance in the Ministry of Finance. The counterpart provided the necessary technical support to the review team, including the provision of requested background information.

How the terms of reference are addressed in the report of the review

Throughout the report the review team draws upon a range of international experiences, to set the Chilean initiative in perspective, illustrate good practices, identify difficulties with particular approaches and drawn lessons from experience with policy reform.

Chapter 1 presents an overview of Chile's tertiary education system and the improvements underway to increase the country's research, development and innovation capacity. Chapter 2 describes the functioning of the BCP: it explains its origin and main provisions, compares a few of its dimensions with current international practices, and describes its key statistics, design principles and application evaluation process. Chapter 3 discusses the ability of Chile's human capital formation system to build capacity and foster innovation, and the challenge of attracting and reinserting scholarship recipient graduates into the country. Chapter 4 highlights the operational and institutional challenges facing the BCP and recommends ways in which these can be addressed. Conclusions are addressed at the end of the report.

The annexes are particularly important for readers unfamiliar with Chile. Annex A provides a brief summary of the country's society and economy. Annex B describes Chile's primary and secondary education system. Annex C explains the different mechanisms available for student financial support for tertiary first degree studies.

Chapter 1: Tertiary Education and R&D Capacity

This chapter offers a thorough insight into Chile's tertiary education system and into the improvements underway to increase the country's research, development and innovation capacity. Based on rich data, it discusses important aspects of higher education policies like enrolment rates, career preferences, student financial support mechanisms and tertiary education reforms.

Tertiary education

Tertiary education institutions in Chile fall into three categories: Technical Training Centres (*Centros de Formación Técnica* or CFTs), Professional Institutes (*Institutos Profesionales* or IPs) and Universities. Course length depends on which of these is attended. CFT training typically lasts two years, (by law, technical degrees require 1 600 hours of training), IP professional degree courses last four years and university degree courses at least five years. Students who choose certain subjects or have to repeat years will take longer. Several universities also offer one-year post-graduate programmes and diplomas, two year Master's programmes and four-year PhD programmes.

The basic qualification for entry to tertiary education is the school-leaving certificate, given after successful completion of secondary education: the *Licencia de Educación Media* (Secondary Education Certificate) is for general education and the *Licencia de Técnico Medio* is for vocational education. While this is necessary for all types of institution, it is sufficient only for CFTs and sometimes IPs. All universities in membership of the *Consejo de Rectores de las Universidades Chilenas,* (CRUCH) require applicants to sit the *Prueba de Selección Universitaria* or PSU test, and are expected to confine recruitment to those school leavers

who have achieved a minimum score, currently 450. Private universities, some IPs and a few CFTs also take account of PSU scores in recruitment. Virtually all young people who have successfully graduated from school and are considering entering tertiary education sit the PSU. For entry in March 2008, nearly 217 000 did so (216 881 according to figures from University of Chile, which administers the PSU). This represented an increase of 3% on 2007 which in turn was a 20% increase on 2006. Students from higher income quintiles tend to score higher on the PSU than those from lower income quintiles.

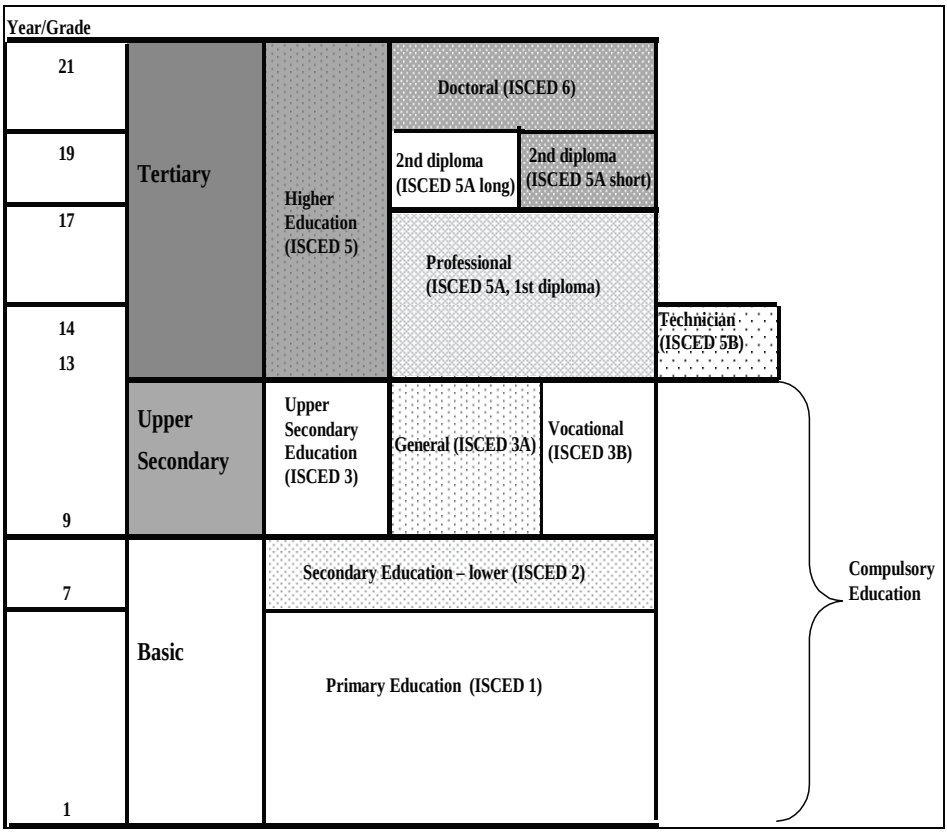
Technician training

Tertiary-level technician training accounts for roughly 12% of tertiary enrolment and its increase is a policy priority for the National Innovation Council for Competitiviness of Chile (CNIC) and the Division of Higher Education of the Ministry of Education (DIVESUP). It is a commonly held view in Chile that universities have excessive enrolment compared with labour market needs, while CFTs are under-enrolling students. Current labour market data do not support this view, as employers still seem to prefer to hire university graduates, and salary differentials are significant. There are indications, however, that the gaps in demand and pay are narrowing and may close in the future as the supply of university graduates increases faster than the supply of technicians.

CFT-trained technicians typically work in automobile and appliance repair, construction, office and business administration, health-related professions, hospitality and hotel management, among others. It is increasingly common for holders of technician's degrees to continue on to receive four year professional degrees (from *institutos profesionales*). While most CFTs also offer IP degrees, almost all will give prior credit for coursework/degrees from their own institutions and, to a limited extent, from other institutions.

CFTs are privately owned and may be run for profit. CFT students until recently received no public support for their studies. They now have one scholarship programme available (the *Becas Nuevo Milenio* programme) and they are eligible to borrow from the state guaranteed loan programme provided their high school grades meet a minimum requirement, and they enrol in an accredited CFT or IP. Some institutions report financing occasional foreign training for academic staff as their particular needs and resources dictate.

Figure 1.1 **Chile's educational system**



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.*

Student enrolments

In 1990 there were 250 000 students enrolled in Chilean tertiary education. By 2008, total enrolment had surpassed 800 000, as shown in Table 1.1. Ninety-five percent of students are enrolled in first degree (*pre-grado*) programmes (SIES, 2008). In this relatively short period Chilean tertiary education moved from an elite to a mass system. Currently enrolment represents 42% of the 18-24 year-old age cohort. A major policy goal of the government is for enrolment coverage to reach at least 50% of the age group. Achieving this goal would mean admitting an additional 200 000 students to tertiary education. Most of these students would be from the lower socio-economic quintiles and would represent the first generation of their families to attend tertiary education. Significant concern exists about

the ability of students with lower entry scores to succeed in academic university programmes without some remedial education. It is also expected that many new entrants will or should seek to enter technical tertiary education.

Table 1.1 **Total student enrolments in higher education by type of institution, Chile, 1990-2008**

Type of institution	1990	1995	2000	2005	2006	2007	2008
CFT	77 774	72 735	53 184	63 104	69 933	86 847	95 903
IP	40 006	40 980	79 904	114 546	113 134	156 126	162 870
Universities	131 702	231 227	319 089	468 497	478 075	519 557	546 208
CRUCH	*112 193*	*161 850*	*215 284*	*252 936*	*262 151*	*285 984*	*295 158*
Non traditional	*19 509*	*69 377*	*103 805*	*215 561*	*215 924*	*233 573*	*251 050*
Total	249 482	344 942	452 177	646 147	661 142	762 530	804 981

Source: *Compendio Estadístico de Educación Superior*, MINEDUC, Chile.

Students in Chile study at 192 tertiary institutions, of which 61 are universities, 44 IPs and 87 CFTs; 25 are members of the CRUCH and 36 are non-CRUCH members (CSE, 2008).

The distribution over areas of study gives a more detailed picture of the preferences of students. Table 1.2 provides that information.

Table 1.2 **Tertiary education enrolment by area of study 2008**

Area of study	Universities		IPs		CFTs		Total	
	Number	%	Number	%	Number	%	Number	%
Agriculture & fishing	22 017	*4*	3 311	*2*	2 557	*3*	27 885	*3*
Art & architecture	29 751	*5*	18 119	*11*	2 131	*2*	50 001	*6*
Sciences	13 354	*2*	24	*0*		*0*	13 378	*2*
Social sciences	92 173	*17*	17 680	*11*	1 323	*1*	111 176	*14*
Law	37 287	*7*	4 429	*3*	6 710	*7*	48 426	*6*
Humanities	11 258	*2*	1 879	*1*	441	*0*	13 578	*2*
Education	100 144	*18*	14 273	*9*	5 348	*6*	119 765	*15*
Technology	115 309	*21*	53 910	*33*	28 575	*30*	197 794	*25*
Health	85 032	*16*	16 319	*10*	19 456	*20*	120 807	*15*
Business & commerce	38 931	*7*	32 926	*20*	29 362	*31*	101 219	*13*
No area listed	952	*0*		*0*		*0*	952	*0*
Total	546 208	*100*	162 870	*100*	95 903	*100*	804 981	*100*

Source: *Consejo Superior de Educación, INDICES – 2008.*

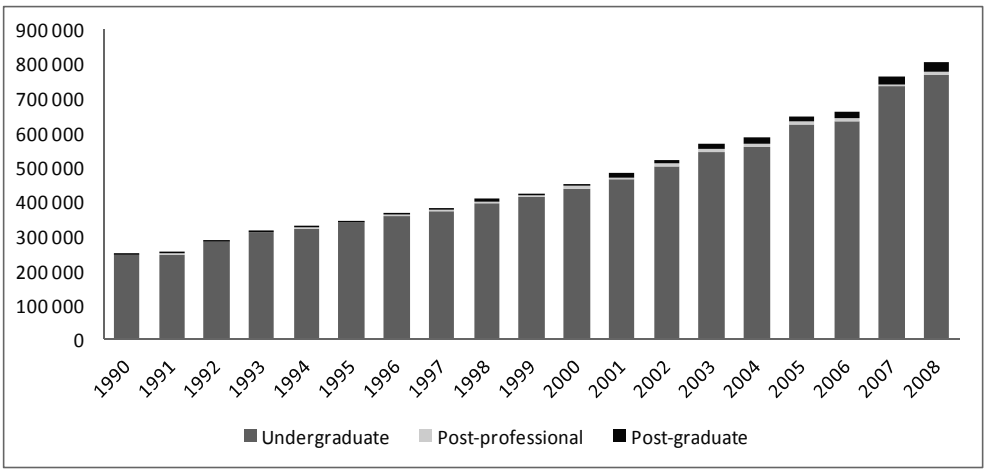
Students in the sciences (natural sciences, including life sciences) represent only a very small percentage (2%). Technology students, however, form a more significant share (23%), and universities, IPs and CFTs all contribute considerably. The bulk of enrolments are in public service areas (education, health and public administration), together accounting for 30% of total enrolments. As illustrated by Figure 1.2, enrolment expansion has been predominantly at the undergraduate level.

In 2007, there were 82 207 first-degrees granted, of which almost two-thirds were from universities. It is mostly university graduates who go on to Master's and PhD studies. Table 1.4 shows that enrolments in graduate education totalled 25 348 in 2008, representing just 3% of total tertiary education enrolments. Enrolments in doctoral programmes constituted 14% of all post-graduate enrolments.

Table 1.5 shows graduate student enrolments by field of study. Whereas the natural sciences dominate enrolments at PhD level, the study patterns of Master's degree students are more widely spread among the social sciences.

Table 1.6 shows the trend in graduate production by field of study over 1990-2006. The largest growth has been at the Master's degree level and mainly in social sciences and engineering and technology.

Figure 1.2 **National undergraduate, post-professional and post-graduate enrolments, Chile, 1990-2008**



Source: *Compendio Estadístico de Educación Superior*, MINEDUC, Chile.

Table 1.3 **First degrees granted by type of institution, 2007**

Type of institution	First degrees granted 2007	Percent (%)
CFTs	12 955	16
IP	17 430	21
Universities	51 822	63
Total	82 207	100

Source: *Compendio Estadístico de Educación Superior,* MINEDUC, Chile.

Table 1.4 **Enrolments in graduate education programmes**

Student enrolments by programme type, 2008			
Type of university	**PhD**	**Master's**	**Total**
Public universities	1 527	9 283	10 810
Private universities with public subsidies	1 536	5 647	7 183
Private universities (unsubsidised)	566	6 789	7 355
Total	3 629	21 719	25 348

Source: *Compendio Estadístico de Educación Superior,* MINEDUC, Chile.

Table 1.5 **Graduate student enrolments by field of study**

Field of study	PhD	Master's	Total
Business administration and commerce	6	5 709	5 715
Agriculture	252	483	735
Art and architecture	40	422	462
Natural sciences	1 189	832	2 021
Social sciences	225	3 922	4 147
Law	115	1 056	1 171
Education	476	4 232	4 708
Humanities	487	1 320	1 807
Health	302	1 363	1 665
Technology	537	2 376	2 913
Other	-	4	4
Total	3 629	21 719	25 348

Source: *Compendio Estadístico de Educación Superior,* MINEDUC, Chile.

Table 1.6 **Graduates of graduate programmes in Chile**

Master's graduates

	1990	1991	1992	1993	1994	1995	1996	1997	1998
NES	64	88	90	69	91	99	108	95	126
ET	10	12	19	24	36	52	87	76	93
MS	97	60	39	43	42	46	67	43	66
AS	9	2	9	19	20	24	44	35	46
SS	29	33	26	45	57	85	141	197	385
H	35	34	28	42	72	52	47	59	76
Total	244	229	211	242	318	358	494	505	792

	1999	2000	2001	2002	2003	2004	2005	2006
NES	102	101	100	96	116	105	126	118
ET	90	105	196	123	165	267	256	307
MS	55	58	61	49	61	101	99	93
AS	34	35	46	61	57	84	58	88
SS	486	509	950	1 037	1 304	1 533	1 490	1 684
H	63	59	120	100	118	138	154	168
Total	830	867	1 473	1 466	1 821	2 228	2 183	2 458

Doctoral graduates

	1990	1991	1992	1993	1994	1995	1996	1997	1998
NES	20	27	40	31	30	44	50	45	63
ET	7	9	6	8	11	17	-	8	5
MS	-	-	-	-	-	-	3	-	10
AS	-	-	-	-	-	-	-	-	-
SS	-	-	-	-	-	-	-	-	-
H	2	2	1	1	2	2	2	4	10
Total	29	38	47	40	43	63	55	57	88

	1999	2000	2001	2002	2003	2004	2005	2006
NES	61	63	63	95	94	159	134	140
ET	1	5	10	15	13	22	24	21
MS	4	7	3	13	10	14	25	20
AS	-	-	-	2		3	-	11
SS	-	-	8	4	10	22	21	34
H	9	8	8	18	17	24	18	23
Total	75	83	92	147	144	244	222	249

NES = Natural and exact sciences	MS = Medical sciences	SS = Social sciences
ET = Engineering and technology	AS = Agricultural sciences	H = Humanities

Note: Data provided based on most recent information provided at RICYT web site.
Source: RICYT, www.ricyt.org.

In 2007, there were 307 doctoral degrees awarded by Chilean Universities. Historically, doctoral education has been the preserve of the largest and oldest of the CRUCH universities (Universidad de Chile, Pontificia Universidad Católica de Chile, Universidad Santiago de Chile and Universidad de Concepción). Recently, more universities – both CRUCH and non-CRUCH have significantly increased doctoral enrolments and the number of doctoral degrees granted. Achieving growth and diversification of graduate education, especially in doctoral programmes, has been a long-standing goal for tertiary education policy; the MECESUP programme has been a major vehicle for providing the resources and promoting the conditions to improve quality and efficiency of domestic doctoral education and stimulate the emergence of new PhD programmes.

Student financial support

This section reviews the support available for domestic and foreign graduate education prior to the BCP and for post-graduate studies in Chile. Annex C provides a summary of the support available for domestic first degrees.

Support for domestic and foreign graduate education prior to the BCP

Prior to the establishment of the BCP, public support for graduate education came from a diverse array of sources. Agencies and ministries such as the Ministry of Planning and the Ministry of Foreign Affairs, the National Arts Council and the International Co-operation Agency, CONICYT and the MECESUP programme financed foreign graduate education (and domestic graduate education, in the cases of CONICYT and MECESUP). CORFO, in co-operation with commercial banks, provided loans to graduate students for both foreign and domestic study.

Universities provide some support to students in the form of scholarships and loans from their own funds. CONICYT's support has traditionally been the largest and most comprehensive, and its main focus has been on provision of scholarship to students and research grants to researchers for the sake of promoting domestic graduate education and research. Infrastructure, some overhead expenses and other indirect costs of graduate education in CRUCH universities are also supported through the *Aporte Fiscal Directo*, or AFD.

This public provision of scholarships has been part of a systematic effort to increase the number of professionals with graduate qualifications. The modalities of support have included Master's, doctoral and post doctoral scholarships, plus specific support for thesis work, sandwich programmes and attendance in professional conferences, *inter alia*.

In 2008 CONICYT published a report, *Advanced Human Capital: Toward an Integrated Policy for Scholarships and Post-graduate Education*, produced by the Technical Commission for Post-graduate Scholarships. That report surveyed the national portfolio of support to graduate education, amassing an inventory of government scholarships and programmes:

- The Fellowship Programme for graduate study abroad and post-graduate scholarships in Chilean universities of the Ministry of Planning and Co-operation (MIDEPLAN). Provided scholarships to employees of the Chilean government, recent graduates and university professors for study abroad.
- Graduate Fellowships for Academic and Student Development (MECESUP).
- Domestic and Foreign Grants of CONICYT.
- Graduate Fellowships from the International Co-operation Agency (ACGI).
- Graduate Fellowships from the National Council for Culture and the Arts (CNCA).

Each of these programmes had different areas of emphasis, selection procedures, levels of support, and monitoring and follow-on activities.

Table 1.7 **Characteristics of Chilean scholarship types, 2000-2006**

	Period	Foreign scholarship for PhD study granted	Average grants per year	Period	Domestic scholarships for PhD study granted	Average grants per year
MIDEPLAN [1]	2000-2006	580[2]	82[2]	2000-2006	77[2]	11[2]
MECESUP [2]	2000-2006	160	23	2000-2006	794	113
CONICYT	2001-2006	247	41	2001-2006	1 199	200
ACGI		0			0	0
CNCA	2003-2006	20	5		0	0
Total		-	151		-	324

Notes:

1. MIDEPLAN Scholarships were for Master's as well as PhD study.

2. Estimated using overall number of international and domestic scholarships for 2000-2006 times the respective 2006 proportion devoted to doctoral study. The report only disaggregates doctoral and other scholarships from MIDEPLAN for the year 2006.

Source: CONICYT (2008), *Advanced Human Capital: Toward an Integrated Policy for Post-graduate Scholarships.*

Support for post-graduate study in Chile

Scholarship support for domestic graduate education is provided principally by CONICYT and MECESUP. Support for PhD students has doubled since 2005. Support for Master's students has increased by a factor of five from its low 2005 base. Grants by gender are reasonably equal for Master's degrees but consistently about 20% higher for men at the PhD level. On average, some 100 Master's scholarships and 500 PhD scholarships have been awarded annually in recent years.

The analysis in the CONICYT 2008 report found different programmes with different targets, and no overall strategy for human capital development, no definition of priority areas, and weak co-ordination among programmes. The programmes for foreign graduate study mostly took the form of bi-lateral agreements aimed at facilitating access of Chileans to foreign universities. Little was done to guarantee the quality of these programmes. No assistance was provided for second-language skills for student studying in foreign languages. The MIDEPLAN programme catered to the needs of government employees who sought to upgrade their professional qualifications, both in Chile and abroad.

No consolidated programme of publicity or information for potential students existed. Nor was any unified system of record keeping or statistics maintained. Some programmes awarded scholarships based on the academic record of the student without regard to the area of study, while others identified the area of study first and then selected the applicants with the best academic records. No consolidated system of monitoring/evaluation or follow up with students and graduates was in place. Although each system did some degree of monitoring, this mostly tabulated input data (number of students supported, amounts of resources provided, etc.). Almost no impact evaluation of these programmes has been undertaken.

Policies for improvement

The government has numerous agencies and mechanisms designed to improve or ensure the quality of the tertiary education system. The Ministry of Education is responsible for regulating university and non-university education, and oversees the CFTs and IPs. The Higher Council for Education (CSE, *Consejo Superior de Educación*), increasingly with the National Accreditation Commission (CNA, *Comisión Nacional de Acreditación*), also contributes to Chile's tertiary education regulatory framework.

The CSE oversees and regulates the licensing of new private tertiary education institutions. It does this through an extended probationary period through which new institutions demonstrate required levels of educational

quality plus financial and administrative soundness. At the end of this period, successful institutions are granted licenses to operate with autonomy. The private universities that the CSE regulates have generally offered few graduate programmes, but this is changing. More are offering Master's degrees, especially professional Master's in areas like business administration. A few are offering doctoral degree programmes. However, private universities normally expand into graduate education only after they are licensed and autonomous and therefore no longer regulated by the CSE. The CSE does have a growing role in regulating CFTs and IP. In fact, in the past few years the majority of new private tertiary institutions seeking licenses are CFTs and IPs.

The CNA was formed in 2006 to conduct accreditation processes and co-ordinate the new national system of quality assurance for higher education. The CNA's principal tasks are to design and develop institutional and programme accreditation, and to help tertiary institutions build up their own capacity for quality assurance and the provision of full and accurate public information.

In addition to the CSE and the CNA, the MECESUP, created by the Chilean government in 1997, has made an important contribution to improving the quality of Chilean tertiary education. The MECESUP programme supported the government's policies for higher education reform initiated in the 1990s. In its first phase the programme supported reforms to the budget allocation process, through a competitive fund to promote quality and relevance; the development of the system for programme and institutional accreditation discussed above; the revitalisation of graduate education; investment in learning infrastructure; and reform of curricula and teaching and learning practices. Supported in part by a World Bank loan, the programme invested over USD 200 million in Chile's tertiary education system from 1997-2005 (World Bank, Disbursement Information System).

A second phase of the programme, known as "MECESUP 2", has continued and expanded on the results of phase one. MECESUP 2 made investments of over USD 90 million from 2006-2009 in an improved regulatory framework for tertiary education (including the creation of a Higher Education Information System), the continued competitive allocation of funding for academic innovation, and the piloting of performance-based budgeting for tertiary institutions. The improvement of domestic graduate education remains a significant priority for the MECESUP programme. Under MECESUP 2 more limited support was provided for foreign graduate training and to activities such as short visits abroad and other types of international networking to strengthen graduate education.

The MECESUP programme is credited by various observers with having catalysed significant experimentation and change in Chilean tertiary education. New curricula, improved teaching and learning practices, budget and management innovations, enhanced faculty qualifications and institutional improvement plans, are among innovations promoted and funded by MECESUP. The challenge for MECESUP now is to ensure the insertion and institutionalisation of its mechanisms that prove to be successful into the Ministry of Education's comprehensive approach to the governance and management of tertiary education. Co-ordinating the support for domestic graduate education through MECESUP with that provided by the BCP for foreign graduate education is a significant part of this challenge. The inclusion of sandwich programmes and development of performance contracts with individual graduate programmes are seen as very welcome additions to the portfolio of Becas Chile instruments. Critics of the MECESUP programme have raised questions about the diffuse focus of investments and the lack of systematic evaluative data.

Improvements in research, development and innovation capacity

Three entities play a large role in the improvement of Chile's research, development and innovation capacity: CNIC, CONICYT and CORFO, the Ministry of Economy's Private Sector Development Agency. Funding for research and development in the higher education sector in Chile comes largely through the latter two.

CONICYT's total 2007 budget amounted to CLP 90 billion, up from CLP 48 billion in 2004. CONICYT has developed a large number of funding instruments. Currently there are eleven, most of them with a number of sub-programmes. The two major research and development competitive funds are the Science and Technology Development Fund (*Fondo Nacional de Desarrollo Científico y Tecnológico*, FONDECYT), for basic research, and the Fund for the Promotion of Scientific and Technological Development (*Fondo de Fomento al Desarrollo Científico y Tecnológico*, FONDEF), for technological research and development. The budget for FONDECYT was stable in real terms between 1999 and 2005 (fluctuating around CLP 19 and 21 billion *per annum*) but has since risen to CLP 33 billion (running currency) for 2008. The recent budget increase for research is partially due to the availability of resources from the Innovation Fund for Competitiveness, a levy on copper exports.

Table 1.8 provides an overview of all eleven CONICYT programmes with their 2007 and 2008 budgets. Together with CONICYT's own operational costs of some CLP 5 billion these add up to an overall budget of around CLP 91 billion in 2007.

Table 1.8 **CONICYT programmes**

		Budget 2007 (CLP billion)	Budget 2008 (CLP billion)
FONDECYT	Core programme funding individual research projects.	26.0	33.1
FONDEF	Applied research, pre-competitive development, technology transfer; university-industry co-operation.	12.2	12.4
FONDAP	Centres of Excellence in priority areas, including units for valorisation.	4.9	4.5
EXPLORA	Presenting science to society at large throughout the country.	3.3	1.9
Financiamento Basal	Basic infrastructure funding for Centres of Excellence.	9.1	6.4
Programa Bicentenario	Improving the Science, Technology and Innovation system; strengthening science base; industry-university linkages.	18.8	9.3
Programa Astronomía	Research in astronomy.	0.6	0.6
Programa Regional	Regional research centres jointly with regional governments.	2.4	2.6
Scholarships for post graduates[1]	Grants to follow PhD and Master's education in Chile and abroad or mixed; as well as complementary funding for *e.g.* printing thesis, conference visits.	8.4	13.6
Relaciones Internacionales	International co-operation.	0.3	0.6
Información CyT	Access to scientific information.	0.1	0.2

Note (1): There are many other scholarship schemes.

Source: CONICYT.

Universities – and especially graduate programmes within universities – are virtually the sole beneficiaries of FONDECYT and FONDEF. Universities received 100% and 99.6% of the awards from these two funds during 2000-2004. Most awards go to CRUCH universities, although awards to non-CRUCH institutions are growing. Some non-CRUCH institutions win more grants than some CRUCH institutions and this trend is likely to continue. Table 1.9 provides details by institution for 2007.

A much smaller source of funding for advanced human capital development is from the Ministry of Economy through CORFO, the Private Sector Development Agency. CORFO's mandate is to promote innovation, technology transfer and entrepreneurship. CORFO has combined all its instruments to promote innovation in the INNOVAChile programme (CORFO, 2008). Most of INNOVAChile's programmes are targeted at companies. However one programme, Innovation Projects of Public Interest, targets universities and government institutes and agencies; and another one, Pre-competitive Innovation Projects, is focused exclusively on universities.

This last programme spends some CLP 13 billion *per annum* for pre-competitive research in universities. For 2008, CLP 13.6 billion was allocated to 38 university projects.

Table 1.9 **FONDECYT and FONDEF awards, 2007 (CLP billion)**

Institution	FONDECYT	FONDEF	Total
CRUCH universities (first twelve)			
University of Chile	7.2	1.9	9.1
Pontifical Catholic University of Chile	4.8	1.4	6.2
University of Concepción	2.5	1.8	4.3
Southern University of Chile (*Universidad Austral de Chile*)	1.5	0.7	2.2
University of Santiago	1.6	0.4	2.0
Pontifical Catholic University of Valparaíso	0.9	0.3	1.2
Catholic University of the North	0.6	0.5	1.1
Federico Santa Maria Technical University	0.6	0.4	1.0
University of Los Lagos	0.1	0.8	1.0
Arturo Prat University	0.1	0.9	1.0
University of La Frontera	0.4	0.3	0.7
University of Antofagasta	0.3	0.4	0.7
Non-CRUCH universities (first two)			
Andrés Bello University	0.4	0.1	0.5
University for Development (UDD, *Universidad del Desarrollo*)	0.1	0.0	0.2
Not-for-profit or government institutes (first two)			
Agricultural and Livestock Research Institute (INIA, *Instituto de Investigaciones Agropecuarias*)	0.1	0.3	0.4
Centre for Scientific Studies (*Centro de Estudios Científicos*)	0.3	-	0.3

Source: CONICYT.

As mentioned above, the establishment of the Innovation Fund in 2006 prompted a major change in resource availability. Allocation of funds is specified by the Committee of Ministers for Innovation, who define key programmes on which the budget should be spent.

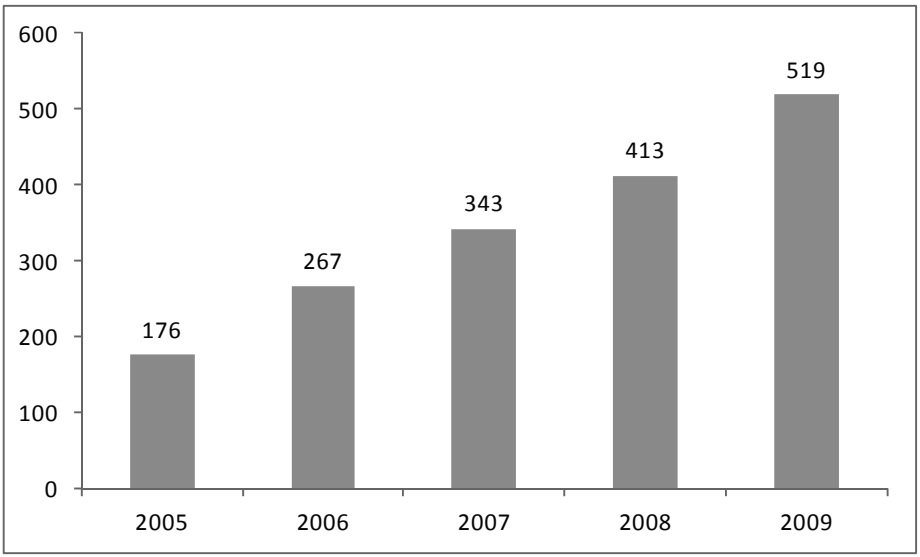
With regards to the CNIC, the latter has made several policy proposals for human capital development since its creation in 2006. The CNIC has sought to maximise the long-term competitiveness of Chile by optimising investment in technology development, research and human capital formation. The CNIC makes recommendations to an inter-ministerial Council for Innovation, whose members include the ministers of Education,

Economy and Finance, *inter alia*. The CNIC has been influential in proposing priorities for innovation and human capital development. They have proposed a comprehensive longer-term strategy for innovation in Chile which proposes the development of industrial clusters in five thematic areas. In addition to its role in strategy formulation, the CNIC has directly influenced the criteria for allocating resources from the Innovation Fund for Competitiveness (as described above) and indirectly influenced funding priorities for CONICYT. Under the CNIC influence the role of CORFO as a financer of innovation has increased, with more funds allocated to university-industry co-operation. CONICYT has also increase emphasis on university-industry co-operation in its funding priorities.

R&D in numbers

Latest figures (2004) indicate R&D investment as a percent of GDP stands at 0.68%. The growth in resources invested in the National Innovation System between 2005 and 2009 has been strong, reaching a peak of USD 519 million in 2009. Most of these resources have been directed towards high potential clusters and cross-cutting development platforms. Significant efforts have been made on three broad fronts: private sector innovation, basic and applied research and advanced human capital.

Figure 1.3 **National system of innovation, budget in USD million**



Source: Budget Office, Ministry of Finance, Chile.

Box 1.1 **Chilean programmes for attracting foreign scholars, professional and technicians to Chile**

Attraction of the advanced human capital programme

I. Objective

Run by CONICYT, this programme was created to finance the recruitment of scientists, researchers and experts living abroad for short or long stays in Chile. This programme seeks to strengthen undergraduate and graduate programmes of regional state universities in Chile, develop research on the country's priority areas, promote collaborative projects with research and teaching institutions in Chile, and develop networks of scientific knowledge.

II. Arrangements

1 - National and Regional Short Stays

Short-term stays to develop research and teach in disciplines related to a national and regional priority areas, respectively. The stays may have a minimum duration of two months and a maximum of ten months. Each project may attract one scientist/expert from abroad.

2 - Long Stays Mode

Long-term to develop research and teach in disciplines related to a national priority area. The stays may have a minimum duration of one year and a maximum of four years. Each project may be made up of one to three experts from abroad.

III. Beneficiaries

Potential beneficiaries of the programme are public universities, whose headquarters are located outside the Metropolitan region and who have a proven track record of scientific and technological research. Applications may include partnerships with a group of as universities and/or research institutes from any region of the country.

Insertion of professionals and technicians in enterprises programme

I. Objective

Run by CORFO, this programme supports the implementation and development of R&D projects and processes in enterprises by recruiting qualified professional and technical personnel to develop research and innovation.

II. Beneficiaries

Profitable or unprofitable domestic firms in the first income tax bracket that have been operating for at least a year. Companies must certify they have adequate technical, administrative and financial capacity to develop the project, as well as the management skills to implement its production phase.

III. Benefits

Covers up to 70% for the first year and up to 50% for the second year of the total monthly gross payroll of the professional(s) and/or technician(s) hired for the implementation of the project. The maximum monthly salary covered by the subsidy will be: CLP 1 000 000 for professionals and CLP 500 000 for technicians. INNOVAChile will co-finance up to CLP 20 000 000 (with an annual cap of CLP 60 000 000) per company.

Chapter 2: Programme Features

The purpose of this chapter is to present an overview of the functioning of the Becas Chile Programme, explain its origin and main provisions, compare its main features with current international practices, and describe and assess its key statistics, design principles and application evaluation process. The chapter discusses how much human capital the country should produce in order to catch up with a peer group of countries. It is likely that the amount of scholarships provided per student – three to seven times higher than in the countries used for comparison in this chapter – will serve well the need of Chile to expand its base of qualified human resources.

Compared to previous programmes, BCP is a big step forward by being more responsive to the needs and choices of students, taking better account of Chile's varying socio-economic circumstances, and being administratively transparent and innovative. Nevertheless, there is room for improvement: BCP has an age bias towards younger students and gives little weight to national priorities in the assessment of applicants for scholarships.

Rationale and historical background

The BCP comprises one element of a broad strategy on the part of the government to "insert the country into the knowledge society and give a definitive boost to the economic, social and cultural development of Chile." The BCP functions as a human capital formation component alongside initiatives to increase public and private investment in R&D and strengthen the capacity for innovation across different industry sectors. The BCP is seen not only as a means of expanding expertise but also transforming attitudes, outlooks and skill sets, as part of "*Esfuerzo Pais*": "a response to the need and urgency to have more academic, professional and technical experts, who are not only more productive but also more creative, innovative and enterprising." (Becas Chile website).

More specifically, the long-term vision of the Chilean government in establishing the BCP was three-fold:

- increasing opportunities for the training and development of advanced human capital abroad;
- modernising and better co-ordinating the various government funded scholarship programmes that were previously administered by a variety of agencies and ministries; and
- fostering greater co-operation and international linkages in support of the government's agenda for human capital development (CNIC, 2009).

The creation of the BCP, however, came about as the result of a fortuitous convergence of events that provided the Chilean government with an opportunity to restructure and articulate separate programmes with related goals. In a context already characterised by internal policy changes, these events included:

- The perceived deficiencies and duplication of efforts in the offering and management of scholarships supporting Chilean study abroad by a proliferation of government agencies (OECD, 2008).
- The establishment of a National Strategy for Innovation in which major emphasis is placed on the need to prepare advanced human capital to support a more active role for Chile in the knowledge economy (CNIC, 2008).
- The availability to government of substantial international reserves, product of revenues generated by the copper industry (ECLAC/CEPAL, 2009).

The BCP is ambitious in its scope, aiming to provide opportunities for 30 000 participants by 2017. The programme envisages growth in participant numbers from around 1 000 in the first year to a steady level of 3 300 after its fourth year. At that point, it may be assumed that the BCP will represent around 20% of domestic post-graduate enrolments, thereby complementing the domestic efforts to develop Chile's human capital capacity.

Through the BCP, Chilean students can pursue higher education in internationally competitive universities all over the world. Areas of study emphasised include five cluster areas (mining, aquaculture, food industry,

tourism and global services), cross-cutting platforms (energy, environment, ICT and biotechnology) and social areas (education, health, housing, public safety and public policy).

The financing for the BCP Fund, totalling some USD 6 billion, is drawn from a fund maintained abroad and will invest around USD 250 million per year in the educational expenses of Chilean students in foreign countries. These funds have yet to be formally appropriated through legislation.

The provisions of the Becas Chile Programme

The BCP provides an extensive range of scholarship types to accommodate the diverse dimensions of Chile's advanced human capital formation needs. Before the BCP there were only five scholarship types; the BCP has extended opportunities through eleven scholarships types that address broad professional profiles, from post doctorates to technicians. These new scholarships allow addressing different human capital needs. These types are outlined in Table 2.1. For several elements of the BCP there are multiple agencies involved, reflecting shared responsibilities for policy and administration.

Table 2.2 shows the benefits and length of support for the different types of BCP scholarships. They encompass a variety of award levels and non-award learning experiences, covering varying periods ranging from short-duration (several months) to long-duration (several years).

Figure 2.1 displays the range of support available under the integrated BCP. The figure presents an indication of the shares of scholarship allocations by programmatic type and level of award. In practice, the allocation of scholarships is more fluid than depicted, reflecting differences in the quantity and quality of applicants in different rounds. Nevertheless, there is a substantial commitment to technical education and training (approximately 27% of scholarships) alongside a dedicated component for the professional development of school teachers in core areas (approximately 12%), alongside significant support for post-graduate study (61%).

Table 2.1 **Becas Chile scholarships, resources and benefits**

Programme	Institutions involved	Financial resources involved	Benefits being considered
- Master's - Doctoral - Professional Master's in education - Doctoral internships - Medical sub-specialties - Co-advised doctoral - Post doctoral	- CONICYT - Executive Secretariat Becas Chile	Budget Law 2009: CLP 15 667 586	- Tuition and fees: 100% - Books and student materials: USD 300 - Monthly support: USD 1 700 adjusted by cost of living - Support for spouse: 10% of support for student - Child support: 5% support for student - Medical insurance: USD 800 - Moving expenses: USD 500 - Returning expenses: USD 500 - Air travel for student, spouse and children (spouse and children only if term is over 12 months) - Language Course (if term is over 12 months), thereafter free for the first 2 quarters and co-funded depending on SES - Pre- and post-natal support for new born children
- Semester abroad - Internship for professional development certificate abroad for university professors (TESOL)	- PIAP - Executive Secretariat Becas Chile	Budget PIAP : CLP 1 584 000	- Books and supplies: USD 300 - Monthly cost of living: USD 1 700 adjusted by cost of living
		Budget TESOL: CLP 309 600	- Health Insurance: USD 600 - Air travel for student - Visa fees
- Mathematics and sciences internships	- CPEIP - Executive Secretariat Becas Chile	Budget 2009 CLP 1 117 014	- Tuition and fees: 100% - Books and supplies: USD 300 - Monthly cost of living: Housing and food + USD 400 for personal expenses - Health insurance: USD 800 - Air travel for student - Visa fees
- Vocational and Technical internships	- DIVESUP - Executive Secretariat Becas Chile	Budget 2009 CLP 5 102 105	- Tuition and fees: 100% - Books and supplies: USD 300 - Monthly cost of living: USD 1 700 adjusted by cost of living - (distributed in housing + food + personal expenses) - Support for spouse: 10% of support for student - Child support: 5% support for student - Medical insurance: USD 800 - Moving expenses: USD 500 - Returning expenses: USD 500 - Air travel for student, spouse and children (spouse and children only if term is over 12 months) - Language Course (if term is over 12 months), thereafter free for the first 2 quarters and co-funded depending on SES - Pre- and post-natal support for new born children

Note: Benefits change based on duration and type of programme. In some cases, also includes cost of processing visa.

Source: Decree 664, which established *Sistema Bicentenario* Becas Chile.

Table 2.2 **Duration of sponsorship provided by Becas Chile (maximum time financed)**

Name of scholarship	Duration of sponsorship
Master's	Max. of 2 years
Doctoral	Max. of 4 years
Post doctoral	Min. 6 months - Max. 24 months
Doctoral internship	Min. 3 months - Max. 10 months
Doctoral co-advising	Min. 10 months - Max. 24 months
Professional Master's in Education	Max. 2 years
Internships in Mathematics and Sciences	4 months
Semester abroad	6 months
Internship for a Professional Development Certificate abroad	Max. 4 months
Medical sub-specialties	Min. 1 academic year - Max. 36 months
Technical Internships	Max. 1 year

Note: This length of time does not include time required to study a second language which may be awarded to sponsored students additionally.

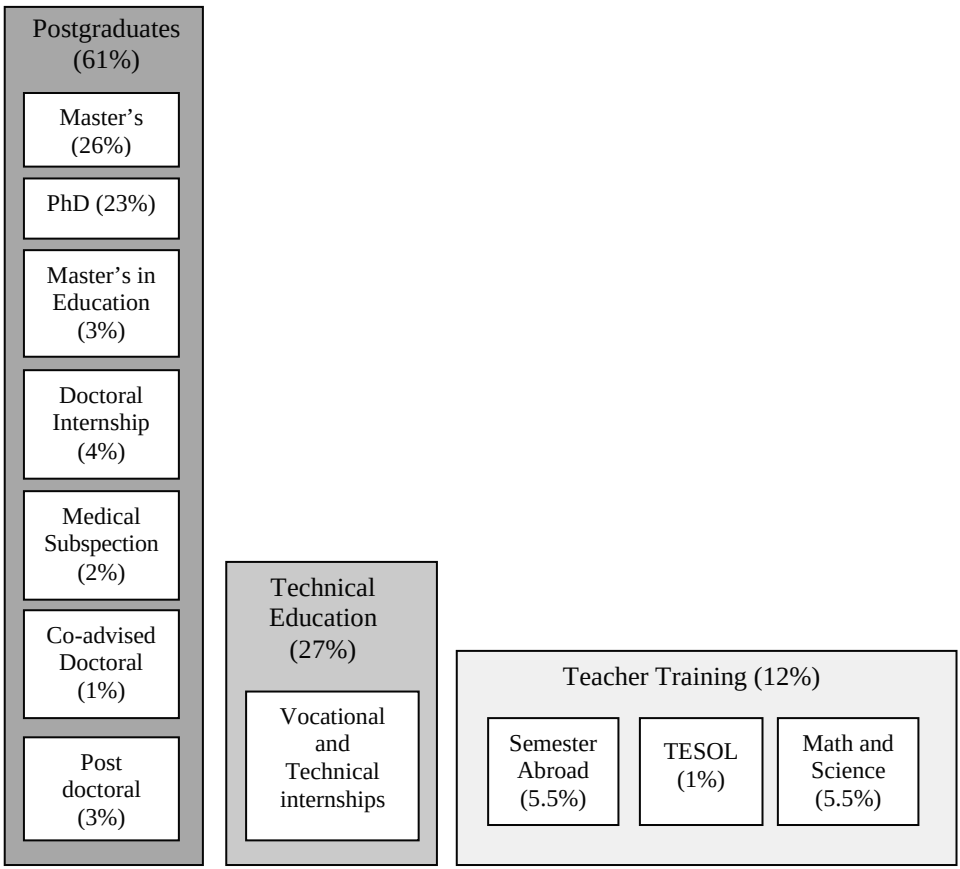
Source: Calls for Applications 2009.

The different scholarship components of the BCP provide different kinds and levels of support for students and involve different criteria for selection among applicants. One of the government's longer-term intentions is to reduce the legacy of complexity and incongruity of the different components, thereby simplifying information for applicants and increasing the administrative efficiency of the overall scholarships system through common processing technologies.

The average benefits available to participants under the BCP are larger than under previous schemes and take account Chile's varying socio-economic circumstances. In fact, previous scholarships such as MIDEPLAN's, did not include language courses and gave an average monthly allowance of USD 820. The latter led a large number of students to work during their studies to cover their living expenses.

With regards to scholarship conditionality, BCP scholarships require recipients to commit to return to Chile. Recipients may stay abroad after graduation for half the number of years for which they were given a scholarship, but must repay the scholarship if they choose to stay beyond that. Upon their return, recipients must stay in Chile for twice the number of years for which they were given a scholarship. The number of years decreases for work outside the capital.

Figure 2.1 **Indicative participant shares within the BCP scholarship programmes**



Note: The figures are calculated in terms of the number of new scholarships to be assigned yearly at steady state.

Source: Becas Chile.

International comparison of BCP provisions and arrangements

The BCP is a large programme both relative to Chile's population and economy and in absolute terms by any measure. As shown in Table 2.3, Chile will be providing three to seven times more scholarships per enrolled tertiary student than a group of comparator countries. The programme's size is not disproportionate relative to Chile's need to expand its advanced human capital base, as is discussed in Box 2.1.

Table 2.3 **Cross-country comparison of programme size**

	Programme or institution	Students sponsored		As a % of total student enrolment at the tertiary level
Chile before Becas Programme	MIDEPLAN, MECESUP, CONICYT, ACGI, CNCA	Year 2007	200	0.03
Chile after Becas Programme	Becas Chile	Year 2010	3 300	0.36
Mexico	CONACYT	Year 2005	2 645	0.11
Brazil	CAPES	Year 2007	4 043	0.08
China	SSSAP	Year 2007	12 402	0.05

Source: Review team compilation, via the website of each programme.

Compared against the programmes of a different set of countries, the BCP is more comprehensive with regards to the range of scholarship options offered and more generous with regards to the benefits per scholarship granted. In terms of degree level, countries tend to focus primarily on the highest end of the education spectrum – senior researchers, doctoral and post-doctoral studies – and few provide scholarships for technical degrees. In terms of benefits, countries frequently have cost-sharing models which can include the student, an NGO, and the home and host countries and institutions. Table 2.4 illustrates these differences.

The government-sponsored scholarship programmes in other countries also actively target "priority areas". For PhDs, these tend to be broad in scope but heavily biased towards the sciences. For technical degrees, existing evidence indicates the focus is narrow and varies by partnership. Table 2.5 details these both for Chile and a sample set of countries.

Finally, government-sponsored scholarship programmes in other countries have significant strings attached to them. While they all require sponsored students to return to their home country, it is unclear what consequences students face when they choose not to return.

Table 2.6 describes the conditionality of scholarship programmes both for Chile and for a sample set of countries. The issues of graduate return and reinsertion relating to the BCP are discussed in detail in Chapter 3 of this report.

Table 2.4 **Cross-country comparison of scholarships and benefits offered**

	Programme or Institution	Types of study abroad scholarships offered	Extent of benefits offered
China	State Sponsored Study Abroad Programmes (SSSAP)	**185 study abroad programmes, 5 major categories:** - State Sponsored Senior Researchers Programme - State Sponsored Visiting Scholar (including Post-Doctoral Research) Programme - State Sponsored Post-graduate Programme - Exchange Scholarship with other countries - State Sponsored Special Programme	For PhD / sandwich PhD degrees: Return international airfare and a living stipend, while the tuition and research fees are paid by the host universities
Colombia	COLCIENCIAS	New and continuing PhD studies, specifically for candidates working with accredited research groups and institutions	For PhD degrees: Tuition, monthly stipend (up to USD 1 600 per month), medical insurance (up to USD 1 500 per year), thesis expenses (up to USD 1 000), and tuition for language courses in which studies are to be conducted (up to 6 months)
Mexico	Mexico's National Council for Science and Technology (CONACYT) scholarship programme	PhDs mostly, and on a case by case basis, Master's and Diploma Certificates	Living stipend (partial or total, USD 1 000 per month, more if living in the United Kingdom or in the European Union), medical insurance, and in some cases, tuition
		Technical degrees (work programme must be designed and approved by the receiving institution prior to application)	All costs covered for scholarship recipient (some costs borne by CONACYT, others by the receiving institution)

Source: Review team compilation, via the website of each programme.

Table 2.5 **Cross-country comparison of prioritised areas**

	Areas prioritised
Chile	Five cluster areas (mining, aquaculture, food industry, tourism and global services), transversal platforms (energy, environment, ICT, biotechnology) and social areas (education, health, housing, public safety and public policy).
China (PhD)	Energy, resources, environment, agriculture, manufacture, information technology, life sciences, space study, maritime study, nanotechnology, new materials, humanities and applied social sciences.
Colombia (PhD)	Identification and sustainable use of biodiversity, preservation and sustainable development of water resources, development of electronics and materials, research in health sciences, Colombian social studies.
Mexico	For PhD / Master's and some Diploma Certificates: Computer science and telecommunications, biotechnology, materials technology, construction, petrochemicals and manufacturing processes. Applied social sciences, epidemiology for the country's most common diseases, study of technologies that contribute to meeting the basic needs of the population and to the economic development of the country's marginalised regions. Master's and Diploma Certificates in languages, arts, sports or similar areas are not sponsored.
	For technical degrees: - The *Internationale Weiterbildung und Entwicklung gGmbH* (inWent) in Germany offers 20 spots for high quality technical degrees to engineers and/or specialists in the areas of quality control, environmental protection and worker safety. - The Japan International Co-operation Agency (JICA) offers 50 spots for highly specialised technical work-study in Japan.
Egypt (PhD)	Agriculture and irrigation, industry, oil and natural gas, electricity and energy, transportation, communication and information, technology, and tourism.

Source: Review team compilation, via the website of each country.

Table 2.6 **Cross-country comparison of scholarship conditionality**

	Conditionality of scholarship programmes
Chile	Scholarship is conditional upon the recipients' commitment to return to the country. Recipients must: - Demonstrate academic excellence and full-time dedication during their studies abroad; - Submit semester grades and/or a letter from their thesis advisor about their progress; - Obtain the degree for which their scholarship was provided; - Repay the scholarship awarded if they choose to stay abroad after graduation for more than half the number of years for which they were given a scholarship; - Stay in Chile twice the number of years for which they were given a scholarship. The number of years decreases for work outside the capital.
Fulbright Chile	Master's degree scholarship recipients must: - Demonstrate academic excellence and full-time dedication during their studies abroad; - Submit semester grades and/or a letter from their thesis advisor about their progress; - Commit to returning to Chile and staying there for a minimum of two years after graduation.
China	Scholarship recipient must graduate from the intended programme and return to China.
Colombia	Scholarship is conditional upon the recipients' return to the country.
Mexico	For PhD / Master's and some Diploma Certificates, scholarship recipient must: - Maintain a grade point average above 80%; - Provide CONACYT with a performance review for every semester under scholarship; - Graduate from the intended programme; - Return to the country. Those who do not return must reimburse CONACYT the full amount of the scholarship plus interest and their names will be publicly published on a list of "contract breakers".
	For technical degrees, scholarship recipient must: - Finish the intended programme; - Provide CONACYT with a full write-up regarding the experience 6 months after it is over; - Return to the country. Those who do not return must reimburse CONACYT the full amount of the scholarship plus interest and their names will be publicly published on a list of "contract breakers".

Source: Review team compilation, via the website of each programme.

The Chinese experience with study abroad programmes

China is an interesting case study for Chile because it highlights how government resources committed for study abroad can best be used to strengthen local domestic capacity, and how study abroad can be an effective incentive without huge outflows of public resources.

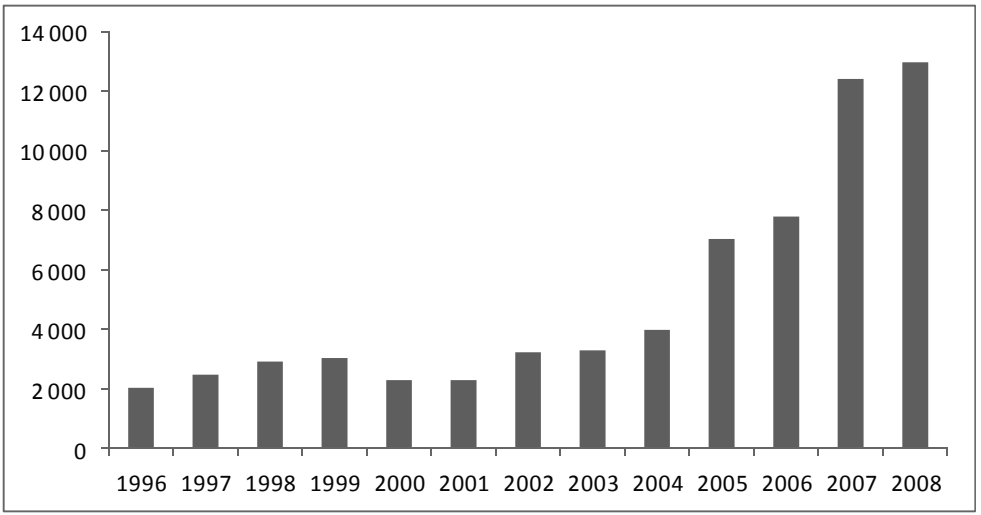
Foreign training has been a cornerstone of China's overall higher education strategy: over a million students and researchers left the country to study abroad between 1978 and 2006. In 1996, the State Sponsored Study

Abroad Programmes (SSSAP) was created, and under its auspices government scholarship programmes ramped up quickly. There is great variety among the 185 SSSAP: some programmes target rural Western provinces, others favour specific ethnic minorities, and still others are designed solely for the researchers and scholars of top universities and research centres. In 2008 China sponsored 12 957 students to go to more than 80 countries (Chinese Scholarship Council, Annual Report 2008, p. 8).

Figure 2.2 shows the increase in state-sponsored students, Figure 2.3 shows their distribution across programmes and Figure 2.4 shows how these numbers compare to the total population of Chinese students studying abroad. As the latter illustrates, a large portion of the students going abroad are self-funded: the Chinese government facilitates their departure, but does not necessarily contribute monetarily to it. Also of note is the large portion of scholarships which are given to scholars and doctoral students, contributing directly to the strengthening of domestic capacity in the tertiary education sector.

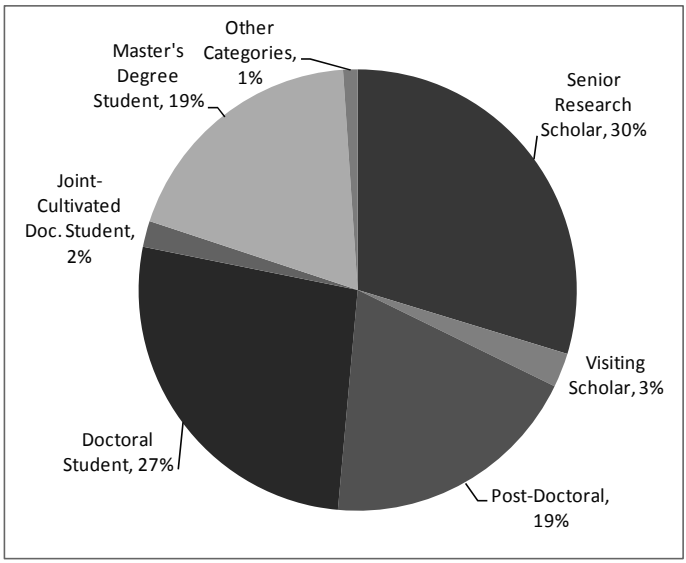
Despite having close to 80 times Chile's population, the absolute number of state sponsored Chinese graduate students is within the same order of magnitude. The comparisons do not imply that Chile should change its target numbers for the BCP (see Box 2.1).

Figure 2.2 **Recruitment of state sponsored study abroad programme from 1996-2008**



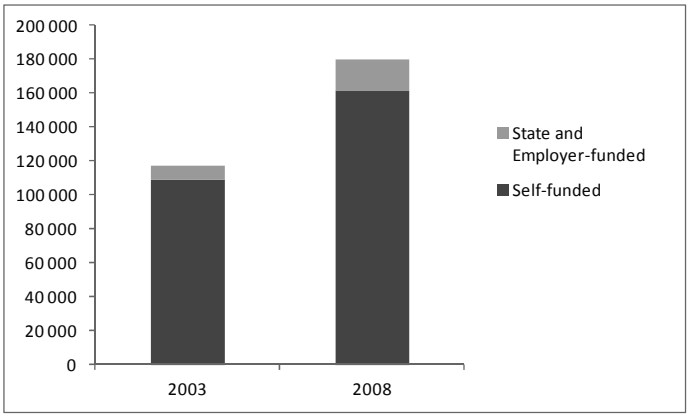
Source: Chinese Scholarship Council, Annual Report: 1999, 2000, 2001, 2002, 2003, 2004, 2005, 2006, 2007 and 2008.

Figure 2.3 **The distribution of scholarships across programmes**



Source: Chinese Scholarship Council, Annual Report 2008, p.8.

Figure 2.4 **The population of Chinese students studying abroad, 2003 and 2008**



Sources:

For 2008, quote from Zhang Xiuqin, Director-General of the Department of International Co-operation and Exchange under the Ministry of Education, WYSTC Blog, www.wystc.org/docs/blog/?p=411, accessed 3 August 2009.

For 2003, Ministry of Education, China, International Co-operation and Exchanges, "The Overall Situation of Studying Abroad", accessed 2 April 2010, www.moe.gov.cn/edoas/en/level3.jsp?tablename=1242702622613408&infoid=1253167200778185&title=The

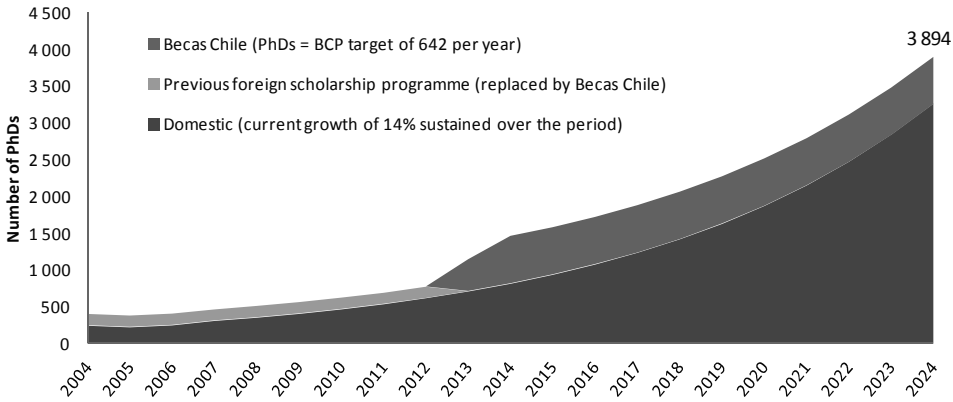
Box 2.1 **How much human capital should Chile produce?**

A broad consensus exists that Chile needs more high quality human capital. But how much, and by when? How much can the labour market absorb in the short, medium and long term? No one knows for sure, but there are educated ways to guess. Sending 30 000 students abroad in ten years might at first sound excessive: but is it?

The review team believes the amounts foreseen are reasonable, provided that Chile enacts the critical corollary policies outlined in this report. The BCP represents a 20% increase in the number of graduate students in Chile.[1] Several different approaches to projecting graduates and absorption capacity suggest that the labour market can absorb the graduates, especially over the long-term. It is best to consider the numbers from two perspectives: *(i)* in absolute terms; and *(ii)* relative to a comparator group of countries.

Consider PhD production. Within Chile, the number of PhD graduates has been growing at 14% per year. If one assumes that Chile's economy grows by roughly 4-5% per year (equivalent to 3-4% at purchasing power parity – PPP), per capita income will increase by 60% in 15 years. If domestic PhD production grows at its present rate, and the BCP achieves its targets, Chile will be producing approximately 3 900 PhD per year by 2024. This would be about 200 PhDs per million of (future) population, a figure safely within the OECD average. Figure 2.5 shows this calculation graphically, including the relative contributions from the BCP and domestic systems.

Figure 2.5 **Growth of annual PhD production in Chile**



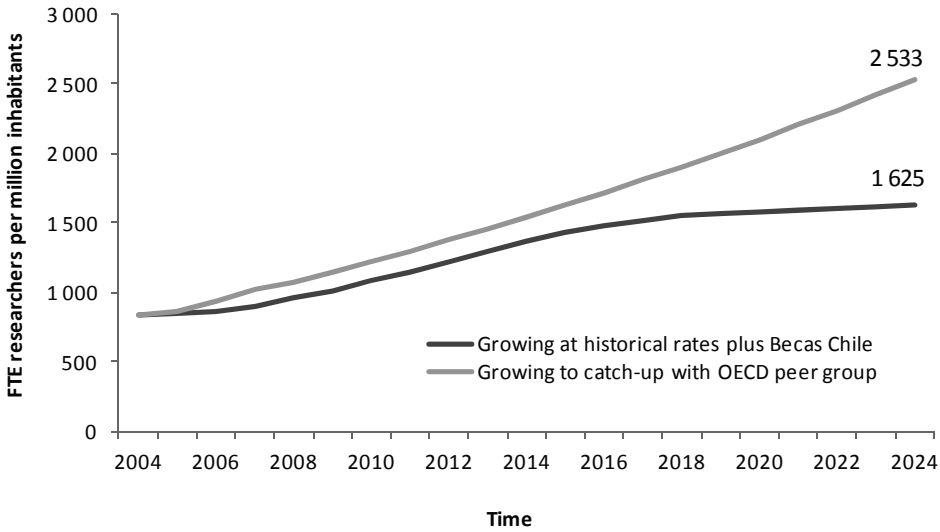
Source: Review team analysis.

The assumption of 14% growth over the next 15 years is unrealistic. In reality, the BCP and the domestic system are likely to compete for the same candidates, slowing enrolment rates and graduate production. Chile needs to pay close attention to this competition as it emerges and carefully adjust programmes to ensure harmonious growth of the domestic graduate system along with the BCP.

A more sophisticated model might be used to estimate the effect of the BCP on full-time equivalent (FTE) researchers per million of population. The current figure (2004) for Chile is 833. Staying with the 15 year time frame, one would want to look at the corresponding figure for OECD countries with roughly twice Chile's 2004 figure of USD 11 500 GDP per capita at PPP. The nine countries in this peer group[2] have an average of 2563 FTE researchers per million of population. Chile would need to triple its researcher population to equal this average.

Figure 2.6 projects Chile's increase in FTE researchers over the period, with a few simple assumptions: *(i)* two-thirds of BCP PhD grantees finish their degrees and return to Chile, and 70% of all PhD graduates (BCP and domestic) become researchers; *(ii)* three-quarters of BCP Master's grantees return to Chile and 25% of all Master's degree recipients (BCP and domestic) become researchers; *(iii)* Chile's population grows at 1% per year; *(iv)* three point three percent (3.3%) of current FTE researchers retire or otherwise leave research per year. Under these again optimistic assumptions, Chile will only close half the gap that currently separates it from the peer group.

Figure 2.6 **Chile's full-time equivalent (FTE) researchers per million inhabitants**



Source: Review team analysis.

Two things should be kept in mind: first, the peer group spends 0.39% more of its GDP on R&D than Chile does (1.06% versus 0.67%). Unless Chile further raises its investment in R&D, it will be hard pressed to absorb these researchers. In fact, experience shows that public investment usually precedes private investment in R&D. The Chilean government doubled public spending on R&D between 2005 and 2009, and a new tax was introduced to encourage greater business R&D investment. Continuing efforts will be required to further enlarge gross national R&D spending as a percentage of GDP.

Second, despite their proportional consistency, large absolute numbers of graduates will come onto Chile's labour markets. The single most important thing Chile can do to absorb these is continue investing in R&D, but it is critically important to implement the other measures discussed in this report to incentivise and facilitate return and reintegration of graduates. It is also important to think strategically and flexibly about short-term, medium-term and long-term mechanisms that can be used to help Chile achieve its goals.

Of course, other assumptions will lead to other figures. What is most important is that Chile monitors the relevant figures and uses the information in an ongoing manner as it considers how to fine tune its overall human capital development policy.

Notes:

1. Chile has roughly 21 000 Master's Students, most of whom are enrolled in two year programmes. Annual new enrolments are slightly more than 10 000 and the BCP provided close to 1 200 Master's scholarships in 2009, or 12%. PhD domestic enrolment is about 3 600, and PhD programmes take about four years to complete. Annual new enrolments are about 900. Becas Chile provided 939 PhD scholarships in 2009, or roughly 100% of new domestic enrolments. The weighted average of the two percentages equals 20% of overall graduate enrolment.
2. Spain, Greece, New Zealand, Korea, the Czech Republic, Portugal, Hungary, Slovakia and Poland comprise this group: their average GDP per capita at PPP is USD 21 700.

Key statistics

Applications for scholarships abroad

Applications in 2009 totalled 4 655, of which 73% were for Master's degree courses (the technicians programme was only called in 2010). There was a reasonable gender balance, except in the case of PhD applications where males were strongly represented. The ratio of Master's to Doctorate applications possibly reflects two main factors, the length of time that applicants are willing to spend abroad, and their preparedness for PhD study. As shown in Table 2.7, there was a reasonable gender balance at the Master's level, but for all other scholarship types males commanded a larger share than females. Nevertheless, this still represents significant progress compared to the situation previous to Becas Chile, when on average only 34% of Master's and doctoral scholarship holders were female, according to MIDEPLAN figures for the period 2000-2005. The gender shares of scholarship recipients reflected the application shares.

Table 2.7 **Applicants by gender and type of scholarship**

Gender	Master's	Doctorate	Post doctorate	Doctoral Sandwich programmes	Master's Education Professionals	Total	Total (%)
Female	1 665	405	17	49	66	2 202	*47.3*
Male	1 717	627	23	53	33	2 453	*52.7*
Total	3 382	1 032	40	102	99	4 655	*1*

Source: Becas Chile Executive Secretariat.

Scholarships awarded

In the first round of doctoral scholarships, a broadly consistent apparent relationship can be seen between the shares of applications and awards. In some cases (*e.g.* mining, tourism, biotechnology, education, environment) the share of awards is less than the share of applications. The reverse is the case in other areas (*e.g.* public safety, food industry, global services) including for applications where a priority was not specified. The largest participating areas are the social priorities of public policy, education, health and environment. In the economic priorities there are much smaller numbers.

Table 2.8 **Doctoral applications and awards, first round**

Priority areas	Applications		Awards	
	Number	%	Number	%
Public Policy	216	20.9	93	21.0
Education	237	22.9	90	20.4
Health	111	10.7	49	11.10
Environment	103	10.0	42	9.50
Energy	43	4.2	25	5.70
Information and Communication Technology (ICT)	46	4.5	16	3,6
Biotechnology	46	4.5	18	4.10
Public Safety	29	2.8	15	3.4
Food Industry	23	2.2	12	2.70
Global Services	17	1.6	10	2.30
Housing	15	1.5	6	1.40
Aquaculture	14	1.4	7	1.60
Mining	21	2.0	6	1.40
Tourism	14	1.4	5	1.10
No declared Priority Area	98	9.5	48	10.90
Total	1 033	100.0	442	100.0

Source: Becas Chile Executive Secretariat.

Table 2.9 **Doctoral applications and awards, second round**

Priority Area	Applications		Awards	
	Number	%	Number	%
Aquaculture	23	1.88	7	1.30
Food Industry	33	2.70	12	2.23
Biotechnology	61	4.99	27	5.01
Education	263	21.50	106	19.67
Energy	49	4.01	21	3.90
Environment	167	13.65	90	16.70
Mining	25	2.04	9	1.67
Public Policy	216	17.66	86	15.96
Health	108	8.83	42	7.79
Public Safety	16	1.31	5	0.93
Global Services	12	0.98	4	0.74
Information & Communications Technology	53	4.33	26	4.82
Tourism	8	0.65	4	0.74
Housing	21	1.72	10	1.86
No declared Priority Area	168	13.74	90	16.70
Total	1223	100.00	539	100.00

Source: Becas Chile Executive Secretariat.

Similar patterns can be observed in the second round. The economic priorities are relatively lower than for the first round. Non-declared applications achieved a higher success rate.

In the first round of Master's applications there was no identification of priorities. In the second round, as shown in Table 2.10, a pattern of prioritisation similar to that seen for Doctorates can be found but, surprisingly, with an even lower representation of economic priorities. Around 60% of Master's awards were in public policy, education and environment fields.

Table 2.11 shows that health, education and environment were strongly represented in sandwich programmes, with biotechnology featuring at a much higher level than for other scholarship types. Post-doctoral scholarships, at a much lower volume, were more evenly spread.

Table 2.10 **Master's applications and awards, second round**

Priority Area	Applications		Awards	
	Number	%	Number	%
Aquaculture	52	1.22	9	1.16
Food Industry	88	2.07	10	1.29
Biotechnology	56	1.32	10	1.29
Education	836	19.67	165	21.24
Energy	249	5.86	42	5.41
Environment	520	12.23	120	15.44
Mining	111	2.61	23	2.96
Public Policy	879	20.68	174	22.39
Health	397	9.34	65	8.37
Public Safety	45	1.06	10	1.29
Global Services	280	6.59	30	3.86
Information & Communications Technology	204	4.80	35	4.50
Tourism	88	2.07	9	1.16
Housing	197	4.63	28	3.60
No declared Priority Area	249	5.86	47	6.05
Total	4251	100.00	777	100.00

Source: Becas Chile Executive Secretariat.

Table 2.11 **Sandwich and post-doctoral programme applications and awards**

Priority Area	Sandwich programmes				Post-doctoral programmes			
	Applications		Awards		Applications		Awards	
	Number	%	Number	%	Number	%	Number	%
Public Policy	4	3.88	3	3.57	3	7.14	3	10.34
Education	12	11.65	10	11.90	8	19.05	4	13.79
Health	30	29.13	21	25.00	7	16.67	6	20.69
Environment	12	11.65	10	11.90	5	11.90	2	6.90
Energy	5	4.85	5	5.95	3	7.14	3	10.34
ICT	7	6.80	5	5.95	3	7.14	2	6.90
Biotechnology	15	14.56	14	16.67	1	2.38	1	3.45
Public Safety	1	0.97	1	1.19	1	2.38	1	3.45
Food Industry	4	3.88	3	3.57	2	4.76	1	3.45
Global Services	0	0.00	0	0.00	0	0.00	0	0.00
Housing	0	0.00	0	0.00	0	0.00	0	0.00
Aquaculture	2	1.94	2	2.38	1	2.38	1	3.45
Mining	3	2.91	3	3.57	2	4.76	1	3.45
Tourism	0	0.00	0	0.00	0	0.00	0	0.00
No declared Priority Area	8	7.77	7	8.33	6	14.29	4	13.79
Total	103	100.0	84	100.0	42	100.0	29	100.0

Source: Becas Chile Executive Secretariat.

As seen in Table 2.12, a noticeable feature is the youth of participants, with some 60% being aged less than 30 years. Thus the BCP does not merely promote the transfer of talent abroad; it also promotes a concentration of young talent abroad. It is not that there are skewed incentives in the points system for encouraging younger participants but rather that the circumstances of younger people, in the rounds conducted so far, enable them to take up wider mobility options than those with family responsibilities. The age imbalance may be corrected to some degree with the future offering of technical, teacher education, post-doctoral and health speciality scholarships, which tend to involve shorter-cycle programmes.

Table 2.12 **Selected students by age (2009 second round)**

Age	Master's	% Master's	PhD	% PhD	Total	Total by %
20-24	57	8.9	62	12	119	10.1
25-29	387	60.6	254	47	641	54.4
30-34	147	23.0	141	26	288	24.4
35-39	39	6.1	60	11	99	8.4
40-44	7	1.1	14	3	21	1.8
45-49	1	0.2	7	1	8	0.7
50-54	0	0.0	1	0	1	0.1
55-59	1	0.2	0	0	1	0.1
Total	639	1	539	1	1 178	100

Source: Becas Chile Executive Secretariat with data provided by CONICYT.

As shown in Table 2.13, five countries (United States, United Kingdom, Spain, Australia and Canada) represented the destination of choice for 85% of Master's scholarships and 80% of Doctoral scholarships. Latin American countries (Argentina, Brazil, Mexico) accounted for only 3% of Master's and 2% of Doctoral scholarships. The review team was advised that the leading six universities in the United States and top five in the United Kingdom account for some 60% of PhD students with BCP scholarships. The question arises, as discussed in Chapter 4, whether the operational design of the BCP, particularly through its weightings for whole-of-university reputation, limits study opportunities for students by field.

Table 2.13 **Selected students by destination country as stated in their first preference (2009 second round)**

Master's			Doctorate		
Country	**Number**	**Percentage**	**Country**	**Number**	**Percentage**
United States	180	28.17	United States	194	36.0
United Kingdom	176	27.54	Spain	89	16.5
Spain	76	11.89	United Kingdom	85	15.8
Australia	68	10.64	Australia	33	6.1
Canada	40	6.26	Canada	29	5.4
Germany	23	3.60	Germany	28	5.2
France	16	2.50	France	23	4.3
Netherlands	10	1.56	New Zealand	17	3.2
Argentina	10	1.56	Italy	7	1.3
New Zealand	9	1.41	Argentina	6	1.1
Mexico	6	0.94	Brazil	5	0.9
Switzerland	6	0.94	Switzerland	5	0.9
Italy	5	0.78	Netherlands	4	0.7
Belgium	3	0.47	Denmark	4	0.7
Brazil	3	0.47	Ireland	2	0
Ireland	2	0.31	Belgium	1	0.2
Sweden	2	0.31	China	1	0.2
China	1	0.16	Czech Republic	1	0.2
Denmark	1	0.16	Norway	1	0.2
Norway	1	0.16	Austria	1	0
South Africa	1	0.16	India	1	0
			Portugal	1	0
			Sweden	1	0
Total	639	100	Total	539	100

Note: In the case of Master's and Master's for Education Professionals, missing data was not provided by selected candidates.

Source: Becas Chile Executive Secretariat with data provided by executing agencies.

Key design principles

Becas Chile as a comprehensive approach to advanced human capital formation abroad

The BCP provides support for students to undertake academic, professional and technical training, and it recognises the utility of graduates for public and private employment. Operationally, the BCP is intended as an umbrella programme covering a variety of types of support for students abroad.

Becas Chile as a student-driven initiative

The BCP is designed interestingly as a student driven initiative, to the extent that individual participants in post-graduate studies identify what and where they want to study (technician and teacher participants are more directed to areas of study). Payments are made, like vouchers, directly to the selected students themselves in the case of stipends for living costs, and by the BCP administering agency on behalf of the student in the case of grants for tuition costs. This student demand driven model contrasts with conventional models where institutions are funded for the programmes they supply. The former design promotes greater student choice and is more responsive to varying student needs and circumstances, but lacks the predictability of the latter approach. Fully student demand-driven systems can result in shortfalls of graduate output to meet labour market requirements. However as the BCP supplements Chile's primarily supply-driven approach to domestic higher education, it can work to augment opportunities for students and stimulate innovation in the domestic system as local institutions take notice of student interests.

Becas Chile contributing to national innovation needs

At the core of the BCP design is a duality of purpose. Alongside the student-driven incentives, the government has articulated specific purposes of the BCP. Of particular interest are the intentions to synchronise the BCP with the higher education policies of the Ministry of Education and co-ordinate the BCP with the National Innovation Strategy. Yet, as seen in Figure 2.7, there appears to be very little weight – typically 1 point out of a possible score of 33 points – given to national priorities in the assessment of applicants for scholarships. The points for relevance to national priorities are awarded following the evaluation of academic record and programmatic quality. The operational implications of this shortcoming in the policy design are considered in Chapter 4.

Becas Chile as an innovative exemplar in public policy and administration

Within the Chilean context the BCP is administratively innovative in several respects. It offers a one-stop-shop for applicants and a single web page for on-line applications. It provides a framework that permits a consolidation of general criteria for selection processes, benefits and payback. And it enabled absorption of pre-existing scholarships programmes, including the Programme for Technicians Abroad and the BECAS *Presidente de la Republica* (MIDEPLAN).

The BCP contains a number of equity features, including tuition waivers for foreign language learning for participants from low income quintiles, incentives for women, and reduced obligations of returning participants who take up employment in regional areas, whether with public or private organisations. It provides scholarships for technical training and professional development, with a systemic benefit of helping to raise status of Technical and Vocational Education and Training (TVET).

The BCP is designed also to enhance the quality of learning experiences, firstly by opening up opportunities internationally for students to access new ideas and different cultures, and secondly by giving preference to universities that are rated among the top 200 in the world.

The assessment of applications by field experts relies on judgements about the quality of particular areas of scholarship within universities, but, as discussed below, such judgements can be variable. With regard to the weight given to the reputation of universities as part of the selection process, the currently available "league tables" and other world rankings have notable drawbacks. In particular, as institution-wide aggregates they tend to reflect the Anglo-American variants of the research university model, especially those with medical schools and large natural science departments, for which the available metrics are mostly suited. As a consequence, the rankings can miss very prominent peaks of intellectual capacity and performance in particular fields outside the model research universities. Even for PhD students the use of world rankings can limit student choice, but it is especially narrowing for those seeking professional, creative and technical skills development.

A more nuanced approach to identifying the quality of education and training by field of research and education would be more appropriate. Field-specific indicators are published by various disciplinary bodies and by research publishing companies (*e.g.* citations impact metrics).

Assessment of applications

Individual student applications are assessed by appointed evaluators, themselves selected on the basis of their expertise in particular fields of education, research and/or professional experience. The evaluators are asked to assign points for each applicant against set criteria. The criteria are set and the allocation of the weights is determined in the particular application guideline for each process.

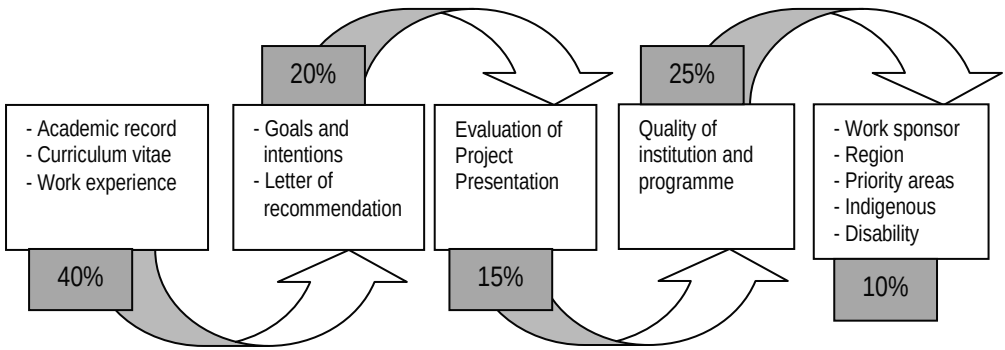
Applications are first processed administratively and then passed to two evaluators, whose judgements are translated into a single numerical score. The evaluator judgements are made with reference to:

- Academic excellence of the applicant;
- Student background: *Curriculum Vitae* and letter of recommendation;
- Letter of intent: academic coherence and research project;
- Quality of the institution at which the applicant seeks to study.

Applications are then sent back for final administrative checking, including the award of bonus points for particular characteristics of applicants and proposed study areas (work sponsor, regions, indigenous, disabled, and priority areas). The applicants for each scholarship type are then ranked by their final score. The rankings are then considered by a single selection committee which sets the "cut-off" point for a scholarship type, having regard to the quality of the students just above and below different cut-off point options. The committee's finally determined cut-off score is applied across all applications for a particular scholarship type, (*e.g.* all PhD scholarships), irrespective of fields of study within a scholarship type.

Figure 2.7 shows the broad process for the evaluation of BCP applications and the award of scholarships. This schematic shows that the total of criteria shares exceeds 100%. The bonus points reflect the new features of the programme design, intended to increase equity and relevance of study opportunities. The bonus points are given after the evaluators have provided their assessments.

Figure 2.7 **BCP General Evaluation Process for post-graduate studies**



Note: Weights and items may vary by scholarship type.
Source: CONICYT, Illustration of second round for PhD applications.

Compared to many OECD countries, Chile's history has given rise to a high level of unease with regard to the exercise of discretion in decision making. Subjective judgements are seen to be opaque and prone to bias. Hence, deliberate efforts have been made to make the evaluation process as objective as possible. This effort is reflected in the points-based approach to participant selection and the use of metrics to guide judgement. Nevertheless, there is considerable room for individual judgement, for instance in weighing the value of different letters of recommendation, and in appraising the quality of international institutions and programmes. The numerical point system is under particular stress because applicants have no standardised test available to measure academic aptitude or achievement. In this respect, the guidelines envisage institutional and programme quality being based one-third on available metrics (*e.g.* world university rankings) and two-thirds on professional judgement.

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

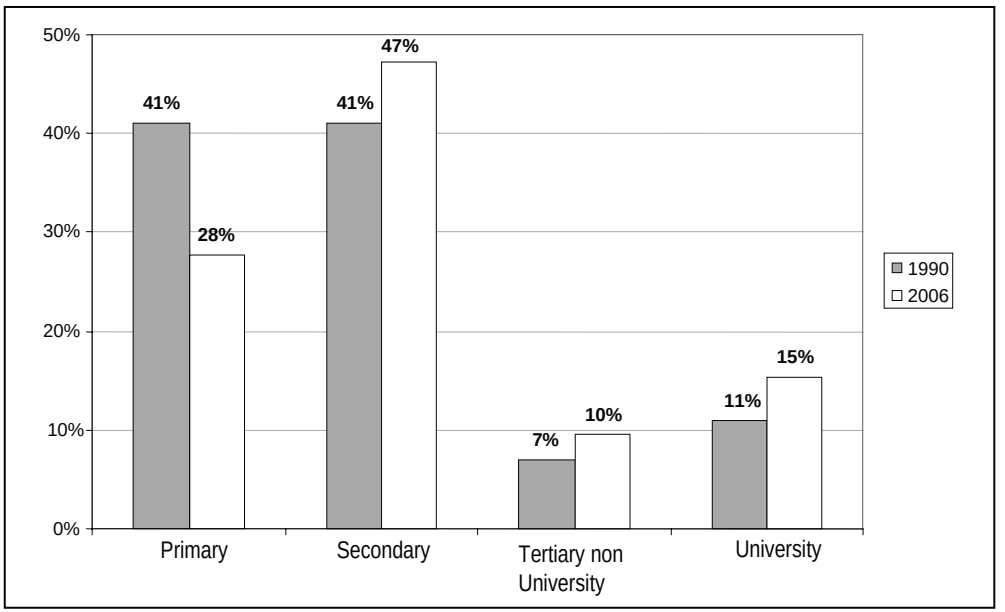
Enterprises, along with public sector organisations, increasingly need employees trained at tertiary level. It is not easy to come up with economic estimates of underperformance of the economy due to the lack of skills and training at tertiary level. The OECD/World Bank Review of Tertiary Education in 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**

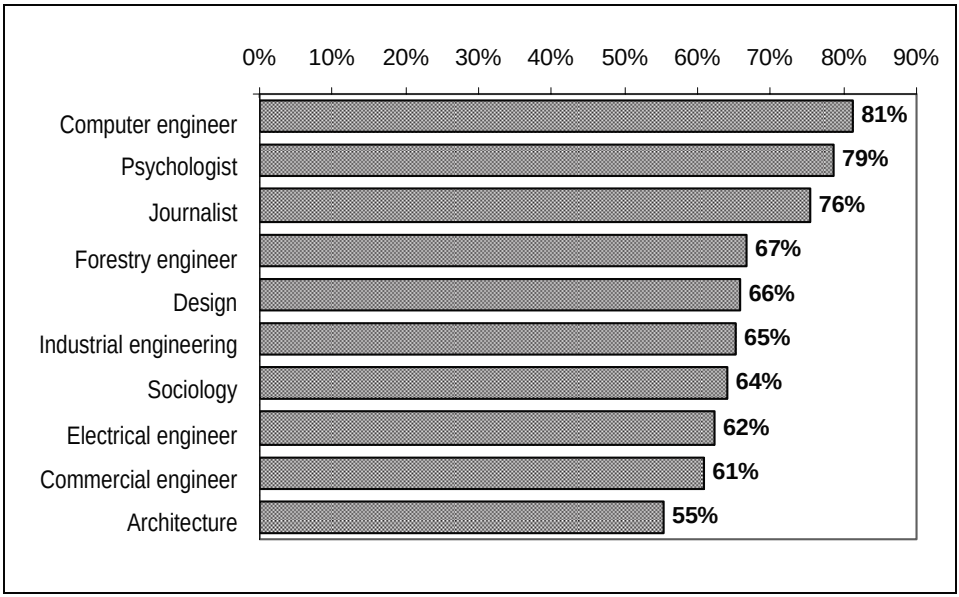


Source: MINEDUC (2007), Country Background Report of Chile, prepared for the OECD/World Bank Report, *Reviews of National Policies for Education: Tertiary Education in Chile*; authors' calculations from CASEN surveys 1990 and 2006.

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.futurolaboral.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, al 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%) (Namgung, 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 (Nangumg, 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 is 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*).

Chapter 4: Operational and Institutional Challenges

This chapter highlights the operational and institutional challenges facing the Becas Chile Programme (BCP). First, the programme's current legal and administrative framework is outlined. Next, an account of operational problems and possible solutions are illustrated. Particular emphasis is made on the applicant evaluation and selection process. The ambiguity of Becas Chile's institutional roles and responsibilities are analysed, highlighting the implications for governance, day-to-day operations and inter-agency co-ordination. Concerning Becas Chile's role in activities related to the development of advanced human capital, proposals are made after an in-depth review.

Legal and administrative framework

The 2009 Budget Law legally created Becas Chile. Supreme Decree No. 644, signed by the President and the Ministers of Education and Finance of Chile on 29 December 2008, regulated the programme. President Bachelet instructed that an Inter-Ministerial Committee be established to be co-ordinated by the Minister of Education. Such a Committee was to include the participation of the ministers of Finance, Foreign Affairs, Planning, and Economy, as well as the President of the CNIC. An Executive Secretariat was formed as the intermediating agency for policy co-ordination, housed within the Ministry of Education (MINEDUC). Specific operational responsibilities were assigned to various agencies. CONICYT has the primary role in the administration of the post-graduatre scholarships, including the allocation of scholarships and payments to beneficiaries. MINEDUC, through the Centre for Pedagogical Improvement, Experimentation and Research (CPEIP), the Languages Open Doors Programme (PIAP) and the Higher Education Division, has the primary role in the administration of scholarships for teachers and technicians.

Operational challenges

Difficulties with administration of the Master's and PhD scholarships in 2009 gave rise to problems with public confidence in the programme. The government took decisive action including major changes to senior personnel in CONICYT. Several factors were cited as contributing to the problem:

- The implementation processes for such a significantly enlarged programme, with a multiplicity of separate schemes brought under a single programme umbrella, were too rushed.
- Information available to applicants was not sufficiently clear and comprehensive to enable applicants to prepare their applications properly in the time available.
- Information available to evaluators was in some cases not sufficiently clear or comprehensive enough to allow them to make the best judgements about the relative strengths of the greatly expanded range of foreign institutions to which students could apply.
- Limited involvement of the academic community and enterprises in the conceptual and design stages of BCP development led to a lack of ownership of the programme by this important group of stakeholders.

These matters are considered below, as each of them will need to be addressd in the effort to build confidence in the programme going forward.

In general, implementation of the BCP was too rushed. There was insufficient lead time to prepare potential participants and evaluators, to develop information and materials to guide choice and decision making, and to involve people in the process.

Importantly, the BCP selection procedures allow for an undesirably high degree of variability. Evaluators estimate programme and institutional quality individually. This could lead to a situation where two students who apply to the same programme might receive very different qualifications for quality based on differing perceptions of evaluators. It also allows for "spill-over effects" of institutional quality onto programme quality; lesser quality programmes at institutions with higher overall reputations get over-rated while higher quality programmes at institutions with lower overall reputations get under-rated.

Moreover, applicants did not always have adequate information to guide their applications. The review team was advised that many students were unclear about the criteria for describing their personal objectives in applying for a scholarship, and about what was involved in taking on a post-graduate

programme in a foreign country. Additionally, it was suggested that some students may have been encouraged by the weights given for institutional quality to make their applications in respect of institutions they believed would score highly, without knowing much about the institutions, particularly in their preferred areas of study, and without any idea of their prospects for acceptance by those institutions. However, Table 4.1 shows a reasonably high proportion of applicants being accepted into their first or second preferences. Additionally, to the extent that world rankings are meaningful, a higher proportion of BCP post-graduate students went to highly rated institutions – 45% of BCP students went to the top 50 Times Higher Institutions compared with barely 20% of pre-BCP schemes.

Table 4.1 **Proportion of scholarship holders accepted by stated preference**

Applicant Preferences	Master's (%)	Doctorate (%)
First	78.0	86.8
Second	16.3	7.1
Third	5.4	6.1
Fourth	0.3	0.0
Total	100.0	100.0

Source: Becas Chile Executive Secretariat.

Finally, insufficient involvement of the academic community and enterprises in the conceptual and design stages of BCP development led to some disaffection for the initiative and disengagement from it. In several respects the BCP was not seen as meeting the needs of either tertiary institutions or enterprises, and in some cases the initiative was perceived as undermining the efforts of institutions and enterprises to build their capacity. The review team understands that such views can reflect other self-interested pursuits on the part of the institutions, and that a momentum for reform sometimes needs to built up initially by overcoming cultural resistance and avoiding provider capture. Nevertheless, it is important as the programme matures for the academic community to commit to such initiatives, especially as they provide advice for students on where to study, write references for scholarship applicants, and are a major source of evaluators of applications. It is no less important for enterprises and employer organisations to commit to such initiatives, in order to strengthen employer involvement so that labour market needs are reflected in programme design and evaluative criteria.

Problems with the selection process

It is necessary to improve the consistency of the BCP selection process for scholarship recipients, reducing undesirable variability, effectively integrating diverse policy goals and ensuring that the numerical scoring system effectively functions. Currently, the system possesses some drawbacks that may limit its ability to identify the optimal set of candidates. The main sources of these deficiencies are:

1. Ambiguity in the assessment guidelines themselves: the BCP guidelines should provide reviewers with clear guidance on how to assess the numerous competing factors that comprise the overall score for an applicant. A brief look at Figure 2.7 in Chapter 2 provides examples of potential ambiguity:
   a) how should a candidate with good grades from a less selective undergraduate institution be ranked versus a candidate with mediocre grades from a very selective undergraduate institution?
   b) In assessing academic record, how should one assess a candidate who has a Master's degree from a domestic institution and seeks a second Master's from a foreign institution? Is the possession of a previous degree of the same type a positive or a negative? What if the candidate seeks a PhD and already has a Master's degree?
   c) In considering a candidate's statement of goals and intentions, what is the proper way to balance a student's desire for personal achievement with his or her desire to make a social contribution?
2. Imprecision in the definition of national priorities; ill-considered reliance on self-reporting by applicants to determine whether and to what extent the proposed courses of study reflect national priorities.
3. Poor communication with the reviewers. Some reviewers felt they received incomplete instructions on how to carry out the review of applications.
4. Lack of systematic feedback from reviewers and evaluators to improve subsequent rounds of selection.
5. Limited ability to distinguish between institutional and programme quality. Some 30% of the weight for institution/programme performance is given to whole of the institution ranking, the remainder is based on evaluator assessment at sub-institutional level. Institutional rankings and reputations are aggregates reflecting average quality, but quality can vary significantly from programme to programme, especially at the PhD level, where departments are small and the presence of a few academics can make an enormous difference. As presently construed, the

assessment of institutional quality in the BCP rankings may allow some candidates who apply to mediocre programmes at overall good schools to benefit, while possibly penalising candidates who apply to superior programmes in otherwise less distinguished institutions.

6. Possible "saturation" or overload of reviewers with too many applications. Realistically, there is a limit to the number of candidates a reviewer can appropriately assess, and the BCP may have pushed close to this point for some reviewers in its initial rounds.

7. Over-reliance on the point system to rank candidates in order of merit; unwarranted faith in the numerical scoring system to accurately reflect disparate measures of student potential and programme goals.

Improving the BCP performance on these points is critical for the effective functioning of the programme, and hence for the public's confidence in it. Some of these issues can be easily remedied; others are complicated and require both a measured response and a re-organisation of how the BCP selection process is conducted.

Currently, the BCP posts selection criteria and application guidelines along with the calls-for-applications for a given round of funding. The agencies then receive applications and partially process them, focusing on the administrative aspects. The applications for Master's, PhDs, sandwich programmes, co-advised theses and post doctorates are then sent to at least two reviewers, who complete the review and scoring. The agencies then provide the ranked applications to the Selection Committee, which selects a "cut off" point for each degree type in turn. The "cut off point" is supposed to distinguish where the marginal quality of the ranked candidates goes from acceptable to unacceptable. However, given the deficiencies and variability inherent in the points listed above, the process should be changed in several ways to make it more effective.

Directions for process improvement

The two main changes that this reports suggests are: *(i)* the revitalisation of the Oversight Committee[1] to set clear general policy for the selection process in a way that minimises potential variability and inaccuracy, and that properly incorporates programme goals; and *(ii)* the creation of specific "panel committees" in a variety of disciplines or areas to determine "cut off points" at a less aggregate level, and to provide other key judgments on specifics issues related to sub-groups of candidates.

The revitalised Oversight Committee may need to have its composition revisited to ensure the presence of senior management of the BCP and related agencies with responsibilities for human capital development

(CONICYT, MECESUP *et al.*) with members designated by the DIVESUP or the proposed Vice Ministry for Higher Education and Research. With its revised mandate, the Oversight Committee could provide solutions to mitigate problems 1-5 above in that it could:

- Create clear policies to guide selection and balance competing goals. This might include:

  a) Distinguishing where different treatment is required for different degree types. The Committee might decide, for instance, that Master's applications could have only two reviewers but that PhD applications require three, at least one of whom might be an international reviewer.

  b) Decide if undergraduate grades from different institutions should be treated uniformly by reviewers and panel committees.

  c) Decide whether and to what extent the socio-economic status (SES) of the applicant should factor in selection. The Committee could determine: *(i)* whether positive discrimination on the basis of SES should be a factor for all degree programmes, or only for Master's but not for PhDs; *(ii)* what measures will be used to determine SES; *(iii)* up to what age would a candidate's "family of origin" be considered the source of SES rather than current income and assets; *(iv)* how to implement SES as a factor of selection – should low SES candidates be given a bonus point or two? Or should high SES applicants be excluded from eligibility? Or should quotas be set for candidates by SES status?

  d) Determine how to count previous degrees – both domestic and/or foreign, by applicants. Should those who already have a Master's be excluded from getting a second? Should they have a point deducted? Does it matter whether the first Master's was domestic or foreign? Is it a positive or a negative if a previous Master's is in a different field from the proposed course of study? Should PhD candidates who already have Master's be ranked above or below candidates who come directly from undergraduate programmes? Should consideration be given to offering loans rather than grants to those applicants with a post-graduate qualification whose case for public support is not compelling?

  e) Elaborate on how to consider work experience, and how this ought to differ by degree type and programme.

  f) Provide heuristic models which indicate the highly desirable candidates from the less desirable ones.

- Add precision to the definition of national priorities. This could be accomplished in two ways:

  a) The Oversight Committee could review any list of priority areas and the weights that these have in the selection process. It could consider how to balance "vertical" priorities such as a perceived need for more specific expertise in areas such as renewable energy, aquaculture, advanced mathematics, business administration, biochemistry, etc., with "horizontal" needs such as for a greater critical mass of PhD researchers and potential academic staff for tertiary education. It would opine on whether it is best for the student, the reviewer, the Panel Committee or some combination to judge how the application reflects national priorities.

  b) As the proposed dual structure of the Committees (the Oversight Committee for general matters and Panel Committees for individual selection) implies that each Panel Committee would need to receive a "budget envelope", the Oversight Committee would *de facto* play a role in determining the priorities by having the authority to propose – for approval by the Inter-Ministerial Committee – differential budgets to different sub-programmes within the BCP. It would, for example, propose the amounts to the "Social Sciences Panel Committee" versus the "Life Sciences Panel Committee" based on the perceived relative need and priorities for human capital. However, in order to avoid the risk of a political competition between areas in order to get more budget and of accepting low-quality applicants just to fulfil the quota, it would be important for the Oversight Committee to establish minimum standards for academic quality which all candidates must meet; where there is budget available but no candidates who meet these minimum standards, the individual Panel Committees would not be free to make awards to substandard candidates. Unused resources from the budget envelopes would be returned to the Programme for reallocation and later use.

- ***Issue guidelines that respect different needs of different degree programmes***. This would be handled as part of the creation of clear guidelines, described in (1.a) above.

- ***Improve the handling of positive discrimination***. As partially described in (1.c) above, the Oversight Committee's guidelines would determine the weight given to special goals such as favouring qualified applicants from lower SES, indigenous Chileans, applicants from outside Metropolitan Santiago, who are disabled, etc. The Oversight Committee would not only determine how to initially include these criteria, but

would study if they were effective in directing the desired awards to candidates with special characteristics. Annual adjustments would be made to make the system more responsive.

- ***Assure high quality training materials are available for evaluators and committee members***. Such materials should anticipate and answer any reasonable questions evaluators or committee members might be expected to have. The materials should be available in easy-to-use formats such as training videos on a BCP website for reviewers.

- ***Oversee the solicitation of feedback and the analysis of selection process effectiveness and efficiency***. Information from one year's selection process should systematically contribute to the improvement of the next round, principally through changes instituted by the Oversight Committee.

The creation of Panel Committees would address problems 1-3 below and would facilitate the implementation of improvements made by the Oversight Committee. The BCP would need to decide on the exact Panel Committee Structure, but one imagines there would be one for Technician Programmes, one for Teacher Programmes, and then a variety of Disciplinary Panel Committees for the Master's, PhD, sandwich, co-advised theses and Post-doctoral Programmes (life sciences, social sciences, physical sciences, mathematics, and engineering, etc.). Separate Panel Committees might be desirable for the Institutional Development Sub-Programme and the Private Sector Internships Sub-Programme. In general, each Committee would be composed of 8-10 senior professionals with recognised standing in the given fields. The Panel Committees would mitigate the deficiencies described above by acting to:

1. ***Create a uniform ranking of programme/institutional quality by discipline***. Once all applications were received, specific panel committees would receive lists of the institutions and programmes which the relevant applicants had applied or to which they were intending to apply. With no reference to individual applicant names, each Panel Committee could group the programmes into three broad categories: *(i)* superior; *(ii)* highly suitable; *(iii)* other. The advantage of this system is that it would create a uniform ranking based on the specific knowledge of a group of active professionals on programme quality within institutions. This could mitigate both the variability of the individual reviewer judgments and the spillover bias of "institutional reputation" on individual programmes.

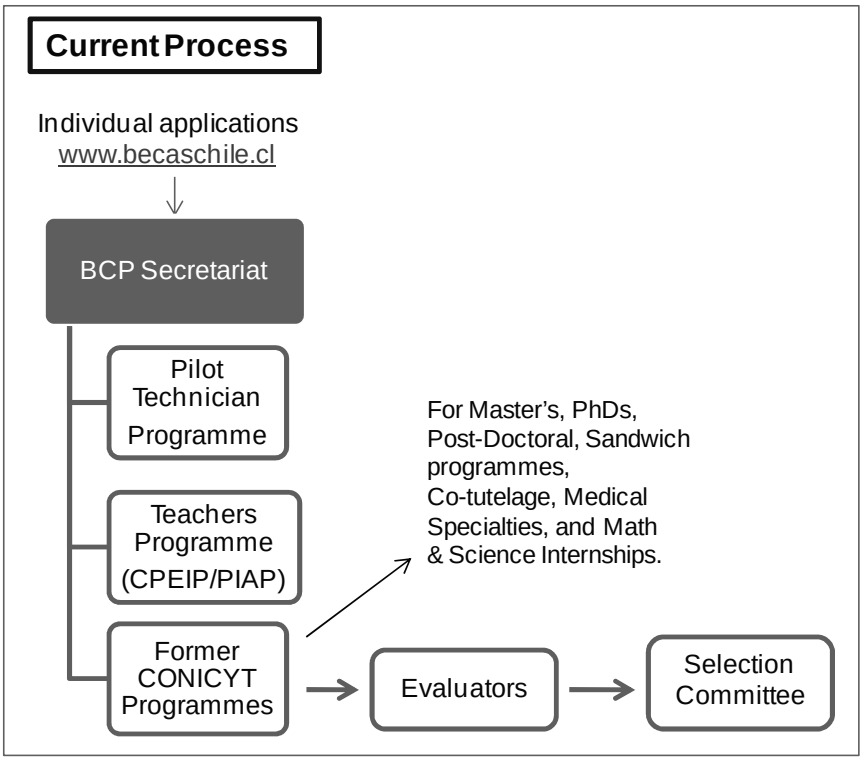
2. ***Monitor evaluator saturation and propose solutions where needed***. Each Panel Committee could monitor the workload of the individual evaluators, ensuring that they do not become overloaded. In cases where qualified candidates very clearly outnumber available spaces and where programme quality is uniform (in professional Master's programmes, for example), a Panel Committee might eliminate the bottom third of candidates to lessen the load on evaluators. This should only be done when needed and when the ratio of remaining candidates would be 3:1 or more – ensuring that pre-screening does not eliminate likely winners. In cases where two assessments deviate from one another by a significant margin, an applicant should be referred to a third evaluator.

3. ***Determine individual "cut off points" per Panel Committee to better reflect candidate qualifications***. Currently, the numerical point system appears to have no way to prioritise a solid biochemistry candidate against a "horde" of superior economics candidates. The result is that Chile will end up with a *de facto* prioritisation of academic excellence at the expense of disciplinary breadth. It is not clear that bonus points given for "national priorities" have enough weight to change this tendency – since these are currently very broadly construed. With Panel Committees, the individual budget allocations are already an exercise in priority setting: some excellent candidates in one area may not be selected because intra-disciplinary competition is high. The result will likely be a better overall distribution of scholarships reflecting national needs. General standards of excellence – respect for the minimum levels of acceptable quality as set by the Oversight Committee – can be maintained without making excellence in a vacuum the determining factor in selection.

The management of the BCP requested specific suggestions for improvement of the selection process as part of this report. The model proposed here is one way – but by no means the only way – of making needed changes to decrease variability and increase public confidence in the BCP selection process. The current process and the suggested new approach are depicted in Figure 4.1.

Additionally, both applicants and evaluators could benefit from the availability of information about the relative quality of international programmes and institutions. Pending the development of a Chilean system for qualifications recognition, use might be made of material developed by other countries about their education systems, qualifications frameworks and and institutional characteristics.

Figure 4.1 **Current process for applicant selection**

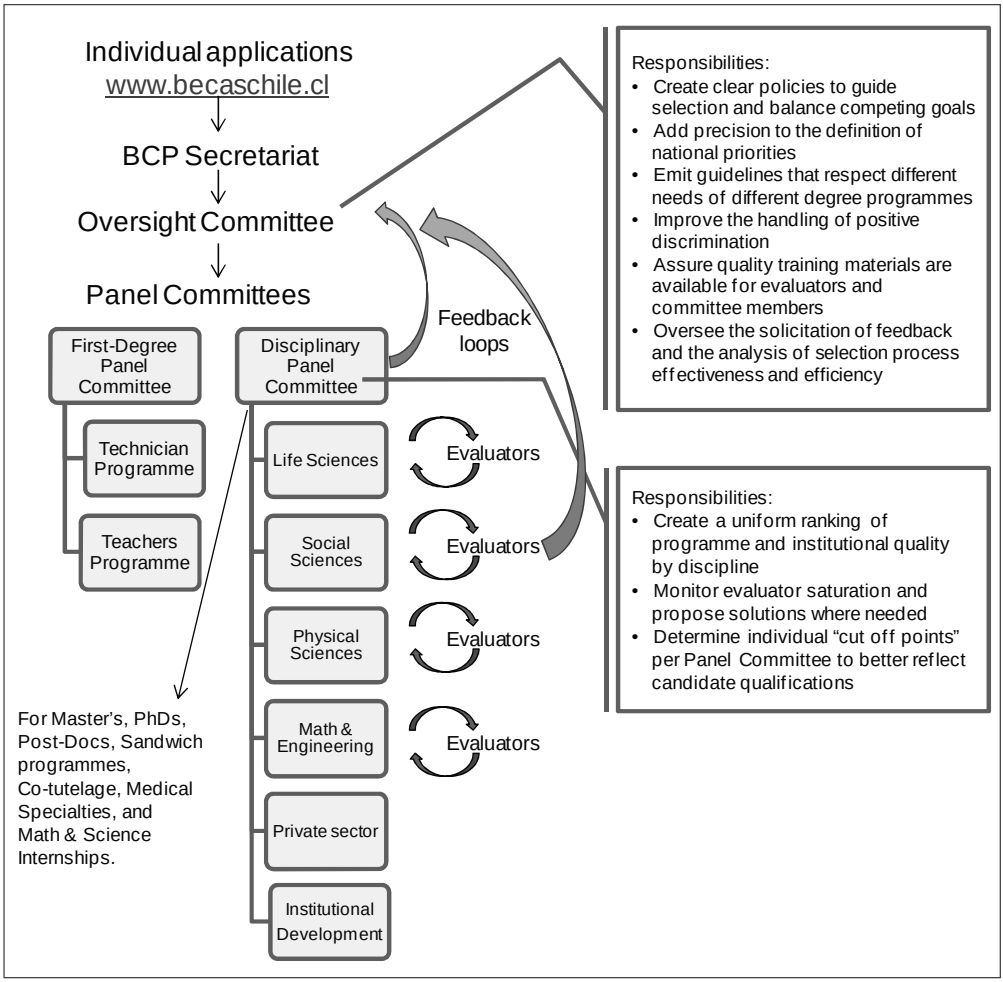


Source: Review team analysis.

Work is underway in various countries with a view to developing more nuanced comparisons of higher education institutions. A broad approach to the construction of "typologies" is being developed (See Van Vught *et al.*, 2005). One particular approach is that of the Centre for Higher Education Development in Germany, illustrated in Figure 4.3 for Physics, where Olympic games style "medals" are awarded where there are comparable qualitative performance metrics, and a hotel-style "stars" system is used for grouping institutions according to scale and shape factors.

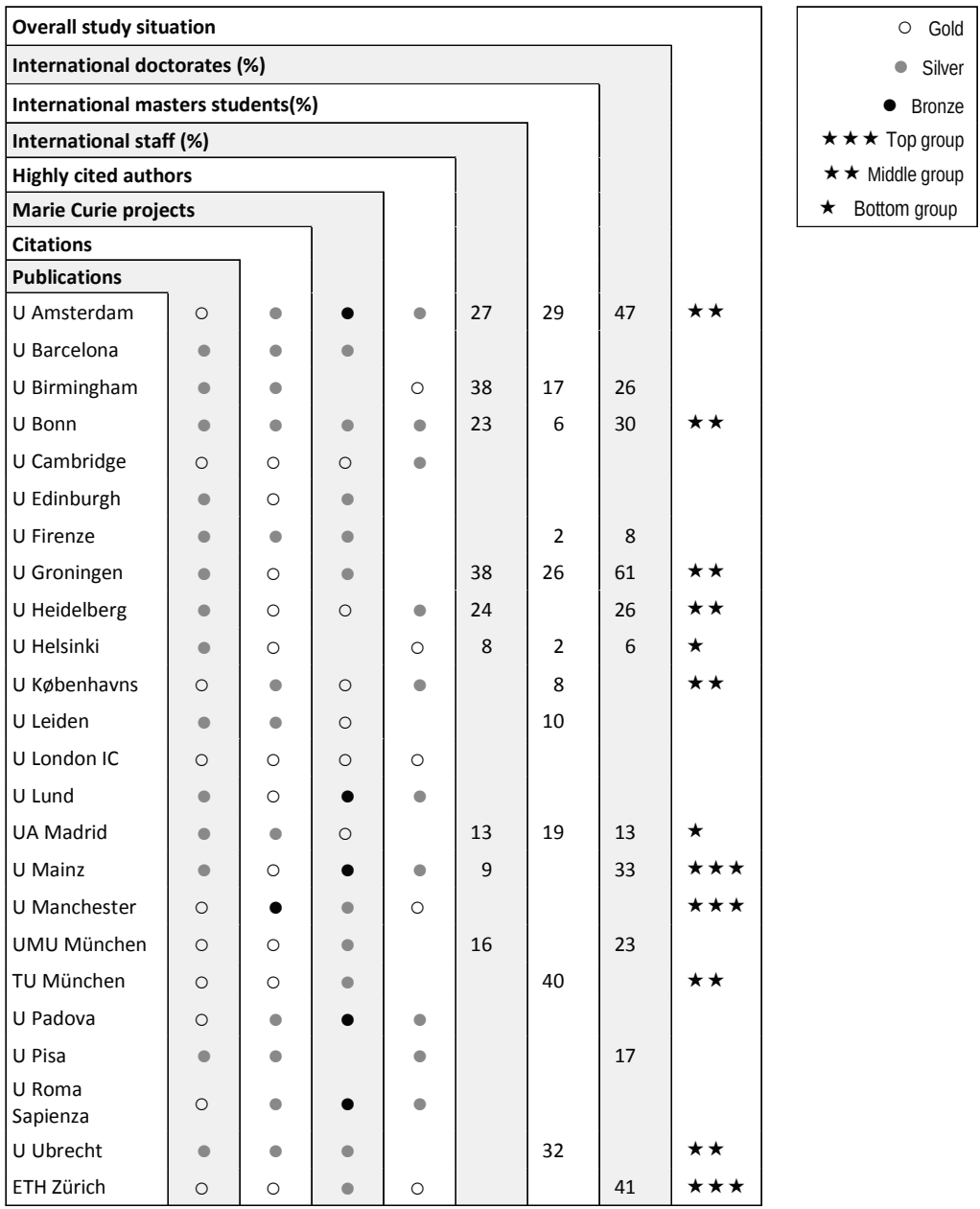
Finally, deliberate arrangements need to be made for engaging the academic and business communities in the development and evaluation of the programme.

Figure 4.2 **Suggested process for applicant selection**



Source: Review team analysis.

Figure 4.3 **Excellence Group: Physics, Centre for Higher Education Development in Germany**



U Amsterdam	○	●	●	●	27	29	47	★★
U Barcelona	●	●	●					
U Birmingham	●	●		○	38	17	26	
U Bonn	●	●	●	●	23	6	30	★★
U Cambridge	○	○	○	●				
U Edinburgh	●	○	●					
U Firenze	●	●	●			2	8	
U Groningen	●	○	●		38	26	61	★★
U Heidelberg	●	○	○	●	24		26	★★
U Helsinki	●	○		○	8	2	6	★
U Københavns	○	●	○	●		8		★★
U Leiden	●	●	○			10		
U London IC	○	○	○	○				
U Lund	●	○	●	●				
UA Madrid	●	●	○		13	19	13	★
U Mainz	●	○	●	●	9		33	★★★
U Manchester	○	●	●	○				★★★
UMU München	○	○	●		16		23	
TU München	○	○	●			40		★★
U Padova	○	●	●	●				
U Pisa	●	●		●			17	
U Roma Sapienza	○	●	●	●				
U Ubrecht	●	●	●			32		★★
ETH Zürich	○	○	●	○			41	★★★

Source: Adapted from the Centre for Higher Education Development, Germany.[2]

Institutional roles and responsibilities

The Budget Law and Decree 664 establishes roles for the different entities within the Becas Chile administrative structure. However, there is some ambiguity of intent and interpretation with regard to the decree. Various stakeholders indicated some confusion about agency roles and responsibilities in their representations to the OECD-WB review team.

In seeking to understand the impact of the BCP and its operational features, it is important to recognise that its administrative arrangements are quite new and that policies and procedures are still being developed. Additionally, some aspects of the initial conception of the programme have been adapting to unanticipated changes in circumstances. At the same time, entities previously involved in awarding international scholarships for Chileans – not only government based, but also independent and even international ones – were caught in the middle by the changes induced by the creation of an agency and continue to "negotiate" their revised roles.

Part of the confusion about the BCP's initial stage of operations has to do with three apparently conflicting points of view regarding its role and the chain of reporting authority, supervision and accountability within the government's bureaucracy. This results in various interpretations of Decree 664:

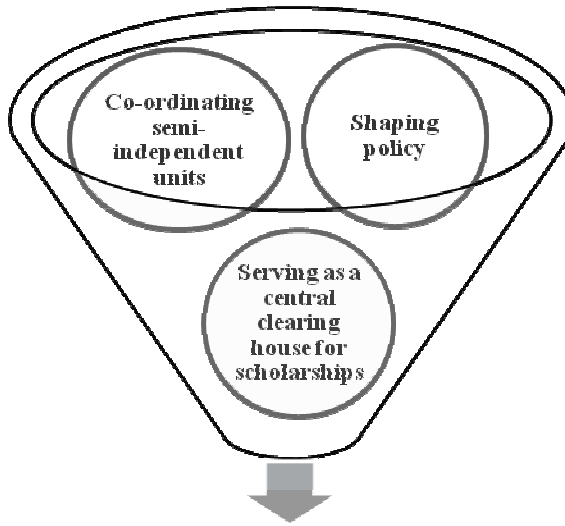
1. ***Shaping policy:*** The first of the interpretations made by some stakeholders is that Becas Chile has, or should have, a broader role at the policy level and a higher hierarchical status within the government structure. This viewpoint is reinforced by the fact that its Executive Secretariat is defined in the Decree as the "Executive Secretariat of the Inter-Ministerial Committee" rather than that of the BCP, and is thus entitled to present proposed programmes to the Inter-Ministerial Committee and is charged with the proper implementation of the ones that are authorised. The Executive Secretariat in this interpretation then assumes the role of official representative of the Inter-Ministerial Committee. Under this set of assumptions, it would seem that BCP is just ***"housed"*** at the Ministry of Education but informally has some higher type of status than the government entities offering scholarships. In fact, the management team for the BCP is accountable to the entire Inter-Ministerial Committee rather than to the Ministry of Education.

2. ***Co-ordinating and negotiating***: A second interpretation advanced by others is that Becas Chile does or should serve as a co-ordinating or liaison unit among government entities in matters related to the awarding of international scholarships. The perception here is that BCP would bring some order and sense of coherence to an otherwise uncoordinated and unclear set of discreet policies, entities and scholarships

which were developed over the years by separate government agencies. These include scholarship programmes handled by government agencies such as CONICYT, CPEIP, *Idiomas Abren Puertas*, etc. Given that most of the scholarship programmes are administered by units within the Ministry of Education, this interpretation sees BCP more as a unit ***"of"*** MINEDUC.

3. ***A Central Clearinghouse***: A third interpretation made by some is that Becas Chile is or should be merely a channel through which all scholarship opportunities should be advertised in a coherent and understandable way. This includes offering a user-friendly process and application form. For those inclined towards this approach, the BCP is or should be an on-line database of funding opportunities. Under this interpretation, it really becomes of little relevance whether BCP is a unit "housed" or "belonging" to MINEDUC.

Figure 4.4 **Various current interpretations of the role of Becas Chile**



Source: Review team analysis.

It is not argued that all three roles of BCP are in conflict or incompatible. In fact, at least two of them – co-ordinating the related work of semi-independent units and serving as a processing "central clearing-house" for scholarships – are highly related. Problems could arise however if, in addition to the aforementioned roles, BCP was also expected to serve as an entity which defines or shapes the national policies surrounding the preparation of advanced human capital. Not being explicit about the limits of the role of BCP is and could continue to be the cause of political and operational problems which may limit its future effectiveness.

Assignment of responsibilites

Two units comprise the organisational structure of BCP; they were established in the domains of governance and operations by Decree 664. A third domain of work has been established at the advisory level, mainly in response to criticisms associated with inefficiencies identified during the initial operations of the programme, and as a way to push for more effective results.

1. ***Governance level****:* According to Decree 664, the principal policy authority of BCP is the Inter-Ministerial Committee which has as its official functions "to define the policy, guidelines, strategies, programmes, work plans and goals of BCP regarding the formation of advanced human capital abroad" (Article 3, Decree 664). As explained earlier, the Inter-Ministerial Committee is presided over by the Ministry of Education. Most individuals consulted during the OECD-WB review visit agreed that it is the Ministry of Education which has the authority, expertise and resources to carry-out the co-ordination of the Inter-Ministerial Committee. This matter is discussed further below.
2. ***Operational level****:* At the operational level, the BCP's work is undertaken by the executive agencies (CONICYT, CPEIP, PIAP, etc) and co-ordinated by an Executive Secretariat, established under the supervision of the Ministry of Education. Its official role is "to provide technical and administrative support for the fulfillment of the objectives established by the Inter-Ministerial Committee." This role includes a specific mandate to "articulate activities" related to the awarding of international scholarships.
3. ***Advisory level***: This third level of activities, not officially established under the Decree 644, has emerged as a way to foster greater effectiveness in the work of those government agencies directly or indirectly involved in the awarding of scholarships. The Inter-Ministerial Committee, although central in defining the policy and goals for the BCP, would not easily function without the work of the staff of

the Ministries involved, either in the preparation of the meetings of the Committee or in following-up with the implementation of their decisions. Based on this perceived deficiency at the operational level, an Oversight Committee was established with the official role of "implementing the agreements, policies, strategies, programmes and instruments defined by the Inter-Ministerial Committee" (*Gobierno de Chile*, 2009). This Committee is composed of staff from the Ministries of Foreign Affairs, Finance, and Economy, as well as the head of the Advanced Human Capital Programme at CONICYT; and the heads of the MINEDUC programmes Technicians Going Abroad, Languages Open Doors (PIAP), and CPEIP. In addition, three Advisory Committees were created as a way to guide and legitimise the actions being undertaken by the BCP Executive Secretariat. Not officially established by Decree, these three commitees are: the Graduate Advisory Committee, the Technical Formation Advisory Committee and the *Ad Hoc* Pedagogical Advisory Committee. The first two of the three committees are presided over by the Minister of Education and each of them has the involvement of the Executive Secretary of BCP, as well as the participation of academicians and experts.

Although the organisational structure looks lean in general, operational problems are more linked to vagueness in the definition of the organisation's scope of activities and purview, which, unless they are more clearly determined, will continue to be a source of concern. This vagueness is exemplified by the way that the official Organisational Chart of BCP is presented on its Web site, where the impression is given that the authority of BCP over-rides that of the governmental units with which it is intended to work. Furthermore, the chart shows no formal relationship of authority from the Ministry of Education (see Figure 4.5). Additionally, the creation of a range of advisory committees has been met with some scepticism on the part of of the academic community. Some have perceived their association with the exercise to be primarily for public relations purposes, given that they have had only minimal involvement in the provision of advice. Others have indicated that these committees have had a real influence on the development of implementation guidelines.

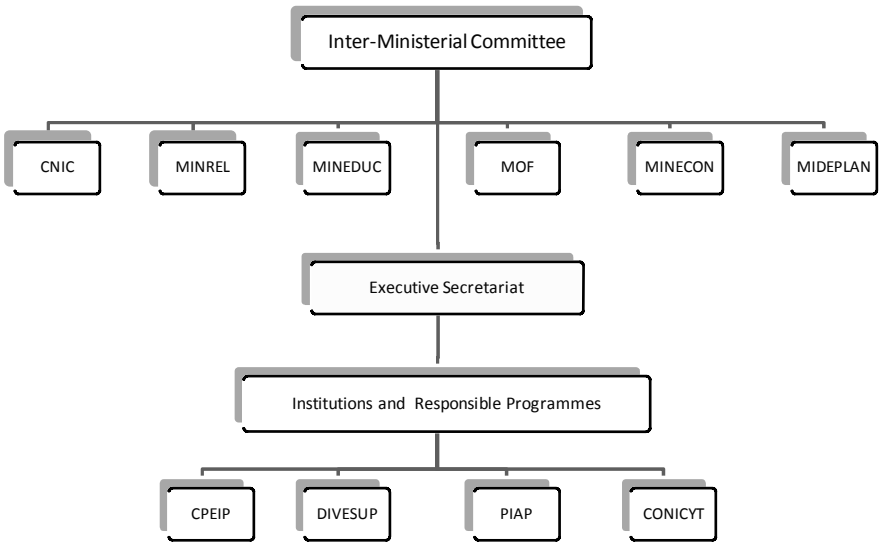
Relationships with other governmental and external agencies

Part of the ambiguity in the creation and initial operations of BCP was in the not always adequately understood or properly clarified level of both formal and informal authority, vested by the President in the newly created government entity. At the operational level, there were seen to be some overlapping areas of programme policy decision making with CONICYT.

The intention of the government when establishing BCP in terms of the managament of scholarship programmes was to bring together the activities conducted by the following entities in a more organised way:

- The Centre for Pedagogical Improvement, Experimentation and Research (CPEIP) at the Ministry of Education;
- The Division of Higher Education (DIVESUP) of the Ministry of Education;
- The Programme Languages Open Doors (formerly known as English Opens Doors) of the Ministry of Education;
- The National Commission for Scientific and Technological Research (CONICYT).

Figure 4.5 **Becas Chile: organisational chart**



Source: Becas Chile (2009) www.becaschile.cl/que_es/institucionalidad.tpl

Officially, it was intended that those entities would give effect to the agreement and guidelines adopted by the Inter-Ministerial Committee when establishing and disseminating their respective Calls for Participation (*Convocatorias*). Behind the scenes, intense negotiations were held among the various government entities involved in order to make the necessary

adjustments. These discussions took place during the course of their respective scholarship programmes and as a result were not exempt from resistance, confusion and tension especially during the first Call for Participation, as this new approach was introduced hastily. At the same time, the launching of the BCP has created high expectations within the general public and, as a consequence, an unexpected and overwhelming volume of work. This new "unified" approach offered to the general public, still shows signs of miscommunication among the involved government entities.

Additionally, there is a set of independent agencies which have historically established a variety of international scholarships for Chileans, some in partnership with the Chilean government, which have also expressed feelings of alienation or marginalisation. These sentiments have been compounded by the fact that they have been forced to make significant changes to their timelines and/or to their guidelines and eligibility criteria just to adjust their offerings to the Becas Chile Call for Proposals. Although the intention to provide information which is easier to "navigate" is a good one and highly commendable, it simultaneously creates significant limitations when intending to present all scholarship opportunities under a single format, in a single annual call for applications and with only one channel of communication with applicants. In addition, issues surrounding miscommunication, improperly defined roles and some operational mistakes could continue to weaken the effectiveness of the initiative.

Connecting Becas Chile with policies and programmes

The functionalistic approach behind the decision to estabish the BCP has opened the door to considerations that are important to address in ensuring its long term viability. By further analysing intended and unintended consequences of decisions made in response to doubts about the programme, a stronger and more effective positioning of the BCP can be fashioned in future stages. Table 4.2 outlines some additional activities where BCP might play a more purposeful role.

As the different roles previously suggested for BCP reveal, a more technical/operational scope of work seems to be the most appropriate, rather than one which is confined to influencing policy decisions. It would be cost-effective for a single human capital agency to be established, with responsibility for the operation of all relevant programmes and for the executive agencies to cease their current functions in relation to those programmes. Developing the technical expertise for supporting national policies for the development of advanced human capital could be of great benefit to the country and to the policy decision making bodies.

Table 4.2 **Suggested role for Becas Chile in activities related to the development of advanced human capital**

Activities	Principal ministries and agencies	Lead agencies	Possible roles for Becas Chile
Definition of national strategic priorities for innovation and the development of advanced human capital	Presidency (Inter-Ministerial Committees). MINEDUC, MINECON (CORFO), CNIC	MINEDUC / MINECON / CNIC	Increasing the weight of national priorities in the evaluation mechanisms established to support scholarships abroad regarding area of studies/countries/institutions. Establishing monitoring/evaluation systems aimed at measuring its contribution to national strategic priorities.
Government funded scholarship programmes abroad	MINEDUC, CONICYT, BCP	BCP	Co-ordinated dissemination of opportunities, channeling applications, outsourcing the evaluation of applications, administering selection, and conducting follow-up.
Bilateral scholarship programmes negotiated with foreign governments	MINREL, MINEDUC, CONICYT	MINREL	Implementation. Dissemination of opportunities. Providing leads about opportunities to MINREL and being involved in discussions in matters related to outbound students as required.
Scholarship programmes abroad negotiated with particular agencies	MINEDUC, CONICYT, BCP	BCP	Identifying opportunities. Providing leads to MINEDUC/MINREL/CONICYT. Once negotiated: channeling applications, outsourcing evaluation of applications, administering election, and conducting follow-up.
Government sponsored scholarships for graduate programmes in Chile	MINEDUC, CONICYT	CONICYT	Identifying opportunities for connection with outbound programmes. Providing technical assistance in fostering flexible approaches to programmes with a component abroad (*e.g.* joint and dual degrees, "sandwich programmes").
Research and academic staff development programmes in Chilean universities and research centres	MINEDUC (MECESUP), CONICYT	MINEDUC	BCP supporting MINEDUC in the management of MECESUP-type government funded international scholarship opportunities directly linked to institutional development. Identifying opportunities for connection with outbound programmes. Providing technical assistance in fostering flexible approaches to programmes with a component abroad (*e.g.* joint and dual degrees, "sandwich programmes").
Follow-up with Chilean students studying abroad	MINEDUC (BCP), CONICYT, MINREL (DICOEX)	BCP, CONICYT	Establishing efficient communication mechanisms for appropriate follow-up and support of Chileans studying abroad. Establishing monitoring/evaluation systems in collaboration with other agencies such as CONICYT.

Table 4.2 **Suggested role for Becas Chile in activities related to the development of advanced human capital** (continued)

Activities	Principal ministries and agencies	Lead agencies	Possible roles for Becas Chile
Repatriation of advanced human capital	MINEDUC, CONICYT, MINECON (CORFO)	CONICYT, CORFO	Supporting CONICYT and CORFO in the implementation of programmes aimed at connecting Chileans being prepared abroad with opportunities in Chile.
Connecting with the diaspora of Chileans involved in advanced human capital activities	MINREL (DICOEX), MINEDUC, CONICYT	DICOEX	Supporting DICOEX-MINREL in developing connections with Chilean communities abroad, with emphasis in individuals and networks involved in advanced human capital activities. Supporting the connection of the advanced human capital Chilean diaspora with relevant counterparts in Chile.
Development of competencies in foreign languages	MINEDUC	BCP	Directly administering the component involving the offering of scholarships which currently exists within the programme aimed at supporting second language competencies, which is currently housed in a different area of MINEDUC. Dissemination of opportunities, channeling the application process, administering an externally conducted selection process, conducting follow-up.
Internationalisation of higher education and research institutions	MINEDUC, CONICYT, MINREL	MINEDUC	Supporting efforts of MINEDUC in the establishment of goals for inbound and outbound students and faculty mobility.
Promoting Chilean higher education abroad	MINEDUC, Fundación Imagen de Chile, ProChile	MINEDUC, Fundación Imagen de Chile	Supporting efforts of MINEDUC and Fundación Imagen de Chile in the promotional efforts of Chilean higher education abroad, serving as a basis for scholarship opportunities.

Source: Review team analysis.

The locus of responsibilities

The diverse set of activities outlined in Table 4.2 are all directly linked to a sound national strategy for the development of advanced human capital for which ambitious expectations have been set. These activities must be linked to an adequate support system. However, the current structural disposition of the Chilean government and more specifically the one existing at MINEDUC, makes it difficult to assume that the goals associated with the national advanced human capital agenda can be fulfilled as desired. In this respect, the problem of adequately positioning the BCP is not only a matter of finding the right fit within the current government structure, but also of considering whether or not it is an opportune moment to propose a rearrangement inside MINEDUC which pairs ambitious advanced human

capital and innovation goals with adequate structural support. If this does not occur, the effectiveness of the BCP will be jeopardised regardless of where it is positioned.

In analysing possible responses to the question posed to the OECD-WB team about where to place Becas Chile, a variety of pros and cons were considered. Among the principal options put forward were:

1. Making BCP an independent entity outside the government (similar to Fundación Chile);
2. Granting BCP semi-independent status within the government structure (similar to CONICYT or CNIC);
3. Merging BCP into the structure of CONICYT;
4. Placing BCP within another Ministry (MINREL, MOF, MINECON);
5. Keeping BCP within the Ministry of Education but in a different organisational setting;
6. Keeping BCP the way it is.

The review team considered the options for enhancing the role of the BCP as the integrating entity for all study abroad scholarships. Options 1 and 2 represent variants of this approach. However, there is an overarching need to integrate study abroad and domestic human capital formation investments, and to connect them more effectively with national development strategies. Viewing the future challenges only from a study abroad perspective is to lose sight of wider needs and possibiities. The structural separation of the BCP from other human capital investments would impede rather than facilitate the necessary integration. There are also particular matters pertaining to options 1 and 2, and these are outlined below.

1. ***An independent entity outside government.*** The option of taking the programme outside the government arena is disproportionate to the problem to be solved. The BCP relates directly to the government's goals for Chile's development, and its connection with those goals should be strengthened not weakened, and its operations made more responsive not less. The programme has been designed in such a way as to curtail any political interference in the selection process; hence, one of the bases for functional separation from government in other jurisdictions is not compelling in the case of Chile.
2. ***A semi-independent entity within government.*** The review team also considered the option of establishing a completely new agency for the administration of the BCP. The attraction of this option is that it makes

and is seen to make a clean break from the problems associated with past arrangements. Hence, it might help in the process of rebuilding community confidence, achieving cultural change in the administration of the BCP and enhancing administrative capabilities. However, it would be at best only a partial solution, and offers no guarantees that it would not be beset by problems similar to those faced by CONICYT in its administration of the programme. Indeed, it is arguable that some limit to CONICYT's "autonomy" might facilitate a more purposeful and integrated R&D effort in Chile.

3. ***Merging the BCP into CONICYT.*** The possible advantage of this option is that it could remove the tension between the policy and operational arms of the BCP, and increase the integration of the BCP with other forms of investment in Chile's knowledge base. The major disadvantage of the option is that it could distract CONICYT from its core business, which is about developing the knowledge base and its links to innovation through R&D. CONICYT would lack the know-how to administer scholarships for teachers and technician training. CONICYT does play a role in advanced human capital formation, including through the provision of scholarships for domestic and international take-up, but its primary function relates to research discovery and translation.

4. ***Placing BCP in a different ministerial portfolio.*** A more joined-up, whole-of-government approach to advanced human capital formation might be facilitated by one of the central agencies of the government taking the driving role. In the case of the BCP, where the initiative for its creation came from outside the Education portfolio, and with its internationalised outlook, it is arguable that a more committed and externally-oriented agency might provide a more energetic and integrated approach to the development of the programme. However, the longer-term logic suggests that it will be increasingly important for Chile to harmonise its human capital development strategy, across the different sub-sectors of the national education and training system. A focus on advanced human capital needs to be located within this broader human capital formation purpose, and the Education portfolio is its natural home.

5. ***Keeping BCP within the Ministry of Education but in a different organisational setting.*** The preferred option is to position the BCP within the responsibilites of the Education Ministry, in order to achieve an integrated commitment to human capital formation, across the various education and training sectors, and involving domestic and international investments. The review team is attracted to the option of a

national Human Capital Development Agency within the Education portfolio, whose governing body would include representatives of other government ministries and business sector organisations.

6. ***Maintaining the status quo*.** The *status quo* is simply unsustainable. Part of its public credibility has been harmed and in the short term it may not have sufficient capability to restore confidence in the programme and realise its contributions to Chile to its full potential.

The review team's preferred option

The review team is most attracted to the option of creating a Vice-Minister for Higher Education, Science and Technology with responsibility for policy in relation to all investments in education and training and research, including domestic and international scholarships. Reporting to the Vice-Minister could be *(a)* a strong policy development and co-ordination unit; and *(b)* a Human Capital Development Agency which brings together Chile's domestic and international efforts to raise skills-based productivity. Thus, in order to avoid duplication and increase efficiency in the system, the administration of scholarships, both domestic and foreign, should be removed from CONICYT, CPEIP, PIAP and DIVESUP and absorbed by a new Human Capital Development Agency. Careful consideration would need to be given, in this changed context, in order to allow CONICYT to continue funding for doctoral and post-doctoral personnel embedded within its funded research projects.

The advantage of this option is that it attacks the operational problems at their source, provides for a joined-up approach to policy and programme development, and builds a strong foundation for an integrated set of initiatives for building the skills and R&D capabilities that Chile needs for the achievement of its national goals.

Note

1. The report describes a role of an active, dynamic and engaged Oversight Committee. The Oversight Committee would receive general policy guidance on major issues from the Inter-Ministerial Committee and, subsequently, work with the BCP Executive Secretariat to develop detailed policies and guidelines as described here. If this more active role for the Oversight Committee is accepted, it may be necessary to review both the terms of reference and the composition of the Committee to ensure compatibility with this expanded role.

2. Centre for Higher Education Development, www.che-ranking.de/cms/?getObject=632&getLang=en.

Conclusions

The Becas Chile Programme (BCP) is imaginative and transformative. It is based on the assumption that Chile can play at the leading edge of international advances in the generation and application of knowledge. By any international comparison it is expansive in the number of its participants and generous in the benefits it provides for them. The review team is encouraged by the commitment of the government of Chile, as evidenced through its various advanced human capital formation initiatives on the domestic front, to optimise the impact of the BCP.

Typically, one can expect bold initiatives to experience initial implementation difficulties. Normally, early corrective action taken to manage transitional problems alleviates most of the concerns, and as the teething lessons translate into procedural improvements, the initiative matures and embeds itself in the policy architecture. At the time of this review of the BCP, difficulties in its implementation have become evident. Problems with some administrative processes, particularly the processes for assessing the merits of BCP post-graduate applicants, have given rise to concerns among the public primarily about administrative competence. However, in the case of the BCP, the review team concludes that the BCP has several procedural problems and challenges and also aspects of its programme design that can be improved in the next stages of the programme to meet its objectives. Hence, ways by which the positive features of the BCP may be built upon are not to be found only through organisational and procedural reforms. Attention needs to be given to the policy purpose of the BCP and its integration with other efforts to increase advanced human capital formation and innovation in Chile.

Strengths of the initiative

The BCP is attractive in its scale and orientation. It has the particular benefit of widening choices for individuals to pursue further learning outside the constraints of the offerings available in Chile. Returning BCP graduates can add to domestic capabilities and help in the transformation of Chile's

higher education and training systems. It stands to make significant progress toward giving Chile the critical mass of highly qualified human capital needed to reach its economic and social aspirations. Its responsiveness to student demand gives signals to domestic providers of higher education services to improve their own offerings. It also has several innovative design features, notably:

- the comprehensiveness of eligible participants across academic and practical fields, and the public and private sectors;
- the incentives given to raise the participation of indigenous people, women, people from regional areas and people with disabilities; and
- considered features, such as the inclusion of foreign language instruction prior to the start of foreign training, allowing students from less advantaged backgrounds to seek and win scholarships.

Concerns about the initiative

The review team has four areas of concern for the BCP: its strategic integration to national prorities; the attraction and reinsertion of BCP graduates to Chile; the operational integrity and efficiency of the programme as a whole; and the policy changes and institutional restructurings that best further the development of advanced human capital in Chile.

Strategic integration to national priorities

The BCP needs to be more sharply focused on national priorities. Chile has been particularly careful, more so than most developing countries, in its efforts to be focused in the development of economic areas. The substantial investment in the BCP should reinforce this selective approach and more explicitly support CNIC priorities, including through stronger weights given for particular studies in the evaluation of applications. Although the BCP model of individual learner choice is laudable, efforts must be made to ensure that the sum of individual choices do not fall short of meeting Chile's human capital development needs.

The BCP could be enhanced and its effectiveness increased through greater flexibility of its existing elements – the enlargement of opportunities for post doctorates to study abroad for periods of less than a year and the expansion of short-cycle programmes – and the inclusion of three new elements: institution-based scholarships where funds are directed to tertiary institutions to select participants; an enhanced scheme to attract visiting professors from institutions abroad, especially in fields of education and

research that Chile is seeking to develop; and enterprise-based scholarships where funds are directed to firms to select participants. This could include:

- An amount of funding for institution-based scholarships could enable tertiary institutions to develop the capacities they need to provide quality education and training programmes in the future, enable the Chilean institutions to build relations with foreign institutions, and provide employment for returning graduates.
- An amount of funding for visiting professors could help to modernise aspects of Chilean education and training, promote a two-way flow of scholars, and thereby contribute to the internationalisation of the Chilean system. It would be worthwhile to reinstate that component of the initially-envisaged BCP, designed to bring foreign scholars to regional tertiary institutions.
- An amount of funding for enterprise-based scholarships could similarly encourage greater involvement of Chilean firms in the programme, help them address their skills requirements and build their capacities for innovation, and provide returning graduates with enhanced employment opportunities.

Additionally, the scale of the BCP, especially the level of increase in PhD production, generates downstream challenges for the capacity of Chilean higher education and research. Those challenges will only be met effectively through a commitment on the part of the Chilean government and desirably enterprises, to continue increasing R&D expenditures in order to make productive use of the added talent.

Attraction back to Chile and reinsertion of BCP graduates

There is also a need for a more purposeful approach to attracting home and reinserting BCP graduates into productive activities. International experience suggests that incentives to return are more effective than coercive or punitive approaches. Employment opportunities for graduates may be increased through improved information to guide student study choices and closer alignment with national priorities at the scholarship awarding stage.

The inclusion of an Institution Scholarship Sub-programme and enterprise-based scholarships would facilitate graduate reinsertion. The attractiveness of Chile as a point of return for BCP graduates, and as a place for visiting professors and other foreigners to work, could be enhanced through a programme of infrastructure development for education and research.

Additionally, the inclination to return and stay in Chile might be influenced through actions to build networks among participants before they go abroad, while they are studying and after they return.

Operational integrity and efficiency

Improving the design and implementation of the BCP will require making a number of inter-related reforms to increase the quality of information available to guide student choice, on the one hand, and to improve the evaluation of the relative merits of applicants, on the other. Insufficient information, particularly about the capacities of foreign institutions in particular fields, may have led to superficial decision making by applicants and variable assessments of applications by evaluators. Applicants need to have better information on which to base their study preferences. They also need to understand what is involved in studying in a foreign country and how they can relate their studies to future employment opportunities in Chile.

Currently, the assessment of the evaluators is translated into a single number, and a single committee selects a "cut off point" for quality among all applicants for the same type of scholarship. This type of system works best when the numerical score is in large measure based on some objective assessment tool common to all applicants – such as scores on a standardised test of aptitude or achievement. BCP applicants do not share any common objective measure of merit. There is no standardised test that measures aptitude or achievement. Grades vary by institution, and other measures, such as recommendations, are likewise subjective.

The two main changes that this reports suggests in this regard are: *(i)* the revitalisation of the Oversight Committee to set clear general policy for the selection process in a way that minimises potential variability and inaccuracy, and that properly incorporates programme goals; and *(ii)* the creation of specific "panel committees" in a variety of disciplines or areas to determine "cut off points" at a less aggregate level, and to provide other key judgments on specifics issues related to sub-groups of candidates.

The revitalised Oversight Committee would receive general policy guidance on major issues from the Inter-Ministerial Committee and, subsequently, work with the BCP Executive Secretariat to develop detailed policies and guidelines. The Oversight Committee would provide guidance to the panel committees on how to rate programme and institutional quality, how to ensure the point system adequately and uniformly addresses relevance to national priorities, and how to undertake a first "cull" of

applications, among other things. In addition, it would oversee the intensive collection of feedback from reviewers and analyse the evaluation process to identify areas for further improvement for future years.

Panel committees would reduce the variability in the absence of objective measures in three ways. First, they could group the quality of the programmes for the applicants in their pool before the applications are sent to individual evaluators. For instance, if the Life Sciences Panel were to find that 150 applicants for PhDs had listed a total of 200 different programmes to which they were applying, the panel committee could collectively group these into perhaps three categories: superior, highly suitable and other. This ranking would reflect the judgment of several specialists, and then could be uniformly applied to all applicants. Second, for measures of national priority, the panel committees could arrive at a uniform measure that could be equally applied.

Third, the panel committees could devise – under guidance from the Oversight Committee – ways of "culling" those applications that are clearly not competitive. For example, where Master's degrees are concerned, if there are 500 applications for 100 scholarships, the panel committee could separate the applicant pool into two broad categories: stronger and weaker. If the Committee's selection of the top 60% applications were placed in the "stronger" group, one could avoid sending for individual review the 200 weakest applications. In doing this, evaluators could spend more time on the candidates who are most likely to be given the 100 available places, reducing the workload and thereby decreasing errors and variability resulting from haste or overload by evaluators.

Institutional arrangement

The measures outlined above are preconditions of improved BCP effectiveness and efficiency. The rectification of the programme design flaws identified will require a more coherent policy approach across the human capital formation and national innovation systems. Solutions to the operational problems go beyond the co-ordination of study abroad arrangements. Reorganisation of administering agencies by itself will not be sufficient to resolve the structural difficulties. In the context of concerns arising from BCP implementation breakdowns, the opportunity arises for the Chilean government to integrate its policy making capacity for human capital formation.

An option worth particular consideration is the creation of a Vice-Ministry for Higher Education, Science and Technology. That role could be given responsibility for policy in relation to all investments in education and training and research, including domestic and international scholarships. The

review team envisages a strong policy unit being formed within the Education Ministry, reporting to the Vice-Minister or a Human Capital Development Agency.

This new institution should bring together Chile's domestic and international efforts to raise skills-based productivity. In order to avoid duplication and improve system efficiency, the administration of scholarships, domestic and international, should be removed from CONICYT, CPEIP, PIAP and DIVESUP and absorbed by the new Human Capital Development Agency.

Finally, the government should consider deliberate arrangements for engaging the academic and business communities in the development and assessment of the BCP, and more generally, creating an explicit framework and capacity to evaluate the effectiveness of its advanced human capital formation strategies. Evaluative exercises undertaken within this framework should be conducted professionally, involve multiple stakeholders and explicitly address the broad objectives of the BCP and its integration with Chile's strategies for advanced human capital development and innovation.

Annex A: Chilean society and economy

Chile has a population of 16.8 million people. Around 23% of the population is aged below 15 years. The urban population represents 87% of the total country population.

In 2008, Chile's gross national income (GNI) per capita was USD 9 400 (Atlas method) and 13 200 PPP (international dollars). Total educational expenditure represented around 7.5% of GDP (2006). In 2006, primary school participation was 98.6%, secondary 90% and tertiary 31% (MINEDUC).

In 2006, Chile's labour force comprised around 6 million workers of whom about 5.5 million were employed. Female workers made up around 34% (2 million) of the Chilean workforce. Some 60% of the workforce was employed in services, 24% in industry, 14% in agriculture, and 2% in mining. The table shows the contributions of different industry sectors to GDP.

Industry contributions to Gross Domestic Product, Chile, 2008

Industry sector	Share of GDP (%)
Mining	19
Financial services	16
Manufacturing	13
Personal services	10
Retail & wholesale trade & hospitality	9
Construction	8
Transport	5
Real estate	5
Public administration	4
Agriculture, livestock, forestry & fishing	3
Other	7

Source: Central Bank of Chile.

From 1990 to 2008, Chilean investment abroad reached USD 47.5 billion, distributed in more than 65 countries in the Americas, Europe, Asia and Africa. Over 900 Chilean firms have invested in more than 2 000 business projects abroad. Nine countries concentrate 91% of this investment, mostly located in Argentina, Brazil, Peru, Colombia, United States, Mexico, Panama, Australia and Venezuela. The nature of Chilean Foreign Direct Investment is a good reflection of the skills built by local capital and industry. These range from the efficient use of natural resources (gas, oil and power generation; energy, mining and forest resources) to value-added activities (metals manufacturing, ore processing, pulp and paper, chemicals and pharmaceuticals) to services, notably retail, computer systems, real estate development, air transport and marine shipping.

Penetration of international markets by the country's exports is one of the key factors of Chilean success. Trade has ballooned from USD 16.5 billion in 1995 to USD 58.9 billion in 2006. Rising copper prices have had much to do with that outcome, given Chile is the world's largest copper producer. Notwithstanding a highly concentrated export sector, Chilean exports are gradually diversifying. In 2006, some 6 969 Chilean firms shipped 5 204 different product lines to 181 markets around the world. Leading trading partners were the United States, Japan, China and The Netherlands. Between 1975 and 2008, non-traditional exports have grown as a share of total exports from 30% to 40%.

The Governor of the Central Bank of Chile has observed that "Chile is abundant in natural resources. One of the most distinctive characteristics of our economy is its large mining sector, particularly of copper, which places it as the world's main copper producer." He notes the importance of the policy adoption of the "structural fiscal balance rule" to smooth copper price fluctuations through the establishment of the Copper Stabilisation Fund. This approach has involved saving the proceeds of high copper prices in sovereign funds. The BCP is an application of this approach.

Annex B: Primary and secondary education in Chile

Compulsory education in Chile lasts twelve years, typically starting at the age of six. Eight years are spent in primary (elementary) education and the remaining four in secondary education. Secondary schools fall into three categories: municipal, private-subsidised (which receive vouchers of equal value) and private-paying. Municipal schools operated by the 345 municipalities may charge fees only for secondary education.

It is generally acknowledged in Chile that by and large the private paying schools educate the most socio-economically advantaged students, the private subsidised schools attract middle-income families and the municipal schools cater for the poorer sections of society. After the first two years of secondary education, pupils are streamed into either humanistic-scientific/general education (ISCED 3A) or technical-professional/vocational education (ISCED 3B). In 2006, 64.5% went into the general stream and 35.5% into the vocational stream (OECD, 2008). Many of the poorest and the least academically prepared students are found in municipal vocational schools and streams.

Chile had an upper secondary graduation rate of 73% in 2005, below the OECD average of 82%, but just better than Spain and New Zealand and significantly better than Mexico's 40%. Chile's figure represents significant progress since 2004, when the rate was 66%, and dramatic progress since 1995, when it was 46%.

Chile participates in OECD's Programme of International Student Assessment (PISA). Fifty-seven countries participated in 2006, when the study focused particularly on science but also covered reading and mathematics. In 2006, Chile's students ranked around 40th in all three subjects, significantly below OECD averages. Chile did least well in mathematics, where male students outperformed females by the biggest margin of any participating country. In reading, however, results had improved significantly since the 2003 study. The performance of pupils in different schools varied significantly, reflecting the wide range of quality of secondary schools.

Annex C: Student financial support for tertiary first degree studies

Universities fall into two categories: universities created by the private sector after 1980 and which are known as private universities, and universities which are members of the *Consejo de Rectores de las Universidades Chilenas*, or CRUCH, and are known as traditional universities. CRUCH universities include 16 state, 6 Catholic and 3 private lay universities. Students in these have access to a range of subsidised financing, while students in non CRUCH higher education institutions have far fewer (and largely unsubsidised) options. CRUCH universities receive both a direct subsidy from the State in the form of a block grant (*Aporte Fiscal Directo*, AFD), and part of an indirect grant (*Aporte Fiscal Indirecto*, AFI) that is allocated to institutions that attract the 27 000 students with the top PSU scores. Private universities, on the other hand, finance themselves largely through student tuition and the AFI.

Some direct public funding of students in first degree programmes (*pre-grado*) is provided in the form of scholarships (grants) and state-guaranteed loans. The Ministry of Education manages the following scholarship schemes:

- Bicentenary Scholarships (BB), for students attending CRUCH universities who are Chilean; show socio-economic need (*i.e.* are in the lowest two household income quintiles); and score 550 points or more in the PSU.
- Juan Gómez Millas Scholarships (BJGM), for students from municipal or private subsidised schools, attending CRUCH universities or any other tertiary institution with accreditation, who are Chilean or from other Latin American or Caribbean countries; are in the lowest two household income quintiles; and score 640 points or more in the PSU.
- Scholarships for outstanding students to study pedagogy (BdP), for students enrolling as their first option in an education or teaching degree at an accredited institution, who are Chilean; score 600 points or more in the PSU; and have a Higher Secondary School grade report (NEM: *Notas de Enseñanza Media*) which averages 6 or above (on a scale of 1-7).

- New Millennium Scholarship (BNM), for students enrolling in a Higher Level Technician course in MINEDUC-approved CFTs or in professional programmes taught by licensed and accredited IPs, who are Chilean; are in the lowest two household income quintiles; and who have a NEM of 5.0 or above.
- Scholarships for academic excellence (BEA), for the top five percent of students graduating from each public or private subsidised secondary high school, who enrol at CRUCH universities or accredited private universities, CFTs or IPs; and are in the lowest four household income quintiles.
- Scholarships for PSU score (BPSU), for students graduating from public or private subsidised secondary high school, who enrol at CRUCH universities or accredited private universities, CFTs or IPs; are in the lowest four income quintiles; and score the best PSU score in the country or region.
- The Indigenous Scholarship, for students from defined minority ethnic groups who are in the lowest two household income quintiles and who have a NEM of 5.0 or above.
- Scholarships for students in the lowest four quintiles who are the children of school teachers.
- Maintenance grants are automatic for the beneficiaries of most scholarship schemes. These consist of food vouchers and cash to cover subsistence. The National Committee for Student Support and Scholarships (*Junta Nacional de Auxilio Escolar y Becas*, JUNAEB) administers the maintenance grants. There is also a maintenance programme for students from isolated regions (the extreme north or south or island territories), which consists of a money contribution and a transport quota for travel.

Public spending on these *pre-grado* scholarship schemes grew by 567% between 1995 and 2009. In fact, funding for scholarships has increased significantly in recent years, from USD 40 million in 2000 to USD 239 million in 2009. In 2007, 9.5% of all students enrolled in a tertiary education institution received a scholarship of some kind. By comparison, 51% of all undergraduates in the United States receive a scholarship.

There are two main student loan schemes:

- The *Fondo Solidario de Crédito Universitario* (FSCU), administered by each CRUCH university, is available only to students enrolled in CRUCH universities. To be eligible, the students must belong to the lowest three quintiles (students from the fourth quintile can also apply but they can receive only a partial amount) and obtain at least 475 points in the PSU. FSCU offers generous terms, including a subsidised annual interest rate of 2% (after accounting for inflation) and a two-year grace period after graduation. Repayments are capped at 5% of the total income earned in the previous year. The repayment period is 12 to 15 years depending on the amount owed. At the end of this period any remaining debt is cancelled. Loan recovery is the responsibility of each university.

- The *Crédito con Aval del Estado* (CAE), administered by the *Comisión Ingresa*. Established in 2006, the new student loan programme is a partnership between the government and commercial banks. A partial default guarantee is provided by the higher education institution while the borrower studies, then by the State from graduation until repayment. Repayment begins 18 months after graduation and may last up to 20 years. To qualify the student must be studying in an accredited institution and have a minimum PSU score of 475 points or (if enrolled at a CFT or IP) a high school (NEM: *Nota de Enseñanza Media*) average of 5.3 or above. As the institutions act as guarantors while borrowers are studying, they establish the maximum number of students whom they can afford to guarantee.

- In total, 26.4% of all undergraduate students take a loan to finance their studies. Forty nine percent of first and second quintile students enrolled in a non CRUCH tertiary education institution have a CAE loan. As reported in *Tertiary Education in Chile*, spending on state-guaranteed loans increased by 448% between 1995 and 2007.

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