



The Conference Board
of Canada

Le Conference Board
du Canada

Centre for Skills and
Post-Secondary Education

The Economic Impact of Post-Secondary Education in Canada.



REPORT NOVEMBER 2014

The Economic Impact of Post-Secondary Education in Canada

Michael Grant

Preface

This report analyzes the economic impact of post-secondary education (PSE) in Canada. It is one of three foundational studies by The Conference Board of Canada's Centre for Skills and Post-Secondary Education. The report considers three kinds of economic impact: spending in the economy (either directly by PSE institutions or indirectly through tourism and other channels), human capital formation, and intellectual capital formation. The report develops a bottom-up approach to understanding impacts, from the PSE institutions to the broader economy.

To cite this report:

Grant, Michael. *The Economic Impact of Post-Secondary Education in Canada*. Ottawa: The Conference Board of Canada, 2014.

© 2014 The Conference Board of Canada*

Published in Canada | All rights reserved | Agreement No. 40063028 | *Incorporated as AERIC Inc.

*The Conference Board of Canada and the torch logo are registered trademarks of The Conference Board, Inc. Forecasts and research often involve numerous assumptions and data sources, and are subject to inherent risks and uncertainties. This information is not intended as specific investment, accounting, legal, or tax advice.

Acknowledgements

This report has been prepared by The Conference Board of Canada under the direction of Dr. Michael Bloom, Vice-President, Industry and Business Strategy, and Diana MacKay, Executive Director, Centre for Skills and Post-Secondary Education. The report was researched and written by Michael Grant, Director of Research, Industry and Business Strategy.

The author would like to thank Carl Amrhein, Michael Bloom, Diana MacKay, and Doug Watt for their advice and guidance. The author would also like to thank Mark Liew, Erin Butler, and Jessica Britcha for their assistance with the research. Thanks go, as well, to Pedro Antunes, Director of National and Provincial Forecasting, and Doris Chu, Senior Economist, for their work on the economic simulations. The author also thanks Gregory Hermus, Associate Director, and Silvia Kyomi Nishiguchi, Economist, with The Conference Board of Canada's Canadian Tourism Research Institute (CTRI) for their contribution to the tourism impact research.

The report was reviewed internally by Dan Munro and Alison Howard. Thanks also go to the many supporters of the Centre for Skills and Post-Secondary Education for their comments. Dr. John Chant, Professor Emeritus, Economics, Simon Fraser University, also made helpful comments.

The report was prepared with financial support from the Centre for Skills and Post-Secondary Education, The Conference Board of Canada. Thanks are also due to the many stakeholders in the Centre's work who read and commented on drafts of this report. Their helpful insights and feedback greatly contributed to it.

The findings and conclusions of this report are entirely those of The Conference Board of Canada. Any errors and omissions in fact or interpretation remain the sole responsibility of The Conference Board of Canada.

For more information about the Centre for Skills and Post-Secondary Education, please visit our website at www.conferenceboard.ca/spse.

CONTENTS

i	EXECUTIVE SUMMARY
	Chapter 1
1	Introduction
4	Method
5	About This Report
	Chapter 2
7	Understanding Post-Secondary Education Incentives
8	The PSE Sector as Provincial Franchises Institutional
13	Governance and Management
19	Strategic Choices
27	Conclusion
	Chapter 3
29	Economic Footprint of Post-Secondary Institutions
31	Direct Spending Effects
41	Indirect Spending Impacts
48	Conclusion
	Chapter 4
50	PSE as a Human Capital Developer
52	Evidence on Returns on Education The
57	Educational Experience Employment and
62	Returns on Education Conclusion
65	
	Chapter 5
67	Universities as Intellectual Capital Developers
69	Innovation and Impact
69	From Patent to Performance
71	Assessing Canada's Performance
73	Incentives or Predisposition?
80	The Multifactor Productivity Argument
81	Conclusion
	Chapter 6
83	Conclusion
	Appendix A
87	Bibliography

EXECUTIVE SUMMARY

The Economic Impact of Post-Secondary Education in Canada

At a Glance

- This study considers the economic impact of Canada's post-secondary education institutions.
- Through their operations, these institutions generate over \$55 billion in value added. Indirect effects may amount to over \$20 billion.
- These institutions also develop human capital, and university research influences the economy through intellectual capital creation.
- Most university research focuses on academic-specific measures of performance. College research tends to focus on practical solutions to business and economic problems.

Canadian studies of the economic impact of post-secondary education (PSE) institutions face a common challenge: establishing a causal link between a post-secondary institution's activities and value added in the broader economy. A national economy is highly complex and many factors determine why some economies do better than others. Those two factors make it very difficult to determine where the value of the PSE institution ends and value in the economy begins.

Strategic Choices Facing Canadian PSE Institutions

Although there is a broad-based consensus that Canada needs a relatively large PSE sector, policy-makers are asking strategic questions about how to maximize PSE institutions' contribution to Canada's economy and society. These questions focus on how large the PSE sector should be, how it should develop, what its operating models should be, and how its effectiveness can be assessed.

PSE is a growth industry in Canada. The real GDP of Canada's universities and colleges grew by over 17 per cent between September 2007 and September 2013, and now stands at over \$40 billion.¹ Full-time equivalent (FTE) enrolments in university increased from 665,098 in 1999–2000 to over 1 million in 2010–11 (including 660,723 full-time Canadian bachelor's students), while college FTE enrolments went from 436,035 to 576,919 over the same period.² These increases far outpaced growth in the Canadian population.

1 Statistics Canada, CANSIM table 379-0031.

2 Canadian Association of University Teachers, *CAUT Almanac 2012–2013*, 39; Statistics Canada, CANSIM table 477-0019.

Provincial governments have tended to limit operating grant funding increases to the rate of inflation. Meanwhile, most collective bargaining agreements have built-in annual cost increases well above inflation. For instance, a recent report by the Ontario government noted that operating grant funding would increase by 1.1 per cent “in the near future,” while institutions’ costs were set to increase by 5 to 8 per cent per annum.³

PSE administrators have had to be innovative to make the numbers work. Operating grant funding is unlikely to increase much in the short to medium term. One way that PSE institutions have responded to demographic change and operational grants limits is by enrolling more international students. Over 10 per cent of the PSE student body is now composed of international students and recent immigrants to Canada.

Economic Footprint

This report assesses the economic impact of PSE institutions, in terms of both direct spending by the institutions and indirect spending that occurs in the economy because of the institutions.

Over \$40 billion in spending flows through Canada’s colleges and universities each year, which generates over \$55 billion in economic activity—after multiplier effects. Almost 700,000 direct and indirect jobs are attributable to spending by PSE institutions.

The Conference Board of Canada estimates that off-campus student spending may generate a direct benefit to surrounding communities of up to \$17.5 billion—and perhaps as much as \$20 billion, after multiplier effects. Visitor spending associated with PSE institutions adds about \$2 billion in economic impact.

3 Ontario Ministry of Training, Colleges and Universities, *Ontario’s Proposed Differentiation Policy Framework*, 3.

Human Capital Impact

PSE institutions make a major contribution to developing people (“human capital development”). The data show good returns for PSE. The net present value of combined private and social returns for a Canadian male who completes tertiary education is \$220,365 over a lifetime (consisting of \$153,520 in private returns and \$66,845 in social returns). Meanwhile, Canadian females realize a total lifetime return of \$158,026 (\$111,487 private return and \$46,539 in social returns).⁴

However, Moussaly-Sergieh and Vaillancourt point out that obtaining a degree is not always so rewarding. When PSE graduates are grouped together, they clearly demonstrate good overall returns on investments in education. Moussaly-Sergieh and Vaillancourt found that males investing in an undergraduate degree can expect to see an annual return, in after-tax earnings, of roughly 12 cents on the dollar, while female students realize 14 cents per dollar. However, their disaggregated results show much lower returns, especially for males who pursue bachelor’s degrees in the humanities or master’s or PhD programs.⁵ Other studies point to gains for graduates of college programs.

Intellectual Property Impact

In 2012, Canadian governments spent over \$4.5 billion on PSE research, primarily through major federal granting councils.

Canada’s PSE system performs well on generating ideas, publishing ideas in academic journals, and having research cited. However, Canada is weak in converting new ideas into new or better products and services that improve Canadians’ lives. Part of the problem is that Canadian universities have tended not to embrace the notion of applied research. Doing so could help speed up and improve the outcomes of our commercialization efforts. Here, business also has a major role to play.

4 The Conference Board of Canada, *How Canada Performs: Return on Investment*.

5 Moussaly-Sergieh and Vaillancourt, *Extra Earning Power*.

Some economic impact studies of PSE institutions have argued that university research spending generates multifactor productivity gains. However, these studies assign multifactor productivity gains to research without explaining the specific mechanisms by which research affects productivity. This is not a convincing or reliable way to demonstrate the economic value of research.

CHAPTER 1

Introduction

Chapter Summary

- Researchers studying the economic impact of post-secondary education (PSE) institutions face challenges in disentangling the institutions' effects from other factors that determine return on investment in PSE institutions.
- The studies often confuse average and marginal impacts.
- This study takes a comprehensive approach to understanding the economic contribution of Canada's PSE institutions.

Canada's post-secondary education (PSE) institutions make major contributions to Canada's economy. For instance, recent studies have estimated the following annual economic impacts: over \$4 billion by the University of Ottawa;¹ \$816 million by Camosun College in Victoria, B.C.;² over \$5 billion by McGill University;³ and \$10 billion by the University of British Columbia (UBC).⁴ The study of UBC estimated a government expenditure multiplier of 10, meaning that British Columbia taxpayers receive a \$10 benefit for every dollar of investment.

These impacts suggest a very large aggregated economic benefit, since Canada currently has 333 recognized PSE institutions (excluding theological schools and distance education institutes). These include the following:

- just under 100 public universities and university colleges;⁵
- a much smaller mix of private non-profit universities and private for-profit universities;
- 133 public colleges and institutes;⁶
- a much smaller mix of private non-profit colleges;
- a large number of private for-profit career colleges.

1 Díaz, Mercier, and Duarte, *2012 Economic Impact Study*, 2.

2 Robison and Christophersen, *Economic Contribution of Camosun College*, 2.

3 SECOR, *McGill University*, 4.

4 Sudmant, *The Economic Impact of the University of British Columbia*, 3.

5 Canadian Information Centre for International Credentials.

6 Colleges and Institutes Canada.

Canada has over 2 million full-time and part-time students. In 2009–10, there were 1.2 million university students and 700,000 college students.⁷

However, researchers conducting PSE economic impact studies face challenges. One is to establish a causal link between a PSE institution's activities and value added in the broader economy. Our national economy is highly complex and it is difficult to determine where the value of the PSE institution ends and value in the economy begins. In some ways, Canada's PSE institutions certainly contribute to economic growth; at the same time, they are situated in an economy with many other sources of wealth creation, including resources, stable governments, and an enterprise culture. How do they interact and where are the economic impacts generated?

Large impacts may stem from placing PSE institutions at the centre of national economic wealth creation. If so, we would expect countries with larger PSE sectors to have more per capita income—yet many countries with equal or higher levels of per capita income than Canada actually have smaller PSE sectors. According to the Organisation for Economic Co-operation and Development (OECD), Canada had the 12th-highest per capita income in the OECD in 2012, while its per student tertiary spending was the third highest.⁸

It is well established that Canada faces fundamental challenges with labour and multifactor productivity. Around the mid-1980s, a gap developed between Canada and U.S. labour productivity growth rates.⁹ The gap widened up to the year 2000 and persists to this day. Likewise, Canada has a weak track record on innovation. As explored in this report, Canada does well on PSE-based metrics of innovation (such as publications and citations) but poorly on innovation commercialization. How might PSE contribute more to innovation and commercialization?

7 Canadian Association of University Teachers, *CAUT Almanac 2012–13*, 39.

8 OECD, *Country Report*.

9 The Conference Board of Canada, *How Canada Performs*.

The Economic Impact of Post-Secondary Education in Canada

Economic impact studies tend to focus on *average* impacts as opposed to *incremental* impacts (or marginal impacts), which may be more relevant to determining strategies for optimal PSE growth. Thus, while on average university graduates earn more than high school graduates, do incremental enrollees do as well as the average enrollee? If innate ability and ambition are normally distributed in the population, then at some point further expansions in PSE enrolment face diminishing returns.¹⁰

Although there is a broad-based consensus that Canada needs a relatively large PSE sector, policy-makers are asking strategic questions about how to maximize PSE institutions' contribution to Canada's economy and society. They are debating how large the PSE sector should be, how it should develop, what its operating models should be, and how its effectiveness can be assessed.

Economics as a social science deals with choice in a world of constraints. Given Canada's very high rate of PSE participation and budgetary limitations, the current system may be pushing up against its constraints. Increasingly, the discussion in Canada is evolving from one about how to expand the system to one about its quality and efficiency. For the most part, the higher education policies of Canadian provinces and territories, the practices of individual PSE institutions, and student choice combine to manage constraints. It is those policies and practices that shape the direction of PSE institutions and, ultimately, their economic impact.

Method

This study takes a bottom-up approach to understanding the economic impacts of PSE and PSE institutions. It seeks to understand the constraints and incentives at the institutional level, analyze how decisions are made, and then project economic impacts.

10 Carneiro, Heckman, and Vytlačil, *Understanding What Instrumental Variables*.

Given this approach, a key research method was structured interviews. We conducted 25 structured interviews with senior executives of PSE institutions across Canada, both colleges and universities. Additionally, we incorporated insights from consultations and conversations with many others in the PSE world. These helped us identify the key issues that institutions face, and how they plan to maintain viability and relevance in a world of constraints. These decisions affect a wide variety of policies and practices, including enrolments, tuition pricing, financing, and allocation of capital. We conducted a literature review to gain a better understanding of these managerial choices.

Using The Conference Board of Canada's proprietary economic models and surveys, we generated estimates of economic impacts that flow from PSE institutions as socio-economic enterprises. We conducted supplementary analysis, based on the literature and secondary data sources, to assess the human and intellectual capital impacts.

The analysis focuses on two major components of the PSE system—universities and colleges. Due to data limitations, it does not include analysis of the economic impact of private career colleges, apprenticeship systems, and workplace training and development. Subsequent studies will seek to identify the impacts of these parts of the PSE system.

About This Report

This report is one of three foundational studies for the Centre on Skills and Post-Secondary Education. (Companion reports deal with the issues of policies, laws, and regulations governing PSE; and the state of skill formation throughout PSE.)

Chapter 2 presents a conceptual overview of the PSE sector in Canada. It outlines some of the challenges and incentives facing the individual institutions, and develops a typology for understanding institutions' strategic choices and a framework for understanding how they generate economic impacts. Chapter 3 assesses the economic impacts of the PSE sector as a socio-economic enterprise. Most of these impacts

The Economic Impact of Post-Secondary Education in Canada

flow from direct and indirect spending. However, PSE institutions also generate impacts and create economic value through the formation of human capital (i.e., people) and intellectual capital, discussed in chapters 4 and 5. The study concludes with a discussion of some implications for the direction of PSE policy at both the provincial and institutional levels.

CHAPTER 2

Understanding Post-Secondary Education Incentives

Chapter Summary

- PSE is a growth industry in Canada.
- The real GDP of Canada's universities and colleges grew by over 17 per cent between 2007 and 2013.
- Most PSE institutions in Canada operate like franchises of the provincial governments, which license them and play a key role in funding them.
- Many PSE institutions face strategic challenges resulting from slow-growing revenues and increasing costs.

PSE is a growth industry in Canada. The real GDP of Canada's universities and colleges grew by over 17 per cent between September 2007 and September 2013 and now stands at over \$40 billion.¹ Full-time equivalent (FTE) enrolments in university increased from 665,098 in 1999–2000 to over 1 million in 2010–11 (including 660,723 full-time Canadian bachelor's students), while college FTE enrolments went from 436,035 to 576,919 during the same period.² These increases far outpaced growth in the Canadian population.

Canada's universities and colleges face a number of constraints that shape their capacity to educate and to conduct research. Individual institutions are constrained by their history and their current operating realities. Government policies, laws, and regulations (PLRs) also provide a context for the decisions of Canada's PSE institutions. This chapter explores the strategic positioning of Canada's PSE institutions and their constraints. The strategic positioning of individual institutions and their management within their constraints ultimately determine their economic impact.

The PSE Sector as Provincial Franchises

Canada's PSE sector functions much like a "franchise" business, with the provincial government acting as franchisor and the institutions as franchisees. Public and private PSE institutions are created by provincial governments through charters and/or specific legislation. These founding

¹ Statistics Canada, CANSIM table 379-0031.

² *Canadian Association of University Teachers, CAUT Almanac 2012–13*, 39; Statistics Canada, CANSIM table 477-0019.

documents set out the core mission of the institutions. Institutional franchisees then work within provincial PLRs to devise strategies to achieve their mission. Some of them also plan for growth.

Provinces and territories set up new PSE franchises in response to their assessment of demand, specifically the demand for teaching services. Most students are drawn from regional or local areas, so the franchise operates in a kind of catchment area. For instance, the University of Toronto attracts about 80 per cent of its undergraduate class from the Greater Toronto Area.³ (This percentage may vary somewhat for PSE institutions in less populated areas.) Provinces and territories award franchises exclusive licences to confer diplomas and degrees, which are key to marketing their educational services.

Provincial governments carefully manage the number of franchisees. On one hand, this restricts competition. On the other hand, it may actually introduce new competition. For instance, an Alberta-based university administrator told us how the conversion of colleges to universities significantly reduced the number of college transfers into universities.⁴ Another administrator, in Nova Scotia, argued that the province had too many universities for the anticipated number of students emerging from high school.

Provincial governments typically start with a logical organization of the marketplace, assigning specific roles to institutes (specialized applied learning), colleges (a broader range of applied learning), teaching universities (focus on academic teaching), and research universities (academic instruction and research). Over time, individual PSE institutions evolve in response to market demand or strategic leadership. Colleges seek to offer degrees like universities do. Universities develop applied programs in, for example, business administration. The provincial

3 Author's notes from the meeting of the National Vice-Presidents' Academic Council, the Canadian Association of University Business Officers (CAUBO), and The Conference Board of Canada's Quality Network for Universities at Kwantlen Polytechnic University, October 18, 2013.

4 Telephone interview by Michael Grant, December 13, 2013.

The Economic Impact of Post-Secondary Education in Canada

government franchisor is constantly faced with requests from the institutions to change their mandate as they seek to remain relevant to the market.

Provincial governments typically fund the construction of new campuses. They then provide significant ongoing operating grant income and occasional capital grants. At the federal level, the three major research granting councils (the Natural Sciences and Engineering Research Council, the Canadian Institutes of Health Research, and the Social Sciences and Humanities Research Council) fund the lion's share of university research activity. In addition, federal programs help pay some of the added infrastructure costs associated with expanded research activities. All told, governments account for between 55 and 67 per cent of the funding for universities and colleges. (See Table 1.)

Colleges' and universities' enrolment-based operating grants dwarf research funding by a factor of 15 to 1. (Ratios vary among institutions.) However, provinces and territories differ markedly in their approach to operating grant funding, as seen in funding formulae. Funding formulae translate enrolments into revenue streams, and they vary the teaching subsidy by discipline and year of study. PSE institutions partly base their adjustments to programs and admission requirements on funding formulae. Depending on its funding formula, an institution may be encouraged to either restrict or expand enrolment.

The funding formulae also reflect the provincial approach to ensuring the appropriate mix between private and public funding. For instance, in 2011, Ontario's universities received about 46 per cent of their operating revenue in the form of tuition, while those in neighbouring Quebec received just over 24 per cent that way. This is pertinent to PSE institutions' incentives to be creative in finding funding sources and pricing their teaching services.

Table 1
Funding of Canada's Public Post-Secondary Institutions
(\$ millions)

	Universities*	Colleges**	Total
Non-government and foreign governments			
Tuition and fees	7,371	2,007	
Donations	1,159		
Grants and contracts	1,922	97	
Endowments	498		
Other sales	2,608	1,148	
Foreign governments	162		
Subtotal	13,720	3,252	16,972
Government			
Federal grants and contracts	3,445	137	
Provincial and municipal grants and contracts	13,394	6,354	
Subtotal	16,839	6,491	23,330
Total	30,559	9,743	40,302
Canadian public source share (per cent)	55	67	58

*university data are for 2012

**college data are for 2011

Sources: Canadian Association of University Business Officers; Canadian Association of University Teachers.

These public policies are critical to the economic viability of individual institutions; they shape Canada's higher learning market. Most students have few incentives, especially at the undergraduate level, to incur the additional travel and living expenses to attend a PSE institution outside their region. Equally important, Canadian provinces and territories effectively tie most of the teaching subsidy to the enrolment at a licensed PSE institution. Students can only access the teaching grant indirectly by enrolling at an approved institution.

New institutional market entrants face significant barriers to entry, and are disadvantaged in relation to funding operations and capital. For instance, the private Quest University Canada, in Squamish, British Columbia, relied on philanthropic contributions to build its small campus.

The Economic Impact of Post-Secondary Education in Canada

It receives no operating or capital grants from the province. Privately funded degree-granting institutions are still very rare in Canada, although they are much more common in the United States.

Although incumbent PSE institutions benefit considerably from their exclusive franchisee relationship to the provincial government, this relationship comes with a level of governmental oversight and involvement that some PSE senior administrators find challenging. Provincial governments attempt to influence PSE institutional choices through funding policies and the direct regulation of programs and practices.

For instance, the interviews for this study revealed a wide variety of provincial policies, laws, and regulations that shape institutional incentives. Thus, in British Columbia, institutions require prior ministerial approval to borrow and cannot run an operating deficit. Meanwhile, in Quebec, institutions are allowed to borrow but face severe restrictions on the tuition they can charge students. Other PSE institutions noted that product innovation (in terms of new programs) required ministerial approval. The process of introducing new degree programs is especially arduous. These policies tend to restrict the incentives for institutions to innovate.

Since the 2008–09 credit crisis and subsequent recession, governments have faced a difficult fiscal environment. These circumstances encourage them to rationalize their franchise structure to improve its financial sustainability. For instance, in September 2013, Ontario proposed a Differentiation Policy Framework. The framework requires PSE institutions to submit data that will allow the Ministry of Training, Colleges and Universities to assess “how institutions see themselves, what makes them distinctive, where they are headed (e.g., planned areas of focus), how they will get there (e.g., strategic enrolment plans, program prioritization and resource re-allocations), and metrics relevant

to holding themselves accountable.”⁵ This assessment will feed into strategic mandate agreements (SMAs) between the Ministry and the PSE institutions.

Institutional Governance and Management

Despite a high degree of provincial governmental funding, Canada still maintains a tradition of higher education autonomy, particularly at the university level. Provincial governments may lay out their priorities through annual letters to the institutions. In Ontario, the Minister of Training, Colleges and Universities requires universities and colleges to submit their strategic mandates, with an eye toward negotiating these with each institution. However, the legislation that creates PSE institutions usually establishes their autonomy from government.

Ministerial influence depends on the nature of the governing legislation and the relative size and influence of the institution in question, as well as the degree of its dependence on government funding. Some institutions develop non-governmental revenue sources (through endowments and corporate or foundation funding for research), which reduce their dependence on provincial government funding and control. Moreover, operating grant funding is rarely cut because governments want to be seen to be committed to higher learning. Governmental control of the higher learning market protects some institutions from competition, which further bolsters their position. Many of Canada’s PSE institutions have more applicants than spaces for some of their programs.

PSE institutions in Canada are usually non-profit organizations. This means that institutional governance need not concern itself with generating a return to the provider of equity capital (effectively, the provincial government). This leaves PSE boards and senior administrators free to allocate resources without shareholder

5 Ontario Ministry of Training, Colleges and Universities, *Ontario’s Proposed Differentiation Policy Framework*, 6.

The Economic Impact of Post-Secondary Education in Canada

interference. In publically listed companies, there is a tension between shareholders (as represented by the board) and senior management. However, in a typical Canadian PSE institution, provincial regulators, governing boards, senior administrators, faculty and students play a role in deciding resource allocations, which can be a highly political process.

Institutional governance is central to the choices that PSE institutions make, which is the essence of their economics. Depending on the province or territory, governance has varying degrees of political, academic, and community influence on institutional strategies. Bicameral governance, with separate bodies for institutional and academic governance (typically through a senate), is common among Canada's universities. Colleges tend toward a unicameral board of governors, often with appointees coming directly from the relevant provincial or territorial ministry. Faculty committees play a role in quality management and program development, but are not part of the formal governance structure of the institution.

At the managerial level, the role of central administration versus academic faculties differs across PSE institutions. In the U.S. context, Lombardi and others have distinguished between a university's administrative shell and the academic core.⁶ The administrative shell exists to present the university to the outside world, and to market the university to both public and private funders. Moreover, the shell operates as a shared service organization that provides registration, marketing, accounting, computing, publishing, and library services to the academic core.

The academic core is largely responsible for teaching and research quality. Academics are organized into departments and faculties with shared notions of academic excellence. They reinforce these shared notions through their control of faculty recruitment and promotion, course offerings, teaching, and research. The degree of influence of academics versus administrators varies among PSE institutions. Departments that are more successful at fundraising are more likely to be given latitude to

6 Lombardi and others. *University Organization, Governance, and Competitiveness*.

control their teaching and research. This speaks to the incentives within PSE institutions to pursue certain kinds of strategies that generate an economic impact.

Internal budgeting also creates different incentives. At some PSE institutions, administrators make most of the internal resource allocation decisions, sometimes based on historical precedent. Other institutions have moved toward decentralized funding models, which give faculties and departments direct incentives to attract their own students and research funding. An Ontario university administrator told us that they allocate 50 per cent of new program revenue directly to the innovating department.⁷ These internal resource allocation systems help explain the market or internal focus of the institutions and their faculties.

A Western-based senior PSE administrator noted that academic governance resulted in conservative approaches to institutional decision-making.⁸ She argued that academic culture was naturally sceptical and that that skepticism often results in institutional inertia. Although academics are generally in favour of adding new programs, they are reluctant to cut under-subscribed courses. She further noted that a tenured faculty had relatively few incentives to engage in institutional innovation. Most of the innovation effort is focused on specific research problems. All this acts as a brake on institutional innovation. In addition, governmental market management further encourages a gradualist approach to institutional change.

That is not to suggest that Canada's PSE institutions do not innovate their product offering. Some enterprising deans and faculty members take an interest in the relevance and growth of their departments. It is common for institutions to acknowledge product innovation, at least in an indirect way, through departmental funding. Depending on the nature of internal accounting, innovative departments are in a better position to hire faculty and support staff, conduct supplementary teaching activities (such as off-campus experiential learning and research missions),

7 Telephone interview by Michael Grant, January 8, 2014.

8 Telephone interview by Michael Grant, December 6, 2013.

The Economic Impact of Post-Secondary Education in Canada

improve office space, and the like. Academic departments do, therefore, have some indirect incentive to increase enrolment through product innovation and quality delivery.

New program development at Ontario colleges provides evidence of innovation. From January 2012 to October 2013, the Ontario Ministry of Training, Colleges and Universities approved 164 new college-level programs.⁹ These programs focus on applied education and training, and cover everything from digital film production (Sault College) and retirement residence management (Fanshawe College) to aquaculture trades (Fleming College).

An Ontario-based university administrator suggested that, at the university level, the funding formula favours expansion of relatively low-cost programs.¹⁰ She cited a creative industry managerial program that would be costly to deliver because of the need for specialized equipment. The economics of such new programs is difficult to justify when the university cannot recoup the higher cost in either greater tuition or higher operating grants.

However, provincial governments' restrictions on competition may reduce incentives to innovate in programs or pedagogy, as students have few choices. This is especially true in growing urban centres. For instance, a college administrator told us that in large urban areas such as Vancouver, there is always excess demand for college places and therefore little need to engage in competitive behaviour.¹¹ College administrators, in this case, did not see themselves as participating in a competitive market.

It is also worthwhile noting that the PSE sector, like the public sector, is highly unionized and therefore constrained by collective bargaining agreements. As such, faculty constrain senior administrators through two mechanisms. First, bicameral governance ensures faculty have a

9 Cambrian College, *Strategic Enrolment Report 2013–14*, 6–9.

10 Telephone interview by Michael Grant, January 8, 2014.

11 Telephone interview by Michael Grant, December 18, 2013.

powerful influence over the pace and direction of growth and existing resource allocations. Second, collective bargaining imposes costs on the PSE institution that it must fund through internal resources. When asked why PSE institutions don't take a more aggressive stance in collective bargaining, a number of interviewees responded that the reputational risk was far too high to justify the pursuit of risky negotiating tactics.

Within the funding structure, each institution commits to a strategy. One way to differentiate these strategies is by the extent to which the institution seeks to directly affect the surrounding economy. Institutions can be mapped on two planes, one that gauges the extent to which they define their mission in terms of the application of knowledge and a second that does so in terms of the concrete demonstration of application. (See Exhibit 1.) Clearly, colleges, polytechnic institutes, career colleges, and the like are strategically positioned in the upper part of Exhibit 1, yet may differ in their effectiveness.

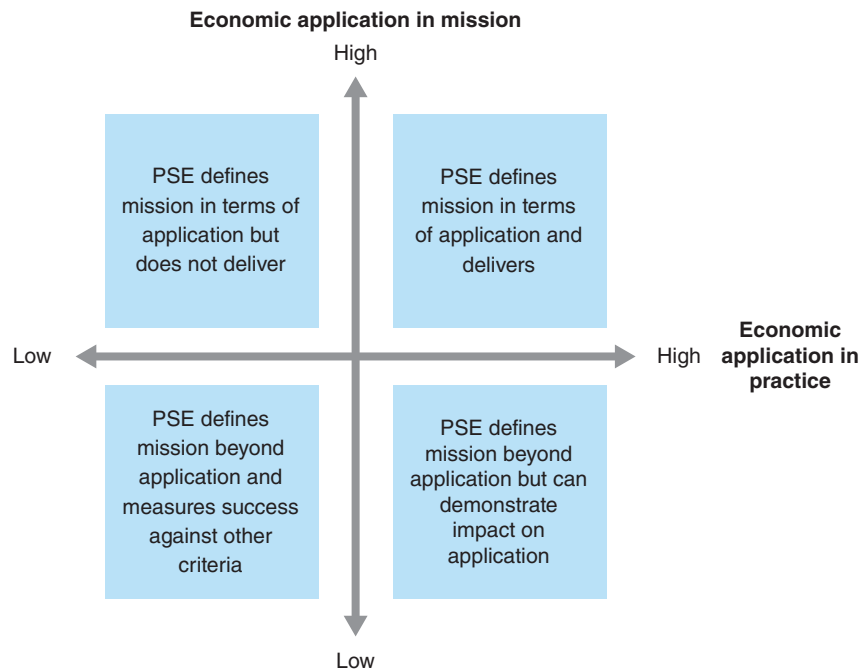
Meanwhile, universities tend to see themselves in the bottom half of the exhibit. Universities generally define their mission in terms of advanced—often primary or theoretical—research and high-level skill development (e.g., critical thinking skills that are not specific to a particular job). Yet individual universities, and even faculties within universities, differ in this regard because some act as training grounds for professions, such as physicians, lawyers, engineers, accountants, computer scientists, teachers, and business managers, and therefore are highly applied. Some institutions have very tight working relationships with the professional licensing bodies that allow graduates to practise. These same licensing bodies act as gatekeepers to the professions and constrain labour market competition.

A minority of universities focus their research on applied solutions. Thus, in practice, some universities may be almost as applied as community colleges, albeit at an advanced level. The demonstration of the application of knowledge through skills development and research makes it easier to show the wider economic impact of PSE institutions beyond the flow of funds through the institution.

The Economic Impact of Post-Secondary Education in Canada

Exhibit 1

How PSEs Value Application in Their Mission and Carry It Out in Practice



Source: The Conference Board of Canada.

To illustrate, some PSE institutions may be able to demonstrate impacts in terms of concrete economic metrics, such as graduates' employment rates, satisfaction with employment, and earnings. Our interviews revealed a wide range of institutional capacity to measure these impacts and use them to shape program offerings. For instance, some institutions focus on providing their students with applied experiences in work settings, while others eschew this approach, favouring more general preparation for life and the ability to learn. Individual institutions differ significantly in the extent to which they engage employers in helping them define and develop their curriculum and pedagogy.

On the research side, institutions sometimes point to licensing revenue and patents as evidence of economic impact. However, institutions that see themselves in the knowledge generation and dissemination business may prefer to measure success by academic gauges that may or may not produce a direct economic impact, such as academic citations or enrolments. Of necessity, these institutions tend to make a more general case for public support, either on social grounds or complex economic grounds (like contribution to multifactor productivity).

These links are important because of public and student support for PSEs. If these stakeholders define outcomes in terms of concrete economic metrics, such as employment and commercialized innovation, then PSE institutions may evolve in the direction desired by their funders. However, some institutions may have problems adjusting if they define their mission differently, hence the debate on the “corporatization” of higher education. In this context, it is worth noting that PSE institutions have only recently become a large, widespread service, after centuries as relatively small, elite institutions. This mass/elitist dichotomy is one core aspect of the debate, both within PSE institutions and in the public arena.

Much of the strategy discussion in Canada is about the degree to which PSE institutions should be assessed according to concrete economic impacts or their role in generating knowledge, or both.

Strategic Choices

Several PSE senior administrators interviewed for this study pointed to a key financial challenge resulting from limits to government funding coupled with rising costs associated with collective bargaining agreements. Most provincial governments have limited their operating grant funding increases to the rate of inflation. Meanwhile, collective bargaining agreements have built-in annual cost increases well above inflation. For instance, a recent report by the Ontario government noted that “in the near future,” operating grant funding would increase by

The Economic Impact of Post-Secondary Education in Canada

1.1 per cent, while institutions' costs were set to increase by 5 to 8 per cent per annum.¹² This means that PSE administrators have had to be innovative to make the numbers work.

Operating grant funding is unlikely to increase much in the short to medium term, because the baby boom echo cohort has largely moved through the system. The size of the core 20 to 24 age cohort, from which most PSE students are drawn, is about to decline. (See Chart 1.) There are two important exceptions, however. First, the Aboriginal youth population is increasing, and it is experiencing greater success in moving from high school to PSE. To improve outcomes further, additional efforts to support Aboriginal student enrolment and success will be required. Second, new immigrants to Canada represent a growing share of the 20 to 24 age cohort. In 1977, recent immigrants (those who had immigrated within the last five years) accounted for around 3 per cent of the 20 to 24 year age cohort, but today that figure is closer to 10 per cent.¹³ This creates a challenge for colleges and universities, which may need to incur higher costs to accommodate this age cohort by, for instance, offering English as a second language (ESL) courses or other supplementary services to ensure that new Canadians can function well at the PSE level.

One of the main ways that PSE institutions have responded to demographic change and operational grants limits is by enrolling more international students. (See Chart 2.) Not only does this address the demographic reality of limited domestic student head count but, equally important, it partly frees institutions from their government-imposed tuition constraints.¹⁴ Where allowed by government, PSE institutions typically charge two to five times domestic tuition rates to international students. (See Table 2.) Given that, on average, Canadian PSE students

12 Ontario Ministry of Training, Colleges and Universities, *Ontario's Proposed Differentiation Policy Framework*, 3.

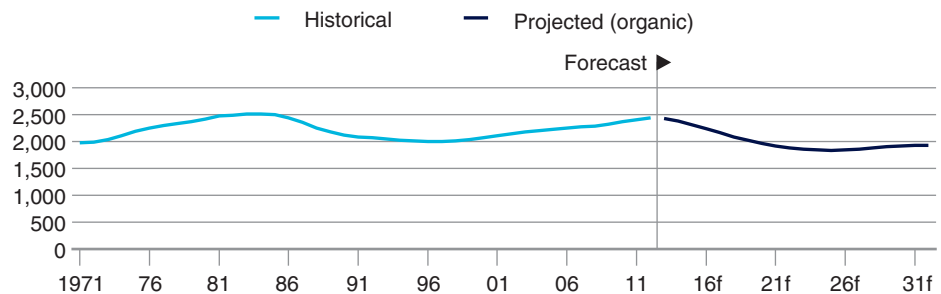
13 Statistics Canada, *Population by Sex and Age Group*.

14 Our interviews revealed that provincial policies on international student tuition differ. Some provinces place no constraints on it, some regulate the level of it, and others regulate the percentage increase in it. All told, however, international student tuition is less regulated than tuition for Canadian-born and landed immigrant students.

Chart 1

The Core 20–24 Age Cohort Is Shrinking (1971–2031)

(thousands)



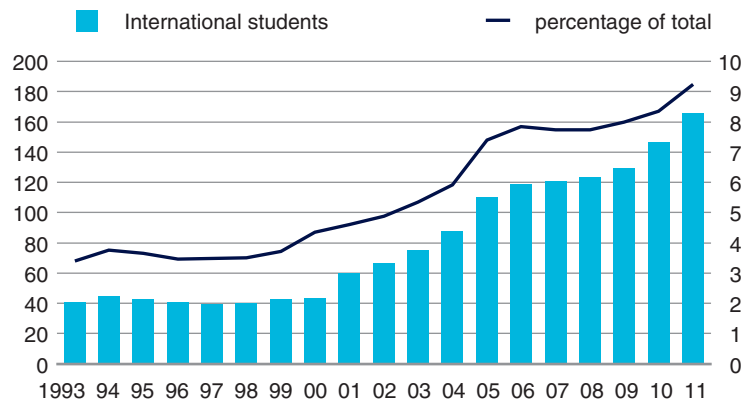
Sources: Statistics Canada, Population by Age; forecast by The Conference Board of Canada.

fund a significant part of the cost of their education, international students who pay three to five times the domestic rate clearly generate an incremental profit for Canada's PSE sector. PSE non-profit accounting and reporting simply fold this profit into the overall accounts of each institution.

Chart 2

International Students Fill the Gap

(thousands)



Source: Statistics Canada.

The Economic Impact of Post-Secondary Education in Canada

Table 2
Arts and Humanities Tuition Fees, Selected Universities, 2012–13

University	Domestic	International	International multiple
McGill University	\$4,267	\$21,600	5.1
University of British Columbia	\$4,700	\$22,162	4.7
University of Toronto	\$5,778	\$25,998	4.5
Victoria University	\$5,778	\$25,998	4.5
Royal Military College of Canada	\$4,460	\$17,500	3.9
École Polytechnique de Montréal	\$4,267	\$16,513	3.9
École de technologie supérieure	\$4,267	\$16,509	3.9
Queen's University	\$5,666	\$20,886	3.7
University of Alberta	\$5,269	\$18,318	3.5
University of Calgary	\$5,333	\$18,157	3.4
Wilfrid Laurier University	\$5,599	\$18,644	3.3
University of Ottawa	\$5,665	\$18,446	3.3
Simon Fraser University	\$5,013	\$16,236	3.2
University of Victoria	\$4,959	\$16,045	3.2
University of Waterloo	\$6,291	\$20,151	3.2
Carleton University	\$5,811	\$18,428	3.2
Ryerson University	\$5,646	\$17,816	3.2
Huron University College	\$5,593	\$17,296	3.1
University of Western Ontario	\$5,593	\$17,296	3.1
McMaster University	\$5,584	\$17,120	3.1

(continued ...)

Table 2 (cont'd)**Arts and Humanities Tuition Fees, Selected Universities, 2012–13**

University	Domestic	International	International multiple
York University	\$5,626	\$17,036	3.0
Lakehead University	\$5,529	\$16,000	2.9
University of Windsor	\$5,515	\$15,915	2.9
Royal Roads University	\$7,280	\$16,000	2.2

Note: Where institutions provided a range of tuition fees, we averaged the range.
Source: AUCC, *Tuition Fees by University*.

Over 10 per cent of the PSE student body is now composed of international students or recent immigrants to Canada. That has made Canada's PSE campuses more ethnically diverse. But as one interviewee pointed out, PSE institutions have an interest in holding the line on international student enrolments for fear of drastically changing the character of PSE institutions from institutions that serve their communities to "education for hire" entities. There are some concerns that the nature of campus life will change too dramatically if institutions continue to aggressively recruit international students.

Some universities have attracted attention by setting up special private institutes to serve international students. For instance, Simon Fraser University is affiliated with Fraser International College (FIC), which offers specialized learning to international students to ease their transition to full university life. Some have criticized this innovation because FIC is run by Navitas, a private Australian learning company.¹⁵ Navitas has a similar arrangement with the University of Manitoba.

International students are pertinent to a discussion of economic impact. If international students are returning to their home countries to apply their knowledge after graduation, then the economic impact of these students is mostly tied to the PSE institution as an enterprise. The

¹⁵ Millar, *The Sneaky Way*.

The Economic Impact of Post-Secondary Education in Canada

economic impact is gauged by the spending associated with the students (and the visitors they attract). However, if the international students stay in Canada or otherwise maintain a connection to Canada following graduation, because of their educational experience, then the economic impact is broader.

Some question why Canadian institutions are being opened to international students while some Canadian communities—such as Aboriginal Canadians and Canadians from disadvantaged socio-economic backgrounds—face lower-than-average levels of academic attainment. This debate reflects the hybrid nature of higher learning institutions—part research centre, part public service organization, and part learning services vendor.

Individual institutions have found other ways to work around tuition constraints. For instance, provincial governments free certain programs from these constraints, particularly in areas where there are high private returns on education, reflecting high demand in the economy, such as engineering and business administration. This explains why average undergraduate tuition costs have risen over two and a half times as fast as consumer prices.¹⁶ In addition, other student fees and charges are sometimes freed from tuition constraints. So although administrators often point to tuition constraints, some have been rather creative in overcoming them.

Another way for institutions to manage constraints is to do more with less. For example, there has been a marked trend toward larger class sizes, with fewer instructors per FTE, at the university level. (See Chart 3.) An interviewee pointed out that this trend toward larger class sizes has developed over the last 25 years and coincides with the emergence of large universities that focus on research and teaching. However, provinces do not use different funding formulae for those institutions that focus on teaching and those that focus on both research and teaching. This suggests that those institutions that have moved to larger

¹⁶ Tal and Enenajor, *Degrees of Success*, 1.

undergraduate classes have done so to subsidize graduate education and research by, effectively, reducing the quality of the undergraduate learning experience.

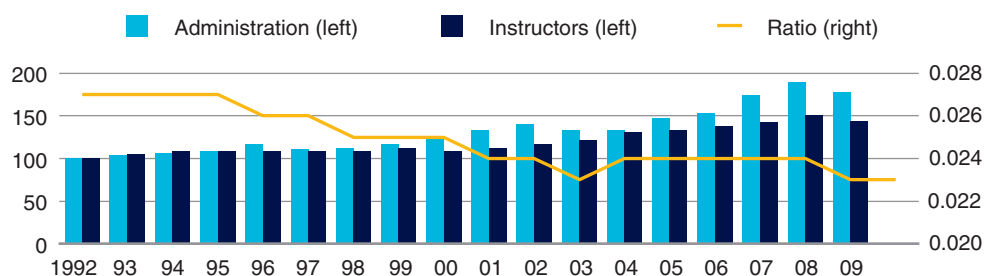
We also note higher administrative expenditures, which our interviewees traced to several sources. One is higher marketing expenditures to attract international students. A second is rising administrative workloads in response to government demands for accountability.

However, a university administrator in Western Canada observed that universities may simply be realizing diseconomies of scale.¹⁷ Most of Canada's institutions start with small central administrations for core functions. But as governments have encouraged institutions to increase access, individual faculties, colleges, or institutes are handling more of the administrative functions. For instance, the interviewee's institution has 31 planning units. It is very difficult to rationalize administrative functions as the institution grows because of faculty independence, so administrative costs increase.

Chart 3

Instructors Per Student Fell as Administration Expenditures Rose, 1992–2009

(index for expenditures; 1992=100)



Notes: Data are for Canadian universities. The blue and black bars show expenditures on administration and instructors, respectively, against a 1992 baseline of 100.)
Source: Statistics Canada.

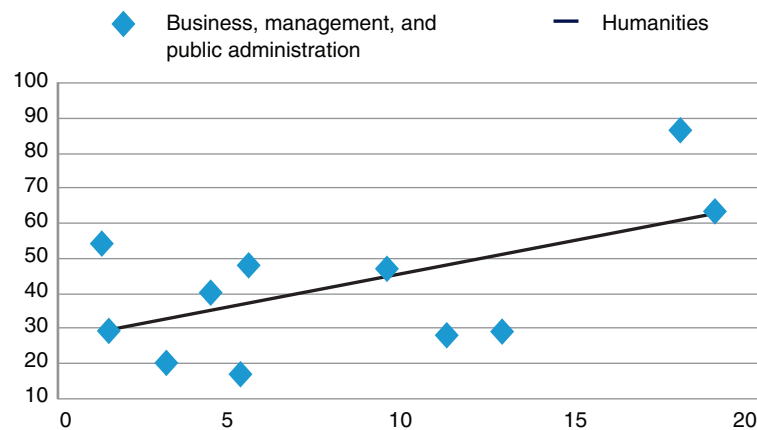
17 Interview by Michael Grant, January 17, 2014.

The Economic Impact of Post-Secondary Education in Canada

Chart 4

Economies of Scale in Teaching, or Mass Production?

(class size; percentage of total student population)



Source: Statistics Canada.

Interestingly, enrolment has risen in disciplines that are relatively easy to expand in a low-cost way, such as lecture-based courses in the arts, the humanities, business, and public administration. (See Chart 4.) If there is excess lecture hall capacity, an additional student adds nothing to the cost of the lecture and may add only a small amount to the cost of assessing learning (especially if sessional instructors are the assessors). However, growing class sizes and the use of sessional instructors have raised concerns about the quality of learning experience. This is pertinent to the way human capital is formed and the economic impact of the PSE sector beyond its enterprise effects.

A source of tension between PSE institutions and their provincial government funders is the relative importance of institution management versus external oversight in quality management. As institutions reach

out to international students, accreditation becomes more important, because international students and their governments may not be familiar with the reputation of individual institutions.

Institutions usually manage quality themselves, with varying degrees of provincial oversight. For instance, British Columbia has a formal system of higher education quality accreditation called Education Quality Assurance (EQA) that it promotes as “Canada’s first and only provincial brand of quality for post-secondary education (PSE).”¹⁸

For marketing purposes, some PSE institutions have sought third-party accreditation, although this practice is still relatively rare. For instance, Simon Fraser University has applied for accreditation by the Washington-based Northwest Commission on Colleges and Universities (NWCCU), which is recognized by the U.S. Department of Education. Other institutions, such as Saint Mary’s University in Halifax, have focused their accreditation efforts on specific programs of greatest interest to foreign students. For instance, the Sobey School of Business is accredited by the Association to Advance Collegiate Schools of Business (AACSB).

Conclusion

Most of Canada’s PSE institutions are operating as hybrid institutions—part public institution, part commercial enterprise. On the one hand, the institutions are marketing to students, an activity that brings in tuition, fees, and sometimes operating grant funding. In this sense, the institutions themselves are commercial, much like Canadian private enterprises.

Yet their governing PLRs and government funding make them equally or more reliant on government. In this sense, Canada’s PSE institutions are extensions of the provincial and territorial governments, which partly control them by financial means and set their incentives. Some of these incentives are counterproductive, as they discourage institutions from responding to market demands.

18 British Columbia Ministry of Advanced Education, *Education Quality Assurance—EQA*.

The Economic Impact of Post-Secondary Education in Canada

With this background, the report now turns to an evaluation of the economic impact of PSE as an enterprise, and as a developer of human and intellectual capital.

CHAPTER 3

Economic Footprint of Post-Secondary Institutions

Chapter Summary

- This chapter assesses the economic impact of PSE institutions as enterprises and their associated economic footprint.
- The two principal types of impact relate to direct spending at the individual institutions and indirect spending that occurs in the economy because of the institutions.
- Over \$40 billion of spending flows through Canada's colleges and universities each year, which generates over \$55 billion of economic activity, including multiplier effects.
- Almost 700,000 direct and indirect jobs are attributable to spending on PSE institutions.
- Off-campus student spending may generate a direct benefit to the surrounding communities of as much as \$20 billion, including multiplier effects.
- Visitor spending associated with PSE institutions adds about \$2 billion in additional economic impact.

PSE institutions are unique organizations. They are usually organized as non-profit organizations, indicating that they exist to pursue social objectives beyond commercial performance. Governments channel billions of tax dollars to PSE institutions to support their teaching and research mandates in recognition of their socio-economic contribution. This is based on the premise that the higher education market, if left to its own devices, would fail to provide an adequate amount of higher education and research. Even so, to remain financially viable, PSE institutions must actively compete for enrolments and additional research funding. Many of them pursue aggressive marketing campaigns, much like for-profit companies.

Individual PSE institutions are among Canada's largest employers. For example, the University of British Columbia (UBC) employs over 10,000 people, making it Vancouver's largest single employer.¹ Large employers, in the Canadian context, are those with over 500 employees, and most universities and many colleges employ more than 500 people.² Well-known companies such as WestJet and TransCanada Corp. employ fewer people than the University of Toronto. Retail banks, Canada's largest national employers, employ fewer people in the Greater Vancouver Area than does UBC.

This chapter assesses the economic impact of PSE institutions as enterprises. There are two impacts of interest.

1 Sudmant, *The Economic Impact of the University of British Columbia*, 6.

2 Statistics Canada, *Employment by Enterprise Size*.

First, there are the impacts that flow from direct spending on the individual institutions. These include first-round effects (spending at the institutions themselves) and second-round effects that emerge as those who have been paid for services in the first round spend that money in the surrounding economy (the “multiplier effect”).

Second, there are the indirect spending effects. These are related to the presence of PSE institutions but do not relate directly to the institutions’ spending. They take two forms. One is off-campus spending by students and the other is spending by visitors who are attracted to communities by PSE institutions and the students attending them.

Direct Spending Effects

To assess the direct spending effects, we conducted an analysis of PSE institutions. We used expenditure and cost data from the Canadian Association of University Business Officers (CAUBO) for fiscal 2011–12, Statistics Canada data, and our own estimates.³ From these sources, we calculated that \$41.3 billion in expenditures flowed through Canada’s colleges and universities in 2011–12. This includes \$31.5 billion in expenditures at universities and \$9.7 billion at colleges.

Exhibits 2 and 3 summarize the main categories of expenditures for universities and colleges. The largest category is general operations, and most of these expenditures are for staff salaries and benefits. For instance, CAUBO has reported that this item accounts for 75.5 per cent of universities’ operating expenditures.⁴

We ran these spending estimates through The Conference Board of Canada’s economic forecasting model of the Canadian economy. The model incorporates an input/output structure of the Canadian economy.

3 CAUBO, *Financial Information*.

4 CAUBO, *Financial Information*, 13.

The Economic Impact of Post-Secondary Education in Canada

Exhibit 2**Expenditures at Canada's Universities, 2011–12**

Total expenditures (\$31.5 billion)	Includes \$959 million in miscellaneous income.
General operating (\$18.9 billion)	Includes salaries, benefits, and other general operating expenses.
Special purpose and trust (\$1.5 billion)	Includes scholarships, bursaries, and prizes.
Sponsored research (\$6.6 billion)	Based on historical data (CANSIM table 478-0007, <i>University Education Expenditures</i>), the federal and provincial governments account for approximately 70 per cent of expenditures on sponsored research; businesses account for the remaining 30 per cent.
Ancillary (\$1.7 billion)	Assumed to be part of investment in intellectual property products.
Capital (\$2.8 billion)	According to Statistics Canada (CANSIM table 032-0001, <i>Public and Private Investment</i>), approximately 30 per cent of university capital expenditures relate to machinery and equipment, while 70 per cent relate to construction.

Sources: CAUBO; Statistics Canada; The Conference Board of Canada.

Therefore, when we flow these expenditures through the model, it tells us how spending by colleges and universities affects other sectors of the economy and the overall Canadian economy.

The model found that the initial \$41.3 billion generated a total economic impact of \$55.7 billion in first- and second-round spending. Every dollar spent on PSE creates \$1.36 of economic value added (or output) in the Canadian economy. This multiplier is relatively high, primarily because PSE is a labour-intensive local service industry. The teaching and research “products” of PSE institutions have relatively low import

Exhibit 3

Expenditures by Canada's Colleges, 2011–12

Total expenditures (\$9.7 billion)	Due to limited information on college expenditures, we assumed that total expenditures for colleges were the same as total revenues for colleges in 2012.
General operating (\$5.8 billion)	Based on historical college education expenditures data (Statistics Canada, CANSIM table 478-0004), it is estimated that general operating expenditures account for approx. 60 per cent of total expenditures for colleges.
Special purpose and trust (\$1.4 billion)	Based on historical college education expenditures data (Statistics Canada, CANSIM table 478-0004), this category accounts for an estimated 15 per cent of total expenditures for colleges.
Sponsored research (\$230 million)	Based on information from the Canadian Association of University Teachers for 2011.
Ancillary (\$1.6 billion)	Assumed to be part of investment in intellectual property products.
Capital (\$700 million)	Based on historical college education expenditures data (Statistics Canada, CANSIM table 478-0004), an estimated 8 per cent of total expenditures are capital expenditures.

Sources: The Conference Board of Canada; Statistics Canada.

content. To provide some context, a recent Conference Board of Canada study of the beer industry found that every dollar spent on beer created \$1.11 of economic value added in Canada.⁵

5 Palladini and Armstrong, *From Farm to Glass*.

The Economic Impact of Post-Secondary Education in Canada

Table 3
Impact on Key Economic Variables

(\$ millions, except where indicated)

Initial expenditure on post-secondary education	41,300
Generates...	
Gross domestic product (GDP)	55,738
Employment (thousands)	678
Household disposable income	26,432
Corporate profits before taxes	12,545
Current account balance	-10,737
Personal income tax	6,933
Corporate income tax	2,467
Indirect taxes	2,743
Federal government balance	13,154
Provincial government balance	-27,607

Source: The Conference Board of Canada.

Table 3 summarizes the impact of PSE spending on key economic variables. It shows broad-based economic impacts in terms of net employment, income, and tax yields. Almost 700,000 direct and indirect jobs are attributable to spending on PSE institutions. As government revenues depend heavily on income, the net income growth produces higher levels of income and indirect taxes. The federal government, in particular, is a net beneficiary of this activity. Meanwhile, provincial governments, as the main PSE funders, show a negative balance.

The provincial governments' negative fiscal balance raises an issue as to the true net economic impact of PSE activity. Given the heavily subsidized nature of PSE spending, it is not clear that the *net* economic impact is anywhere close to being as large as these gross impacts, for two reasons. First, governments raise taxes to support spending on PSE. Canadian governments support over half of the total spending that takes place at PSE institutions. Taxation transfers spending from

taxpayers to PSE institutions with no net change in total spending in the economy. If the impact calculation were limited to the private funding of PSE institutions, the results would be about half as large.

Second, funding PSE spending through taxation creates other impacts on the microeconomic functioning of the economy through the allocation of resources. Taxes create a wedge between the prices facing buyers (of goods, labour, or whatever else is being taxed) and sellers. They encourage some tax avoidance activities and discourage increased production. For instance, Dahlby and Ferde estimated (for 2006) that the marginal cost of raising a dollar of public funds varied from \$1 (for Alberta sales tax revenue) to \$40.83 (for Alberta corporate income tax).⁶ Most economic impact studies for PSE institutions ignore these tax effects when calculating total economic impact, which leads them to exaggerate the net economic impacts somewhat.

That explains why PSE institutions need to make the investment case for public support based on an inherent market failure. From an economist's perspective, taxation is a form of forced savings to the taxpayer who, understandably, wants to see those savings well used. If PSE cannot make a solid investment case, then the transfer of resources from taxpayers to PSE institutions just takes consumption away from taxpayers to support consumption by students, faculty, and administrators. There may be well-founded social reasons for making this transfer. But from a purely economic perspective, the case has to be made based on the formation of human and intellectual capital, and their ultimate use in the economy. These points are addressed in later chapters.

6 Dahlby and Ferde, *What Does It Cost Society?*

The Economic Impact of Post-Secondary Education in Canada

Table 4**Impact on Demand Components of GDP, 2012**

(current \$ millions)

Consumer expenditures	15,772
Total government spending	24,700
Private capital investment in structures and equipment	3,118
Business intellectual property products investment	5,990
Government capital investment	10,153
Government intellectual property products investment	6,848
Final domestic demand	66,475
Change in inventories	0
Exports	0
Imports	10,737
Net exports	-10,737
GDP at market prices	55,738

Source: The Conference Board of Canada.

With these caveats in mind, Table 4 shows the impact on components of aggregate demand. Noteworthy is that the initial expenditure of \$41.3 billion actually creates an increase of around \$66.5 billion in domestic demand, but the impact on final GDP is lower due to the \$10.7-billion increase in imports, most of which are attributable to second-round spending effects.

Table 5**Impact on Real Gross Domestic Product, by Industry**

(per cent, 2007 \$)

Goods-producing sector	14
Primary	4
Utilities	1
Construction	6

(continued ...)

Table 5 (cont'd)

Impact on Real Gross Domestic Product, by Industry

(per cent, 2007 \$)

Manufacturing	3
Business services sector	44
Wholesale and retail trade	9
Transportation and warehousing	3
Information and cultural services	3
Finance, insurance, and real estate	14
Professional, scientific, and technical	8
Other business services	7
Public sector	43
Education	40
Health	1
Public administration and defence	2

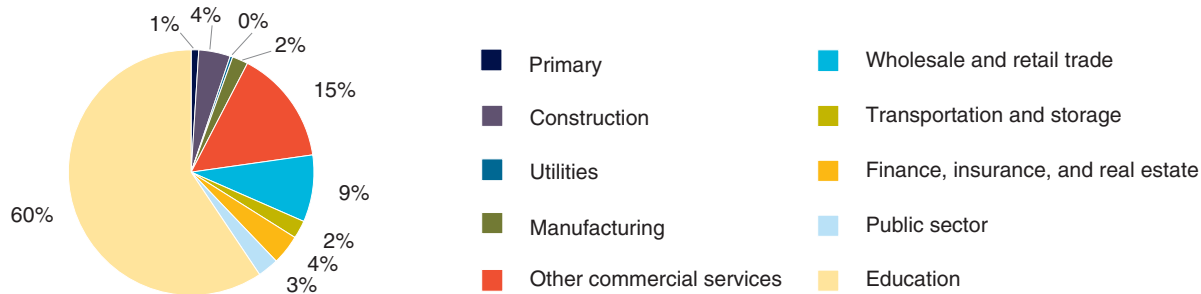
Source: The Conference Board of Canada.

Table 5 looks at the impacts on an industry basis. The industry impact actually favours the private sector, because PSE institutions consume private business services while delivering teaching and research. Moreover, second-round spending effects favour private sector spending.

Finally, we consider employment impacts. We noted earlier that the incremental increase in employment amounts to 678,000 jobs. Chart 5 shows the job gains associated with the expenditures, broken down by sector. Not surprisingly, these gains are heavily concentrated in the education sector, which accounts for around 60 per cent of all the jobs created.

Although the model is national in scope, and therefore presents results for Canada, it is worthwhile noting that individual communities vary in their reliance on their PSE institutions. Provincial and territorial governments shape these impacts through their franchising decisions, which reflect two approaches. Some institutions are located near

The Economic Impact of Post-Secondary Education in Canada

Chart 5**Distribution of Employment Gains, by Sector, 2012**

Source: The Conference Board of Canada.

population centres to provide ease of access to students. Others are located in less densely populated areas, in part as a form of regional economic development.

Exhibits 4 and 5 show the location of Canada's universities and leading colleges, polytechnics, institutes, and centres. Clearly, the relative local economic impact of a PSE institution depends on three things. First is its size (as an enterprise) in relation to the surrounding economy. Second is the extent to which it draws students from other jurisdictions. Third is the extent to which it produces graduates and intellectual property that local employers use.

To illustrate, St. Francis Xavier University has a relatively large impact on the economy of Antigonish, Nova Scotia. According to the 2011 Census, the population of Antigonish was 19,589.⁷ Enrolment at the university is 5,291.⁸ Total employment at the university is around 500 people, half of whom are academic employees.

7 Statistics Canada, *Census Profile: Antigonish*.

8 Association of Atlantic Universities, 2012–2013 Survey.

Exhibit 4

Location of Canadian Universities



Source: The Conference Board of Canada.

The Economic Impact of Post-Secondary Education in Canada

Exhibit 5

Location of Canada's Largest Colleges, Polytechnics, Institutes, and Centres



Source: The Conference Board of Canada.

Indirect Spending Impacts

Off-Campus Student Spending

Our direct spending estimates reflect spending that flows directly to PSE institutions. However, students and visitors attracted to a community by an institution also spend money in the local economy.

In previous work for the University of Regina, we generated an estimate of off-campus student spending.⁹ This was based on an online survey of the university's students, which we conducted in January 2012. We received 1,126 complete and 352 partial responses, representing about 12 per cent of the total student population. Some 84 per cent of the respondents were undergraduates and 16 per cent were graduate students. The survey results yield insights into student spending habits and the benefits that this spending provides to local, provincial, and national economies.

Table 6
Off-Campus Spending Per Month, University of Regina
(\$)

Rent/accommodation	617
Utilities/household bills	177
Food/groceries	259
Electronics	58
Transportation/gas/parking	162
Clothing/accessories	81
Entertainment	68
Extra-curricular	57
Other	143
Total monthly expenditures	1,622

Source: The Conference Board of Canada.

9 The Conference Board of Canada, *Fuelling the Surge*.

The Economic Impact of Post-Secondary Education in Canada

Table 6 summarizes the findings for the University of Regina. Students' average off-campus spending amounted to \$1,622 per month per person (undergraduates for 8 months of the year and graduate students for 12 months). Not all of this expenditure is a net economic gain for the municipality, province, or Canada. The net economic gain from this spending depends on where the student comes from. A municipality realizes a net gain when domestic and international students arrive from other municipalities to attend. Meanwhile, a province realizes a net economic gain when students come from out of province and Canada gains when students come from other countries.

In the case of the University of Regina, every year the university attracts about \$30 million in expenditure to the province from outside Saskatchewan and \$47 million to Regina from Saskatchewan residents beyond the city.

If we apply the University of Regina results to the PSE system writ large, it is possible to estimate the impact of off-campus spending. First, we net out the roughly 5 per cent of students who live on campus and whose expenditures are already captured in the PSE institutions' revenues. This gives us a Canadian student base living off-campus of just over 1.8 million students. International, graduate, and out-of-province students are more likely to live off-campus for 12 months of the year, while we assume undergraduates from the province reside in the PSE community for 8 months.

The actual impact depends considerably on whether the locally derived student base lives at home or outside the home. A 2011 Statistics Canada analysis of the General Social Survey compared the living arrangements of the 20 to 29 cohort of late baby boomers (born 1957 to 1966), Generation X (1969 to 1978), and Generation Y (1981 to 1990).¹⁰ It found that Generation Y was much more likely to both be in school and living at home. About half of the Generation Y cohort lived at home with their parents at those ages. We therefore assume half of those from the surrounding municipality live independently off campus.

10 Statistics Canada, "Study: Generational Change."

Table 7**Impact of Spending by College and University Students Who Live Independently Off-Campus**

Origin of student	Students (number)	Living independently off-campus (number)		Spending (\$ millions)	Net benefit accrues to
		Graduate	Undergrad		
International	182,400	63,840	118,560	2,779	Canada, province and municipality
From elsewhere in province	456,000	27,360	428,640	6,091	Municipality
From another Canadian province or territory	91,200	31,920	59,280	1,390	Province and municipality
From the municipality	1,094,400	27,360	519,840	7,273	No net accrual
Total	1,824,000			17,533	

Notes: These are estimates based on data from the University of Regina. All off-campus students lived independently except students who came from the municipality, 60 per cent of whom did so.

Source: The Conference Board of Canada.

Estimates are summarized in Table 7. We estimate that off-campus student spending may generate a direct benefit to surrounding communities of as much as \$17.5 billion, and as much as \$20 billion after second-round spending effects are considered. As noted in the table, most of the net benefit generated by the spending accrues to the surrounding municipality.

An interviewee from an Ontario university explained that their institution often receives inquiries from municipalities offering incentives for them to establish campuses in their municipality.¹¹ Our economic impact study clearly demonstrates why municipalities would offer such incentives, as most economic impacts from spending are concentrated in the immediate municipality.

11 Interview by Michael Grant, January 8, 2014.

Visitor Spending

PSE institutions are centres for social interaction and, therefore, attract travellers who visit the campus and students at the campus. To shed light on this area of impact, we conducted an original survey of 1,500 Canadian adults on the role that colleges and universities played in their out-of-town trips over the previous 12 months.

Table 8
Post-Secondary-Related Visits to a Different City in the Past 12 Months, 2013
(per cent)

Age	To visit family or friends enrolled at a college or university	To attend an event at a college or university	Both	Total
18–24	29.4	9.1	8.6	47.2
25–34	25.3	5.2	8.4	38.9
35–44	19.9	3.8	3.8	27.5
45–54	16.8	2.1	6.6	25.4
55–64	16.8	0.8	2.9	20.5
65+	16.8	2.3	1.6	20.7
Total 18+	20.3	3.6	5.1	29.1

Source: The Conference Board of Canada.

Overall, the survey results revealed that just over 29 per cent of respondents reported making one or more post-secondary-related visits (PSVs) over the past 12 months to a city other than the one they lived in. Regarding the purpose of the trip, 20.3 per cent of respondents visited family or friends enrolled at a college or university, 3.6 per cent attended an event at a college or university, and 5.1 per cent did both. (See Table 8.) The survey results show that visits are most common among younger adults and decline with age. In fact, 47.2 per cent of respondents aged 18 to 24 reported having made at least one PSV over the past 12 months, while the percentage declined to just under 21 per cent among Canadians over 55 years of age.

Based on the survey results, we estimate that just over 8.1 million Canadians took a PSV over the past 12 months. (See Table 9.) The largest segment, nearly 5.7 million, visited family or friends enrolled at a college or university. An additional 1 million attended an event held at a college or university. Meanwhile, just over 1.4 million Canadians both visited family or friends enrolled at a college or university and attended an event at one.

Table 9

Most People Who Travel to a PSE Institution Do So to Visit Friends or Family, 2013

(estimated number of trips)

Age	To visit family or friends enrolled at a college or university	To attend an event at a college or university	Both	Total
18–24	985,710	305,910	288,915	1,580,534
25–34	1,228,606	250,272	409,535	1,888,413
35–44	935,954	178,277	178,277	1,292,508
45–54	906,176	110,509	353,630	1,370,315
55–64	753,616	36,762	128,666	919,044
65+	869,796	121,367	80,911	1,072,074
Total 18+	5,679,858	1,003,096	1,439,934	8,122,889

Source: The Conference Board of Canada.

Among those who reported making at least one visit to a PSE institution in the past year, the average trip duration was reported to be 3.9 nights with an average travel party size of 1.6. (See Table 10.) Respondents also indicated that roughly two-thirds of visits took place within their province, while just over 31 per cent took place outside their province. This suggests that these visits make relatively little incremental contribution to provincial GDP but may increase the GDP of PSE-hosting communities in relation to other communities in a province.

The Economic Impact of Post-Secondary Education in Canada

The average trip duration among respondents travelling within their own province was 2.8 nights with an average travel party size of 1.5. Meanwhile, the average trip duration among respondents travelling to another province was 5.9 nights with an average travel party size of 1.7.

Table 10
Out-of-Province Trips Last Longer and Involve More People

	Mean	Mean, within-province trips	Mean, out-of-province trips
Trips	3.54		
Trips to another province	1.11		
Nights	3.93	2.77	5.95
Party size	1.6	1.5	1.7

Source: The Conference Board of Canada.

Although cars were the dominant mode of PSV transportation, many trips involved intercity public transportation. While 58.4 per cent of respondents who took a PSV trip in the previous 12 months used private cars as the main mode of transportation, an additional 27.2 per cent used air transportation, 6.5 per cent took the bus, 2.9 per cent took the train, and a further 3.3 per cent rented a vehicle. (See Table 11.)

Table 11
Most Visitors to Post-Secondary Institutions Travel by Airplane or Private Car
(per cent)

	Share of all trips
Airplane	27.2
Train	2.9
Bus	6.5
Private car	58.4

(continued ...)

Table 11 (cont'd)

Most Visitors to Post-Secondary Institutions Travel by Airplane or Private Car

(per cent)

	Share of all trips
Rental car	3.3
Other	1.6

Source: The Conference Board of Canada.

Our survey also revealed that the majority of PSVs benefit local businesses, particularly those in the tourism sector. According to responses based on their most recent PSV, nearly half of respondents ate out at local restaurants while on their trip; 44 per cent stayed in commercial accommodations; 33 per cent purchased groceries; 28 per cent purchased clothing, souvenirs, or other merchandise; and 19 per cent purchased tickets for local events and activities. In fact, very few (13 per cent) respondents indicated their most recent trip involved no real benefits to local businesses. (See Table 12.)

Table 12

Visitors to PSE Institutions Often Buy Meals and Accommodation

(per cent)

Purchases	Share of all trips
Meals at restaurants and other food establishments	48
Commercial accommodation	44
Groceries	33
Clothing, souvenirs, or other merchandise	28
Tickets for events and entertainment	19
No purchases of meals, accommodation, groceries, retail goods, or entertainment	13

Source: The Conference Board of Canada.

The Economic Impact of Post-Secondary Education in Canada

Based on the average spending of Canadian travellers who visit family or friends, we conservatively estimate that trips to Canada's PSE institutions resulted in nearly \$1.9 billion in spending during the past year.¹² Apart from a sizable share attributed to transportation costs, most of the \$1.9 billion spent benefited local businesses near colleges and universities.

Our survey results reveal that PSE institutions contribute significantly to tourism activity in Canada and that visits to them result in significant benefits to transportation providers and local businesses.

Conclusion

PSE is big business. Annually, about \$41 billion in spending flows through Canada's PSE system. Through second-round spending effects, the gross economic impact on Canada from the PSE system is \$55.7 billion, for a spending multiplier of 1.36. In addition to these direct spending effects, PSE students spend an estimated \$17.5 billion off campus and have a gross economic impact of about \$20 billion, after second-round spending effects are considered. Moreover, we estimate about \$1.9 billion in PSE-related tourism spending.

The net economic impact is lower than these gross estimates for two reasons. About 60 per cent of the spending at Canada's universities and colleges is funded by provincial governments. Provincial governments must raise taxes to support this spending. So a large part of the spending is, in effect, a transfer from taxpayers to PSE institutions. Taxation at this level has some distorting effects on microeconomic functioning. The net direct economic impact may be less than half of the gross direct impact.

12 Based on data from Statistics Canada's 2011 Travel Survey of Residents of Canada (TSRC), the average spending of Canadians visiting family and friends within the country was \$57.64 per person, per night for overnight trips and \$52.24 per trip for same-day trips. The reported figure of \$1.9 billion for PSVs was calculated using only 50 per cent of the average spending for both overnight and same-day trips from the TSRC. We decided to use only 50 per cent of the average spending to account for the fact that, for many trips, a PSV is not the primary purpose of the trip.

In addition to their direct and indirect impacts on the economy, colleges and universities have an investment case to make to justify the government financial support they receive. They can point to their role in developing human and intellectual capital that raises the productive capacity of the economy. The next two chapters critically assess PSE institutions' capacity as developers of human and intellectual capital.

CHAPTER 4

PSE as a Human Capital Developer

Chapter Summary

- Human capital theory attempts to explain why people invest in education beyond the secondary level, where education is fully subsidized.
- University degree holders generate a 36 to 46 per cent annual return over high school graduates.
- Between 2000 and 2010, the earnings premium for a university degree in Canada fell from \$142 to \$138 for every \$100 earned by a person with a high school diploma.
- Although a higher level of education clearly generates good labour market returns, disaggregation of results reveals wide variations between disciplines.

Over the last 50 years, economists have made significant strides in the conceptualization and measurement of private and public returns on investments in education. Gary Becker, winner of the Nobel Prize in Economic Sciences, conducted seminal work on “human capital” that is instrumental to the way economists think about and measure these investments.¹ In Becker’s formulation, individuals invest in education based on an expected future stream of income and other benefits—very much like other types of investments. In Canada, society (through governments) underwrites PSE investments to capture the societal and economic benefits beyond those realized by the individual.

Although relatively simple in theory, in practice, human capital investments at the post-secondary level are complex. Until they finish secondary school in Canada’s public system, students receive a fully subsidized education. After they graduate, however, they face tuition and other costs in the PSE system today, without a guaranteed return tomorrow. Moreover, investing in PSE is not like purchasing securities like stocks or bonds. Security purchases are contracts between providers and users of capital. Securities have large and liquid secondary markets that allow investors to divest from their investment as circumstances change. These markets also allow for “hedging” of risk. For human capital investments, the provider of the capital is also the user, there is no secondary market to liquidate the investment, and financial hedging is largely absent.

1 Becker, *Human Capital*.

Unlike other capital investments, the actual return that individuals realize on PSE depends partly on their own ability and drive; partly on the institution's capacity to deliver a valuable educational experience and facilitate the transition from school to employment; and partly on the condition and functioning of the economy and labour market. The educational system does more than educate people; it also shapes labour market supply. PSE institutions may effectively create excess supply or supply shortfalls that are reflected in labour market earnings. In practice, the return individuals realize on their education investment varies, even for people with the same level of education, because that return depends on many other factors besides education. Aggregating returns by level of education tends to smooth out this variability.

In practice, the actual return involves three factors:

- the educational experience (how capital is paid for and accumulated);
- school-to-work transition (linking the capital formation to its employment);
- employment experience (which leads to the ongoing accumulation of capital through work).

Evidence on Returns on Education

A vast literature clearly shows significant and positive returns on investments in education. Psacharopoulos and Patrinos reviewed evidence for a sample of 42 countries.² They found that every additional year of education produces a 10 per cent return on the investment. Interestingly, these returns are directly related to a country's development. The returns in less developed countries are significantly higher than in developed countries. Psacharopoulos and Patrinos found some evidence of diminishing returns on education beyond a certain level. Disaggregating the data by country or occupation reveals where such diminishing returns are most prevalent.

2 Psacharopoulos and Patrinos, "Returns to Investment."

These findings are pertinent to Canada, a developed country with a very high rate of post-secondary enrolment. A number of Canadian studies have focused specifically on the returns on higher education over the long term. For example, Owram pointed out that university enrolments took off around 1960. He noted, for instance, that enrolments grew as much between 1963 and 1968 as they had from 1913 to 1963.³ Emery picked up this point and attempted to explain the phenomenon.⁴ One explanation is that rising enrolments reflected the change from blue collar to white collar jobs. The earnings data clearly show that the labour market demanded higher skills and the university system expanded to fill this need.

A number of Canadian studies show how the job market values education over time. For instance, Bourbeau, Lefebvre, and Merrigan looked at returns from 1991 to 2006 based on census data.⁵ They found that in the 1980–95 period, the labour market valued work experience relatively highly, as returns on experience increased while returns on education remained stable. However, since 1995, youth workers have done better, especially those with higher education credentials. Their work shows that the returns on university education are substantially higher than those for college or CEGEP. It is also noteworthy that the returns on education are very different depending on the province or territory in question, which suggests that the actual return is partly about the education but equally (or more) about the health of the labour market that accepts graduates. Returns are especially high in Western Canada, and particularly in Alberta, which generates the highest returns for those with trade credentials.

Boothby and Drewes confirmed this hierarchy of returns.⁶ They used census data for 1981, 1991, and 2001 to estimate returns and found that the returns on non-university post-secondary diplomas (including

3 Owram, *Born at the Right Time*.

4 Emery, *Total and Private Returns*.

5 Bourbeau, Lefebvre, and Merrigan, *Returns to Education*.

6 Boothby and Drewes, "Post-Secondary Education in Canada."

The Economic Impact of Post-Secondary Education in Canada

community college, trade institution, and other vocational education credentials) were small when compared with a high school diploma and significantly less than a university degree. Ferrer and Riddell supported this finding. They found that a community college or trade diploma generated an 8 per cent annual return when compared with a high school diploma.⁷ However, university degree holders generated a 36 to 46 per cent return over high school graduates.

Gunderson agreed that the overall evidence supports higher returns for academic streams of higher education over technical and vocational streams. However, he cautioned these studies may inflate the returns because they have difficulty controlling for individual ability and drive, as well as the shorter duration of vocational programs when compared with university programs. In work with Krashinsky, Gunderson found that apprentices generated a wage premium of 9.2 per cent over high school dropouts but that these gains were exclusively concentrated in males, as females actually experienced a negative return on investments in apprenticeships.⁸

This evidence may explain the push toward expanding degree-granting institutions (including conversions of colleges to degree-granting institutions) and the expansion of college transfer programs. However, Moussaly-Sergieh and Vaillancourt pointed out that degree granting is not a panacea. When university graduates are grouped together, they clearly demonstrate good overall returns on investments in university education. Moussaly-Sergieh and Vaillancourt found that males investing in an undergraduate degree could expect to see an annual return, in after-tax earnings, of roughly 12 cents on the dollar, while female students realized 14 cents per dollar. However, their disaggregated

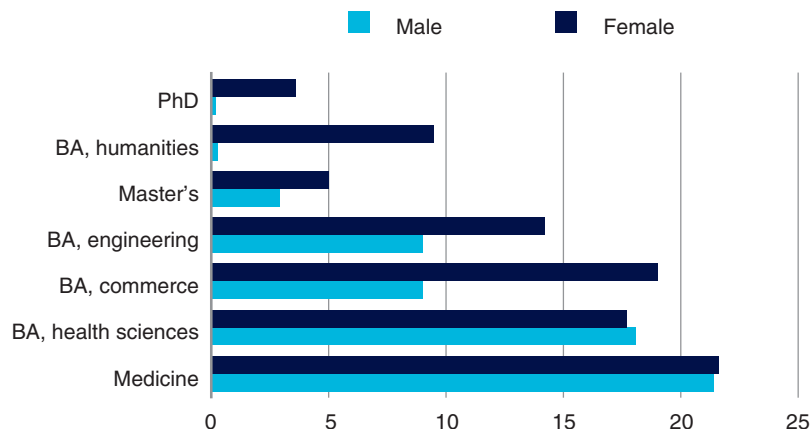
7 Ferrer and Riddell, "The Role of Credentials."

8 Gunderson and Krashinsky, *Returns to Education*. The negative economic returns for women, on average, are in large part a consequence of women's proportionally higher enrolment in low-return fields, such as aesthetics and hairdressing. To be sure, women (and men) may experience other non-economic benefits from participation in apprenticeships in these fields—such as higher self-esteem, development of life skills, and better health outcomes—but on a purely economic analysis, the return raises some important issues.

Chart 6

Private Rates of Return, by Discipline and Degree, 2000

(per cent)



Source: Moussaly-Sergie and Vaillancourt, Extra Earning Power.

results show much lower returns, especially for males who pursue bachelor's degrees in the humanities or master's level or PhD programs of study. (See Chart 6.)

The Conference Board regularly compares Canada's performance with that of other OECD countries in *How Canada Performs*.⁹ One of the metrics it uses is returns on tertiary education, which includes all forms of post-secondary education. The most recent study confirmed positive returns on post-secondary education, based on data from the OECD's *Education at a Glance 2012*. The average net present value of combined private and social returns for Canadian men who complete tertiary education was \$220,365 (consisting of \$153,520 in private returns and \$66,845 in social returns). Meanwhile, Canadian women realized a total return of \$158,026 (\$111,487 private return and \$46,539 in social returns).

Notwithstanding these positive returns, Canada was only a second-tier performer in the study. Canada ranked 10th out of 15 comparator countries—the report gives Canada a “C” grade. Comparator countries

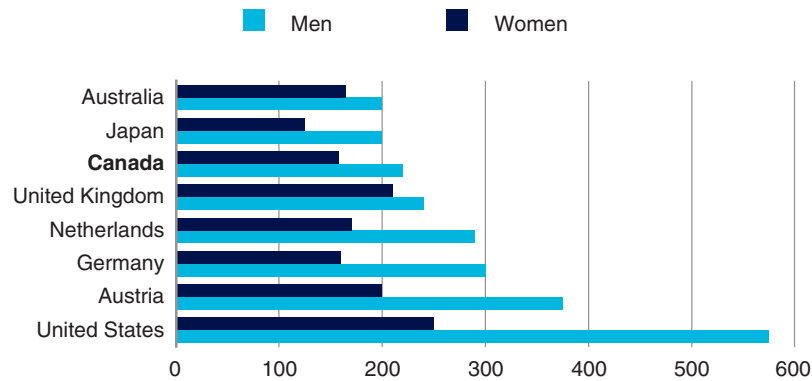
9 The Conference Board of Canada, *How Canada Performs: Return on Investment*.

The Economic Impact of Post-Secondary Education in Canada

Chart 7

**Return on Investment in Tertiary Education, 2008 or
Most Recent Data**

(US\$ 000s)



Note: The data are for total private and public net present value, at purchasing power parity.
Sources: The Conference Board of Canada; OECD.

such as the United States, the United Kingdom, Germany, and the Netherlands produced higher returns on tertiary education than Canada did. (See Chart 7.)

Moreover, *How Canada Performs* noted that the earnings premium for a university degree in Canada fell between 2000 and 2010 from \$142 to \$138 for every \$100 earned by a person with a high school diploma. Recent research by CIBC confirmed these findings.¹⁰ The overall unemployment gap between those with post-secondary and secondary school credentials has narrowed in recent years. So too has the difference in job quality, as measured by the percentage of people with a given credential who are only able to secure part-time employment. In terms of earnings, someone with a bachelor's degree still earns a third more than a high school graduate, with master's and PhD degree holders earning an additional 15 per cent beyond that. However, over the last decade, the real weekly wages of high school graduates actually rose faster than those of bachelor's, master's, and PhD degree holders.

10 This paragraph is based on the analysis in Tal and Enenajor, *Degrees of Success*.

The Educational Experience

The literature on returns on education distinguishes between years of schooling and educational attainment. The distinction is important because of so-called sheepskin effects—an educational credential is a signal to employers of acquired skill. Achieving a full credential is especially important in post-secondary education. For instance, when Ferrer and Riddell compared the earnings of completers with those of non-completers, they found completers earned 4 to 6 per cent more for a high school diploma; 6 per cent more than that for completion of a community college or trade school program without a high school diploma; and 3 to 5 per cent more than that for completion of a community college or trade school program with a high school diploma. However, the greatest earnings effect was at the bachelor's degree level, where completers earned over 20 per cent more than non-completers.

These results explain why completion rates are especially important in PSE. For example, British Columbia has more than 309,000 students enrolled at any one time. In 2010–11, 103,934 exited the system, but only 55,877 did so with a credential.¹¹ In 2010–11, roughly 19,000 students went back to the same institution after stopping out, 15,000 moved to a new institution after stopping out, and 3,600 returned to an institution they attended previously from another institution after stopping out.

Other work from BCStats found that those stopping out generally had a favourable opinion of the institutions they attended.¹² However, they differed from completers in that their studies tended to be more academically oriented than employment oriented. Moreover, leavers found these studies more challenging than did completers. Interestingly, leavers were more motivated by the pursuit of a credential, usually in the arts, than were completers, who were driven more by specific skill acquisition. Their employment experience showed that the pursuit of a general credential did not pay dividends in the labour market.

11 British Columbia Ministry of Advanced Education, *Student Pathways*.

12 BCStats, *Completers Versus Leavers*.

The Economic Impact of Post-Secondary Education in Canada

As the economy and society place more emphasis on longer school stays, more flexibility may be required in the system. The elongation of school stays is resulting in greater variation in individual patterns of study and work. Canadians are more likely to interrupt their education, return to school later in life, and explore non-PSE avenues of higher learning as they sort through career options. So, although they may still wish to pursue advanced education, they are much more likely to want flexible learning options as they do so. This argues for more flexible learning options among different types of PSE institutions.

Another issue relates to the quality of the learning experience and the acquisition of skills. Individual institutions differ significantly in the way they engage students in the learning experience. The National Survey on Student Engagement (NSSE), a survey of post-secondary students in Canada and the United States, provides some idea of how students rank their educational experience. For example, one metric considers the degree of engagement with faculty in teaching and research. (See Table 13.) The 2012 results are based on a sample of 570 colleges and universities in Canada and the United States. The data show that engagement improves as students proceed from freshman studies to their senior year.

We alluded to the trend toward larger classes in some disciplines. This trend may partially explain student disengagement and high rates of stopping or dropping out. A lack of engagement may be jarring for students used to a high level of engagement in high school. Some of Canada's largest universities score well below the average on this metric, but Canada's smaller undergraduate universities score extremely well. (See box "What Is Unique About Quest University Canada?") However, these small public undergraduate teaching universities operate under the same funding model as much larger universities.

Table 13
Level of Faculty Interaction, Selected Universities
and Colleges, 2012
(mean score)

	First year	Senior year
Quest University Canada	56.3	69.6
Acadia University	34.0	44.9
Bishop's University	32.9	47.5
Trinity Western University	32.2	43.1
NSSE Average	35.2	42.5
Sheridan College	34.0	42.0
Wilfrid Laurier University	24.4	33.4
University of Guelph	20.1	32.2
University of Toronto	23.0	32.2
University of Alberta	23.1	31.5
University of British Columbia	23.1	31.2
University of Regina	24.7	31.0
York University	23.5	31.0
University of Ottawa	20.0	28.9
Université Laval	16.4	27.4

Note: Interaction was scored on a scale from 1 to 100, with 100 being the best.
Source: National Survey of Student Engagement (NSSE).

Although PSE institutions often claim to develop advanced skills, the evidence of acquired learning is still very much the same as it has always has been—namely, certificates, diplomas, and degrees related to a specific discipline, awarded largely on the basis of academic activities such as essays and exams. However, the development of critical thinking skills is only indirectly related to this pedagogical approach.

In the U.S. context, authors Richard Arum and Josipa Roksa attempted to independently verify the acquisition of critical thinking skills by using the OECD's Collegiate Learning Assessment tool. The OECD uses this statistical instrument to carry out its 17-country Assessment of Higher

Education Learning Outcomes (AHELO) Project.¹³ Arum and Roksa found that 45 per cent of 2,300 U.S. college students who used the tool showed no statistically significant improvement in critical thinking skills after their first two years in college. (It would be helpful to replicate this study for Canada.)

What Is Unique About Quest University Canada?

Quest University Canada is a small liberal arts and sciences university in Squamish, British Columbia. It has attracted attention because of its extremely high scores on various indicators of the National Survey on Student Engagement. It is the top-scoring Canadian university on student-faculty interaction, enriching educational experiences, and active and collaborative learning.¹⁴

Much has been made of Quest's unique block learning model. In the typical semester system, students take multiple courses per term, spending three hours of lecture time per week per course. Students then complete outside assignments, which may consume about the same time as lectures. This pedagogy requires students to be good time managers and to focus while shifting between different subjects.

By contrast, the block system focuses students on one subject at a time. Each course is taught for three hours a day every weekday in three-and-a-half-week stretches. In addition, students spend roughly five hours on classwork outside of class each day. This approach naturally focuses students. They are encouraged to identify broad questions and to design innovative ways to explore answers during the block. Moreover, the block system allows the university to attract adjunct faculty. It is much easier for adjunct faculty to make a three-and-a-half-week commitment to teach at Quest than a 12-week part-time commitment at a typical university. As a result, Quest is able to attract top adjunct talent for short stretches of teaching.

¹³ Arum and Roksa, *Academically Adrift*.

¹⁴ National Survey on Student Engagement, *NSSE Annual Results 2012*.

The economics of the Quest business model is also unique. Quest is modelled on private liberal arts and sciences colleges, which are common in other jurisdictions (most notably the United States) but foreign to Canada. The criticism is that private universities are elitist because they charge students full tuition, room, and board that can amount to \$40,000 per year. However, Quest explicitly manages the social mix through a blend of merit-based and need-based scholarships.

The merit-based scholarships take the form of institutional scholarships. For instance, the David W. Strangway Scholarship covers full tuition for four years (worth \$125,000). Six of these are awarded every year. Meanwhile, the Quest University Canada Scholarships provide between \$2,000 and \$24,000 based on merit and other factors that Quest deems important to the social mix and learning environment at Quest.

The need-based grants are allocated to students based on family income (as determined by tax filings). The first \$1,320 of each need-based award is in the form of a guaranteed work-study job on campus (\$11 per hour for 120 hours). Jobs range from library assistant and peer tutor to groundskeeper and maintenance worker, and amount to either four hours per week or a full-time job for one month (May or August). This component of the grant is optional. In addition, the student may be eligible for need-based grants up to the amount of tuition. Fifty per cent of students receive a need-based grant, and over 25 per cent of all Quest students are from families with an annual household income of less than \$70,000. All students are also eligible for government financial aid.

Quest's classes are capped at 20, with an average class size of 16 students. However, its production costs are in line with those of major universities. It does not receive government operating grants, so tuition costs reflect production costs more directly here than at most other Canadian PSE institutions. Quest focuses on the learning experience. It cross-subsidizes tuition to improve access and to create a diverse student population. It does not cross-subsidize from teaching to research activities. This model clearly produces highly engaged learners who rank their learning experiences extremely highly.

Employment and Returns on Education

While critical thinking skills may be important, it is the employment context for applying these skills that actually generates the return on education. A review of the highest paying jobs in Canada provides some insights into how PSE generates returns, and why these returns vary among disciplines and credentials.

In 2011, Statistics Canada undertook a household survey of the top 1 per cent of earners. (See Table 14.) It found that over 87 per cent of top earners had post-secondary qualifications. Over half of them had a credential in one of three major fields: business (29.2 per cent), health (14.5 per cent), or engineering (11.4 per cent). More importantly, the study showed that high-income Canadians tended to work in either business management or high-earning regulated occupations, such as law, medicine, and engineering. In particular, doctors—a group that included general practitioners, specialists, dentists, and veterinarians—had a very high incidence of high earners.

Table 14

Managers Are Largest Occupational Group With Earners in the Top 1 Per Cent

	Number of workers in the occupation per 100 workers	Proportion of this occupational group among top earners (per cent)	Average income (\$)
Management occupations	4.9	38.8	421,200
Senior management occupations	19	16.7	466,300
Specialized middle management occupations	4.1	11	388,700
Health occupations	3.1	14.3	333,600
Professional occupations in health (except nursing)	14.9	13.8	334,300
Business, finance, and administration occupations	1.1	13.7	398,500
Professional occupations in business and finance	4	9.4	407,400

(continued ...)

Table 14 (cont'd)**Managers Are Largest Occupational Group With Earners in the Top 1 Per Cent**

	Number of workers in the occupation per 100 workers	Proportion of this occupational group among top earners (per cent)	Average income (\$)
Occupations in education; law; and social, community, and government services	1.3	11	365,800
Professional occupations in law and social, community, and government services	4.6	8.7	384,400
Natural and applied sciences, and related occupations	1.9	9.9	335,600
Professional occupations in natural and applied sciences	2.9	8	347,600
Other occupational groups	0.3	12.3	335,000

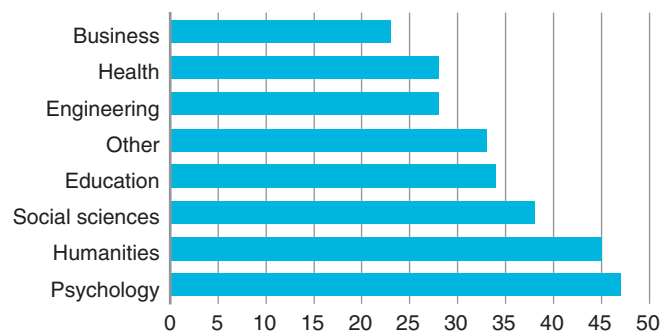
Source: Statistics Canada, Education and Occupation of High-Income Canadians.

Self-regulated professions work closely with PSE institutions to design education that matches professional requirements. In addition to PSE-based learning, professions usually require suitable experience as a prerequisite for licensure. With varying degrees of success, professions may restrict the number of licences issued to new entrants, either new graduates or foreign qualified professionals. This is usually justified as a way to maintain professional standards, but it may also reflect a profession's interest in creating scarcity and, therefore, higher earnings for incumbent licence holders. So the highest earning professions are those where the profession works closely with PSE institutions to structure both the education and training requirements and the labour market that accepts graduates.

The Forum of Labour Market Ministers, a federal-provincial body, has compiled a list of professions targeted for liberalization under the Pan-Canadian Framework for the Assessment and Recognition of Foreign Qualifications. These provide good examples of professions that work closely with the PSE system on education and training while maintaining barriers to new entrants. They include architects, engineers, auditors and

The Economic Impact of Post-Secondary Education in Canada

accountants, pharmacists, registered physiotherapists, registered nurses, physicians, teachers, and dentists. All these occupations require PSE and are successful at managing the supply of new entrants into their profession. It is also noteworthy that they tend to be service professions with a limited amount of cross-border trade activity.

Chart 8**Share of University Graduates Earning Less Than the Median Income**

Note: Blue bars show fields of study that collectively account for 45 per cent of recent graduates.
Source: Tal and Enenajor, Degrees of Success.

Because these professions set limits on new entrants, the PSE system must limit how many spots it offers students in these fields. It does so through entrance requirements. As such, enrolment tends to expand in fields that do not face such requirements but do generate lower returns on education investments. Tal and Enenajor show that these lower return fields account for about 45 per cent of recent graduates. (See Chart 8.) So, although business and the regulated professions raise the average of overall returns, many graduates are from less-structured programs. Although business programs are also relatively low cost, they do better because they are highly applied, develop skills that apply to thousands of businesses, and often involve cooperative learning.

Humanities and arts programs are much more likely to rely on the development of general critical thinking skills not specific to any occupation. As Arum and Roksa's work showed, it is unclear that graduates actually acquire these skills. Professional occupation programs develop critical thinking skills but also show students how to apply them to specific types of occupational issues. In arts and humanities programs, it is up to the employer—largely through trial and error—to determine whether students have truly acquired these skills and know how to apply them in a particular work setting. In the future, employers are likely to see more and more graduates with these types of credentials.

Clearly, investments in education have very different risks and returns, depending on the school-to-work pathways. Some pathways are likely to guarantee high returns, while others are much riskier. On average, post-secondary graduates do well, but the areas where enrolment is expanding tend to be riskier in terms of earnings potential.

Conclusion

As a general principle, education is a good investment. It generates significant private and social returns. However, there is evidence of decreasing returns as institutions grow larger. The earnings of PSE graduates are clearly not evenly distributed. The highest returns are concentrated in business and self-regulated professions. When colleges and universities develop people for these professions, they are successful at generating good returns.

Under current funding models, there is little incentive for PSE institutions to expand enrolments in higher cost programs that may actually generate higher returns by developing job-specific skills. Enrolment incentives encourage colleges and universities to expand offerings into areas where they can lower costs and use existing excess capacity. However, more enrolments in such general programs, often in the arts and humanities, are only indirectly related to labour market needs. While arts and humanities graduates often achieved good returns in the past because

The Economic Impact of Post-Secondary Education in Canada

the economy required a certain number of people with critical thinking skills, there are signs that the demand for general skills may be reaching a limit and that new graduates in general programs are not doing as well as previous graduates.

CHAPTER 5

Universities as Intellectual Capital Developers

Chapter Summary

- In 2012, Canadian governments spent over \$4.5 billion on university research, primarily through major federal granting councils.
- As a result of funding, Canada performs well in generating ideas, publishing ideas in academic journals, and having research cited.
- However, Canada is very weak in converting new ideas into better products, services, and processes that improve Canadians' lives and contribute to economic performance.
- Canada's universities could do more to embrace the opportunities for applied research. Embracing such a mandate is probably more important than PSE intellectual property policy in determining the level of commercialization.
- Assigning multifactor productivity gains to university research without explaining the specific mechanism by which research affects productivity is not a convincing or reliable way to demonstrate the value of university research.

In 2012, Canadian governments spent over \$4.5 billion on university research, primarily through major federal granting councils.¹ The federal financial commitment to higher education research more than doubled, in real (inflation-adjusted) terms, between 2000 and 2012.² This additional funding has affected both the size and the functioning of Canada's university sector. As a university administrator told us, tenured faculty members are drawn more into research activities, which often means fewer teaching hours. This has resulted in either larger class sizes per tenured faculty member or increased use of non-faculty teachers.³

The transfer of resources from Canadians to universities is tangible and measured. What tangible results are obtained from this investment in university research? This is not a straightforward question. To begin, there may not be a direct relationship between basic research and tangible results. Research may proceed for many years and through multiple channels before ideas are translated into products, services, and processes that improve Canadians' lives and contribute to economic performance. Nevertheless, governments and others are asking universities to justify research investment in terms of the applicability of findings to the broader economy and society.

This chapter considers universities' activities as intellectual capital developers. It explores aspects of the current approach to university research funding and the outcomes of these activities.

1 CAUBO, *Financial Information*.

2 Statistics Canada, CANSIM table 358-0001.

3 Interview by Michael Grant, January 17, 2014.

Innovation and Impact

From an economic perspective, intellectual capital generates a return when it is incorporated into tangible products, services, and processes that businesses and consumers want to buy. New ideas change the way things are produced and the nature of products, services, and processes. This change is called innovation.

The Conference Board of Canada defines innovation “as the process through which economic and social value is extracted from knowledge by generating, developing, and implementing ideas to produce new or improved strategies, capabilities, products, services, or processes.”⁴ We distinguish between radical and incremental innovation. Successful radical innovators do more than just innovate; they also fundamentally change markets by sweeping away old ways of doing things. Meanwhile, incremental innovation gradually improves products, services, and processes. When innovations are incorporated into products, services, and processes that people value and pay for, innovation is said to be commercialized.

From Patent to Performance

It is important to understand how the innovation commercialization process unfolds. Some innovators may protect their ideas from copying through copyright, trademarks, patents, and trade secrets. Intellectual property (IP) protection is a signal that the innovator may choose to commercialize her or his ideas. However, it is not necessarily evidence of actual commercialization. For instance, if an academic is motivated by academic advancement, then the important thing is to copyright publications and to have other academics cite the work in their papers. Academic advancement is related to publication and citation performance. If academic advancement is the researcher’s goal, then there is little need to commercialize ideas.

4 The Conference Board of Canada, *Centre for Business Innovation: Innovation Defined*.

IP protection is a form of market protection. It protects the holder by preventing others from profiting from the ideas. However, the economic value of IP is not determined by the protection per se, but rather by the commercialization process. IP simply structures the market for commercializing ideas by shaping competition. Although firms are funded by capital markets partly on their ownership of IP, their ability to reach paying customers is equally or more important. It is not enough to have a good idea; firms need to commercialize the ideas to attract capital.

As one moves away from basic research toward commercialization, many business capabilities come into play. As an indication, in 2013, Apple Inc. spent over twice as much on selling, general, and administrative expenses (US\$10.8 billion) as it did on research and development (R&D; US\$4.4 billion).⁵ Indeed, a Booz and Company study found little direct relationship between innovation success and R&D spending.⁶ Companies like Apple, Google, 3M, and General Electric are regarded as leading innovators yet rank well down the list of top R&D spenders. These companies are excellent at thinking up products and services that people want, focusing their research efforts on areas where they can establish a unique value proposition, and attracting paying customers to their products. They also acquire promising technologies from entrepreneurial companies.

IP, especially patents, is a rather broad indicator of intent to commercialize. More significant than IP itself is its use by companies. When IP is created at a university, university researchers may license their ideas to companies, or the researchers or others associated with the university may start and grow companies based on ideas developed at the university. It is these companies that create enterprise value and employment; it is through commercialization that economic value is created.

5 Apple Inc., *10K Filing*, 33.

6 Booz and Company, *Global Innovation*.

Assessing Canada's Performance

Canada lags behind major competitors in innovation performance. The innovation section of a Conference Board of Canada report, *How Canada Performs*, gives Canada a “D” grade.⁷ *How Canada Performs* divides innovation metrics into three areas: creation of ideas, diffusion of ideas, and transformation as companies apply ideas. Canada performs relatively well on idea creation, as measured by academic-specific metrics, such as number of scientific articles, public spending on R&D (much of which is performed in universities), and cited papers. However, we are weak in the commercialization stages that establish property rights to ideas (IP) and the use of IP to create unique company value propositions. Canadians are good at starting companies but not very good at using innovation value propositions to grow them to significant size. The performance of academic-specific metrics suggests that academics are mostly concerned with academic advancement through publication.

Canada performs relatively poorly in comparison with other advanced countries on the overall number of patents and the patent/population ratio. Other advanced countries also do better than Canada in using scientific articles to develop or enhance manufacturing or service industries. Countries such as Japan and Germany perform very well in terms of using scientific publications to improve industry performance, whereas countries such as the United States, the United Kingdom, and Australia perform better than Canada in high-end services. (See Chart 9.)

The Council of Canadian Academies formed an expert panel to look at the incongruity between Canada's academic research performance and its lack of innovation commercialization.⁸ The panel concluded that Canadian businesses chose not to pursue innovation as a business strategy. The panel puts this down to structural features of the Canadian

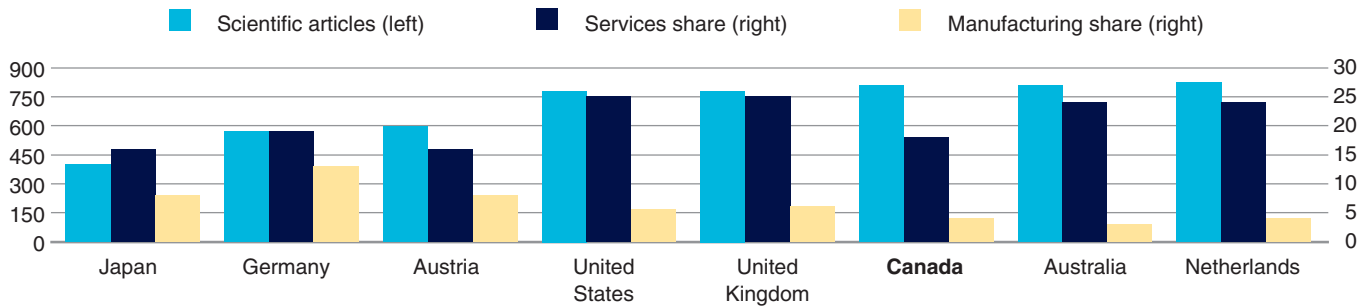
7 The Conference Board of Canada, *How Canada Performs: Innovation*. The next paragraph on performance also draws from this source.

8 The Expert Panel on Business Innovation, *Innovation and Business Strategy*, 8–9.

The Economic Impact of Post-Secondary Education in Canada

Chart 9

Number of Scientific Articles per Million Population, Knowledge-Intensive Services as a Share of GDP, and High/Medium-Tech Manufacturing as a Share of GDP, 2009



Sources: The Conference Board of Canada, *How Canada Performs: Innovation*; OECD.

economy, most notably our rich resource endowment and small domestic market. There is a shortage of what the panel calls “commercial receptor capacity”—in other words, willingness by companies to commercialize innovations developed elsewhere. The panel also points to the relatively weak Canadian venture capital market.

However, Australia is a relatively small, resource-rich economy, and yet it performs better than Canada in terms of the size of its knowledge-based service industries. Moreover, as we explore elsewhere, one of the main reasons for Canada’s undersized venture capital market is that it has not performed well over the years.⁹ Our work on innovation finance argues that managerial capabilities create the companies that venture capital funds. Funding alone cannot create excellent companies. The federal government’s recent \$400-million commitment to a fund of funds is a natural experiment that will test an alternative hypothesis—funding creates growing, innovative companies.

Given that business schools are one of the fastest growing parts of the Canadian PSE sector, it is reasonable to expect PSE institutions to influence the managerial capacity of Canada’s innovative companies

9 Grant, *Start Me Up*.

and to improve the links between companies and university research. The Council of Canadian Academies is right to point out that this is all about the approach to business. It is not merely business strategy but also strategy execution. Thousands of business people are trained at Canada's PSE institutions and they are the ones Canada needs to commercialize ideas.

Incentives or Predisposition?

Canada's PSE institutions can help improve the weak links between university research and commercialization in two ways. They can educate people who go on to commercialize ideas or they can form links with companies (either established companies or start-ups) to commercialize ideas.

Regarding the first strategy, entrepreneurial drive and skill are probably as important as technical skill in forming and growing innovative companies. Clearly, the data show that successful people tend to have university degrees (despite the impressive list of innovative, entrepreneurial university dropouts who have formed highly successful companies, including Bill Gates, Steve Jobs, Mark Zuckerberg, Richard Branson, Michael Dell, and Ralph Lauren). However, entrepreneurship is a unique way to succeed because it involves a combination of technical skill, risk-taking, and business acumen.

It is unclear how PSE develops skills like risk-taking and business acumen. Startup Genome, the entrepreneurial mapping initiative, found that Silicon Valley had a higher ratio of graduate degree holders among its entrepreneurial base than did major Canadian centres like Toronto or Vancouver (which scored especially low on this metric). This suggests that individual PSE institutions vary in the way they prepare graduates for entrepreneurship. (See Table 15.)

The Economic Impact of Post-Secondary Education in Canada

Table 15**Top Start-Up Regions, by Start-Up Entrepreneurs' Level of Education**

(ratio of entrepreneurs with graduate degree to all other entrepreneurs)

	Education
Toronto	1.4 : 1
Vancouver	0.6 : 1
Waterloo	2.3 : 1
Silicon Valley	2.5 : 1

Source: Startup Genome.

The Southern Ontario city of Waterloo looks more like Silicon Valley in the ratio of graduate degree holders to non-holders in the entrepreneurial base. Waterloo attracts a lot of attention because of its relatively high number of successful start-ups. By one estimate,¹⁰ there were 575 companies in the Waterloo technology cluster, several started by graduates of the University of Waterloo, including BlackBerry, OpenText Corporation, MKS, Descartes Systems Group, Desire2Learn, and NexJ Systems. However, the University of Waterloo ranks only 15th in research funding among Canada's universities.¹¹

Some have pointed to the University of Waterloo's IP regime as a factor in the relatively high number of companies emerging from the institution. Individual institutions differ in the way they treat academic IP. At one extreme, some universities take the position that the academic is an employee of the institution. As such, the university effectively owns the IP produced by the academic. At the other extreme, some universities are interested in creating incentives to commercialize ideas, and therefore empower the academic to commercialize through relatively liberalized approaches to IP ownership and cash flow rights flowing

10 Council of Ministers of Education Canada, *Imagine Studying in Canada*.

11 Research Infosource Inc., *Canada's Top 50 Research Universities List*.

from IP. Table 16 summarizes the different kinds of policies. Waterloo is among the more liberalized environments for academics who wish to commercialize ideas.

However, a representative of the University of Waterloo's technology transfer office told us that its IP policy is probably not as important as the mandate and culture of the university.¹² When the University of Waterloo was established, it sought to distinguish itself from existing universities. It did so by drawing on the German engineering traditions that accompanied the region's high level of German immigration, first from the United States (Pennsylvania Dutch) and later from Europe. In Chapter 2, we noted the importance of the PSE mission in defining the culture and approach of individual institutions. In the case of the University of Waterloo, the mission was defined as an applied university along the lines of a German engineering university. The approach to IP is more a reflection of that mission than a determinant of technology spin-offs from the university.

The evidence suggests that most of Canada's research universities have not embraced this kind of applied mission. Canada's largest research universities (in order, in terms of the amount of sponsored research) are the University of Toronto, the University of British Columbia, the University of Montréal, McGill University, and the University of Alberta. However, a report by the Milken Institute ranking North American cities based on their high technology employment ranked Toronto 15th, Montréal 19th, and Vancouver 36th.¹³ Meanwhile, Seattle, a two-and-a-half-hour drive south of Vancouver, is ranked second. Toronto is the fourth most populous city in North America and yet ranked lower than San Diego.

¹² Interview by Erin Butler, January 8, 2014.

¹³ DeVol and others, *North America's High-Technology Economy*.

The Economic Impact of Post-Secondary Education in Canada

Table 16**Intellectual Property Policies at Canadian Research Universities (U15), 2014**

University	Copyright Ownership of IP	Patent Ownership of IP	Revenue to university if commercialized by creator	Revenue to university if commercialized by university	First right of refusal to commercialize
University of British Columbia ¹	Creator	University	Negotiated	50% of net revenue	University (Tech Transfer Office)
University of Alberta	Creator	Creator	33.33% of net revenue ²	66.67% of net revenue	Creator
University of Calgary	Creator	Creator	Negotiated, 10–25% of net revenue	50% of net revenue	Creator
University of Manitoba	Creator	Creator	50% of net revenue	50% of net revenue	Creator
University of Toronto	Creator	Joint	25% of net revenue	40% of net revenue	Creator
McGill University	Creator	Joint	20% of first \$100,000 of net revenue, then 30%	First \$10,000 of net revenue shall accrue to the creator, then 40% of net revenue to the university	University (Tech Transfer Office)
McMaster University	Joint, Creator or University	University	25% of net revenue	50% of net revenue ³	University (Tech Transfer Office)
University of Ottawa	Creator	University	Negotiated	20% of the first \$100,000 of net revenue and 50% of the remainder thereof	University (Tech Transfer Office)
University of Western Ontario	Creator	Creator	25% of net revenue (except for software, which is 6.25–12.5% of net revenue)	50% of net revenue	Creator
Queen's University	Creator	Creator	Negotiated	Negotiated	Creator
University of Waterloo	Creator	Creator	0% ⁴ or ex-post rent cost negotiated	Negotiated	Creator
Université Laval	Creator	University	50% of net revenue	50% of net revenue	University (Tech Transfer Office)

(continued ...)

Table 16 (cont'd)

Intellectual Property Policies at Canadian Research Universities (U15), 2014

University	Copyright Ownership of IP	Patent Ownership of IP	Revenue to university if commercialized by creator	Revenue to university if commercialized by university	First right of refusal to commercialize
Dalhousie University	Creator	Creator	50% of net revenue	50% of net revenue or negotiated	Creator
University of Saskatchewan	Creator	Creator	0% or negotiated	50% of net revenue	University (Tech Transfer Office)

¹ If a university inventor chooses to be directly compensated by a company receiving any rights in relation to the commercialization of a university research product, that university inventor will not receive any portion of the net revenue from the commercialization of the university research product.

² The university will have the right to either approve or prevent any subsequent transactions by which the rights to the IP are affected, where any party directly or indirectly involved is not at arm's length to the inventor.

³ Fifty per cent of net revenues shall be paid to the IP creators or reinvested in further research. The actual proportion to be paid to the IP creators or reinvested in further research shall be decided by the IP board based on any representations that the IP creator wishes to make.

⁴ Except when contractual arrangements have been made through informed consent or the university has provided direct support for the development of IP (such as funding, material supplies and equipment, dedicated space, teaching relief time, or staff support), the university assumes no a priori share of revenue, ownership, copyright, or other obligations for the rights to IP developed by members of the university. Reimbursement for direct support costs shall be negotiated between the university and the developers of the IP in accordance with university policy and procedures.

Notes: Information for the Université de Montréal is not shown due to lack of access to policies.

Each university has its own definition of net revenue. It generally means all consideration received by the inventor or the university from third parties, from the sale or licensing of a patent, less the out-of-pocket costs paid by that party to obtain the patent and granting, performing, and enforcing any assignment or licensing of the IP. Any consideration not received in cash is most often valued by agreement between the university and the inventor.

Sources: The University of British Columbia Board of Governors; University of Alberta; University of Calgary; University of Manitoba; University of Toronto; McGill University; Queen's University; McMaster University; University of Ottawa Office of Faculty Relations; University of Western Ontario; University of Waterloo; Université Laval; Dalhousie Faculty Association; University of Saskatchewan; and May Hen.

The Milken report suggests that U.S. universities generally do a better job of commercialization than Canadian universities. In 2008, Canada's universities held 5,908 patents.¹⁴ However, in 2012, their IP revenue from all sources (including royalties, milestone payments, and sales of IP) amounted to only \$70 million.¹⁵ By comparison, in 2012, U.S. universities generated over US\$2.6 billion from licensing.¹⁶ Even accounting for the fact that the U.S. economy is 10 times larger than Canada's, Canadian universities do not perform anywhere near as well as U.S. universities on

14 Statistics Canada, CANSIM table 358-0025.

15 Association of University Technology Managers (AUTM), *AUTM Canadian Licensing*.

16 AUTM, *AUTM U.S. Licensing*.

this metric. Notably, German and Japanese companies patent in Canada almost as much as Canadian companies do and much more than Canadian universities do.¹⁷

However, the impact of university research is greater than patent income suggests. To begin, the university share of patent income may only be 25 per cent of the total income, based on our assessment of universities' IP policies. Moreover, universities do not always hold a patent on ideas generated at the university. Individual faculty may hold patents themselves and sell or lease them, or use them to commercialize an invention on their own (although few of our interviewees could point to examples where this had happened).

It seems that university research is more likely to be commercialized by companies paying universities to conduct research. According to CAUBO, in 2011–12, universities and polytechnics received \$825 million to conduct research on industry's behalf. Companies such as IBM Canada and Bombardier Transport have framework agreements with PSE researchers that define research procedures, ownership of property rights, residual royalties, and the like. This research, by definition, feeds into commercial value creation.

However, this private funding pales in comparison with the multi-billion-dollar commitment by governments to university research. In fiscal 2012, the federal research funding organizations spent \$3.4 billion on university research that may generate patents.¹⁸ However, annual patent revenue is based on the stock of patentable knowledge. Patents typically last 20 years. As such, the federal research funding councils have spent tens of billions of dollars over time to realize over \$70 million in annual university patent income. Such returns are considerably lower than the government's cost of capital. Government funding of university research, therefore, needs to be justified on some other basis than direct commercialization.

17 Canadian Intellectual Property Office, *Annual Report 2010–11*.

18 CAUBO, *Financial Information*, 7.

Universities can rightly point to start-up companies that have “spun off” from a university. One report set the number of these companies at 1,242 in the 10-year period to 2008.¹⁹ However, the issue in Canada is not starting companies as much as starting *fast-growing* companies.²⁰

Canadians start around 140,000 new businesses every year.²¹ However, venture capital is only interested in a small subset of these businesses that are capable of growing very quickly, usually generating triple-digit sales growth. In financial circles, rapid growth is what distinguishes a true start-up from other new businesses. However, our interviews suggest that very few rapid-growth companies emerge directly from Canada’s PSE sector.

Today, about a third of new businesses are started by people with university degrees.²² As recently as 1990, more businesses were started by those with less than a high school education than with university degrees. Today, most new businesses are started by people over the age of 50. The typical path to a new business start-up in Canada would appear to be a university degree leading to a secure career leading to a post-career business.

A university administrator put poor commercialization performance down to the academic mindset.²³ She said academics see their mission as discovery of fundamental truths. Some are hostile to the university seeking to commercialize research. Academics tend to be problem-solvers. They define a research question, seek the answer, and then move on to the next problem, often with little interest in the commercial possibilities of their solutions. Moreover, their training focuses on deep but narrow specialization. They are not predisposed to commercialize ideas, and they do not typically have the general entrepreneurial and business skills necessary to do so.

19 Statistics Canada, CANSIM table 358-0025.

20 Grant, *Start Me Up*.

21 Statistics Canada, CANSIM table 527-0001.

22 Tal, *Startups*, 2

23 Interview by Michael Grant, December 13, 2013.

The Multifactor Productivity Argument

As Canada's PSE system is found wanting in terms of direct innovation impact, universities often make arguments for indirect impact, to encourage ongoing funding of their research mandate. This involves linking the university to macroeconomic metrics like multifactor (or total factor) productivity. Multifactor productivity is a measure of the output garnered from all inputs. It speaks to an economy's value creation efficiency. Multifactor productivity is sometimes interpreted as innovation or technological progress, because it measures residual output that cannot be explicitly linked to production inputs, such as capital and labour. Typically, econometric techniques are used to derive estimates of multifactor productivity. In fact, as measurement techniques for labour and capital have improved, the output assigned to multifactor productivity has declined.

In many studies of the impact of universities, multifactor productivity effects account for a very significant share of total effects. For instance, in the aforementioned study of the University of British Columbia, half of the \$10-billion annual impact related to the multifactor productivity estimates, which essentially assigned multifactor productivity gains based on share of total R&D spending.²⁴ Likewise, the University of Ottawa study claimed a \$1.26-billion annual impact based on the university's share of R&D spending.²⁵

The technique of assigning multifactor productivity gains to the higher education sector based on share of R&D spending was suggested by Fernand Martin in a 1998 paper.²⁶ Although easily calculated, it lacks theoretical and empirical substance. As Griliches pointed out in his comprehensive review of the evidence on the relationship between R&D and productivity, "Serious difficulties in econometric inference result from the fact that most of the variables of interest tend to move together over time and space, making it hard to untangle their separate effects.

24 Sudmant, *The Economic Impact of the University of British Columbia*, 30.

25 Díaz, Mercier, and Duarte, *2012 Economic Impact*.

26 Martin, "The Economic Impact of Canadian University Research and Development."

Moreover, it is not easy to establish causality.”²⁷ Assigning multifactor productivity gains to university research without explaining the specific mechanism by which research affects productivity is not a convincing or reliable way to demonstrate the value of university research. Governments have made increasing investments in higher education research over the years, thereby increasing the ratio of higher education R&D (HERD) to business expenditure on R&D (BERD). That policy has had an unknown impact at this time.

Using the Martin method, this policy would result in a greater share of multifactor productivity being assigned to Canada’s universities, even if they have little to do with productivity improvements. The evidence suggests that recent multifactor productivity improvements are due to the replication of existing technologies, primarily through information technology investments by businesses.²⁸ This is not to suggest that universities have no impact on multifactor productivity, merely that it is difficult to generate precise estimates of this impact. Assigning multifactor productivity gains based solely on share of R&D likely overstates the impact of university research on the economy.

Conclusion

Canadian governments have made a multi-billion-dollar commitment to university research. However, the measured links between university research and value creation in the economy are weak. Direct measures of the impact of university research, such as patent performance and the number of fast-growing start-up companies, show a very low impact in relation to the scale of the investment. Meanwhile, general metrics, such as links to multifactor productivity, show very large impacts but lack credibility.

27 Griliches, “Issues in Assessing the Contribution,” 19.

28 Baldwin and Gu, *Multifactor Productivity in Canada*.

The Economic Impact of Post-Secondary Education in Canada

Universities need to do a better job of explaining the value proposition of investments in university research. This value may, in fact, be related to the discovery of basic truths. As such, university research impact is rightly judged by metrics such as publications and citations.

However, if the objective of university research is to improve the broader economy, then universities need to explain more clearly how research activities do this. One way is to link research to the quality of graduates—in other words, the human capital effect—based on the case that university research leads to better prepared graduates. Another way is to improve the entrepreneurial and management skills of graduates, which may affect the number and quality of start-ups they establish. Finally, universities can directly affect innovation through collaborations with business enterprises, through contract research, patents, and faculty start-ups.

CHAPTER 6

Conclusion

Chapter Summary

- This report has considered a variety of economic impacts flowing from Canada's PSE sector.
- Canada's PSE institutions have done a good job of expanding in response to demand for greater skills.
- PSE institutions have benefited from what economists call "skill-biased technological change."
- The highest returns on education are realized in applied fields at the university level.
- Humanities, social sciences, arts, and education programs are less likely to generate high returns.
- Standardized tests would help Canadians understand the relationship between higher education and skill development.
- There will continue to be pressure on Canada's universities and colleges to demonstrate their impact on Canada's innovation performance.

This report has considered a variety of economic impacts flowing from Canada's PSE sector. Canada's PSE institutions have done a good job of expanding in response to demands for greater skill. As such, they are growing enterprises that generate significant spin-off benefits to their immediate communities and provinces. We estimate this "enterprise" effect exceeds \$50 billion per annum. In addition, higher education, as a social institution, attracts visitors to communities. Roughly \$2 billion per annum in additional economic benefit flows to communities that host PSE institutions.

PSE institutions have benefited from what economists call "skill-biased technological change." Simply put, technology does more of the mundane work that humans used to do. Therefore, humans have to be more skilled to do the jobs that technology does not do well. That means more jobs require unique human skills, such as the ability to repair machines, the ability to run advanced equipment, creative problem solving, conceptual thinking, teamwork, and communication.

This trend is driving high returns on education and more demand for PSE. On average, Canadians who acquire higher education can expect a double-digit annual return on their investment. However, these returns are variable, depending on the level of education and the field of study. The highest returns are realized in applied fields at the university level. These are areas in which there is a direct relationship between acquiring skills and applying them in either highly paid professional occupations or business. Indeed, regulated occupations are very good at both working with PSE institutions on skills acquisition and in limiting competition in the labour market. The highest paying occupations are almost invariably in areas with highly structured labour markets with significant barriers to entry.

In other fields of study, there is a less direct relationship between skills acquisition and application in the labour market. Humanities, social sciences, arts, and education programs are less likely to generate high returns. The economic returns in these fields are more dependent on the acquisition of general skills, such as critical thinking skills, that may be applied in a variety of circumstances. As the school-to-work transition is less structured, it can be more difficult for graduates in these areas to find high-paying, full-time employment. As such, we are starting to see a narrowing of the wage gap between graduates in these fields and high school graduates.

This development is leading to a debate about education quantity over quality. Government funding policies encourage PSE institutions to expand international student intake, and to create larger classes in disciplines where it is easy to expand capacity but returns on investment are low. Colleges and universities that wish to offer programs in higher cost areas, even when they have greater relevance to the labour market and economy, face fiscal constraints. The result is larger classes. Independent measures of learning quality often favour liberal arts universities that have made a commitment to smaller classes. These are the same institutions that have chosen to differentiate themselves by focusing on their teaching mandates.

Unlike primary and secondary schools, PSE institutions have little comparable, independent data on education quality to verify whether students are acquiring critical thinking skills. Standardized tests of primary and high school students' skills are done through regimes such as the Progress in International Reading Literacy Study (PIRLS) and the Programme for International Student Assessment (PISA). The OECD is developing an Assessment of Higher Learning Education Outcomes (AHELO) tool, and Ontario has participated in a feasibility study of it. Such standardized tests would help Canadians gain a better understanding of the relationship between PSE and skills development.

Over the last decade, Canada has made a commitment to significantly higher levels of funding for PSE research, especially in universities. Given that Canada continues to struggle with innovation performance, it

The Economic Impact of Post-Secondary Education in Canada

is not clear how this financial commitment could translate into heightened economic performance. Canada's universities perform well on academic-specific metrics, such as citations and publications. This suggests that Canadian universities make a valuable contribution to the body of world knowledge, which may be drawn upon in many ways. However, that may not be sufficient for Canadian governments that face poor productivity performance, a slow-growing economy, and fiscal deficits. In order to sustain or increase their funding levels, Canada's universities and colleges will continue to face pressure to demonstrate their impact on Canada's innovation and overall economic performance.

APPENDIX A

Bibliography

Apple Inc. *10K Filing with Securities and Exchange Commission*. Annual report, New York: EDGAR, 2013.

Arum, Richard and Josipa Roksa. *Academically Adrift: Limited Learning on College Campuses*. Chicago: University of Chicago Press, 2011.

Association of Atlantic Universities. 2012–2013 Survey of Preliminary Enrolments. Halifax: Association of Atlantic Universities, 2013. www.atlanticuniversities.ca/statistics/aau-survey-preliminary-enrolments (accessed December 20, 2013).

Association of Universities and Colleges Canada. *Investment in University Infrastructure Will Contribute to Canada's Economic Recovery*. News release, Ottawa: AUCC, January 27, 2009. www.aucc.ca/media-room/news-and-commentary/investment-in-university-infrastructure-will-contribute-to-canada-s-economic-recovery/ (accessed December 10, 2013).

—. *Tuition Fees by University*. www.aucc.ca/canadian-universities/facts-and-stats/tuition-fees-by-university/ (accessed December 16, 2013).

Association of University Technology Managers. *AUTM Canadian Licensing Activity Survey FY2012*. Deerfield, Illinois: AUTM, 2012. www.autm.net/Licensing_Surveys_AUTM.htm (accessed October 24, 2014).

—. *AUTM U.S. Licensing Activity Survey FY2012 Highlights*. Deerfield, Illinois: AUTM, 2012. www.autm.net/Licensing_Surveys_AUTM.htm (accessed October 24, 2014).

The Economic Impact of Post-Secondary Education in Canada

Baldwin, John R., and Wulong Gu. *Multifactor Productivity in Canada: An Evaluation of Alternative Methods of Estimating Capital Services*. Cat. no. 15-206-X. Ottawa: Statistics Canada, 2007.

BCStats. *Completers Versus Leavers: Beyond the Simplistic “Drop-Out” Label*. Information paper, Victoria: BCStats, Summer 2011.

Becker, Gary. *Human Capital: A Theoretical and Empirical Analysis*. New York: National Bureau of Economic Research, 1964.

Boothby, D., and T. Drewes. “Post-Secondary Education in Canada: Returns to University, College and Trades Education.” *Canadian Public Policy* 32, no. 1 (2006): 1–22.

Booz and Company. *Global Innovation 2012 Results Summary*. New York: Booz & Company. www.booz.com/media/file/BoozCo_The-2012-Global-Innovation-1000-Results-Summary.pdf (accessed May 22, 2013).

Bourbeau, Emmanuelle, Pierre Lefebvre, and Phillip Merrigan. *Returns to Education for 21-to 35-Year-Olds Across Canada: Results From the 1991–2006 Canadian Analytica Census Files*. Discussion paper, Montréal: Université du Québec à Montréal, January 2010.

Breitzman, J. “University Patent Powerhouses.” *The Scientist* 19, no. 12 (2005): 39–47.

British Columbia Ministry of Advanced Education. *Education Quality Assurance—EQA*. www.aved.gov.bc.ca/education_quality_assurance/welcome.htm (accessed October 24, 2014).

—. *Student Pathways to BC Public Post-Secondary Education*. Victoria: British Columbia Ministry of Advanced Education, 2012.

Cambrian College. *Strategic Enrolment Report 2013–2014*. Sudbury: Cambrian College, 2013.

Canadian Association of University Business Officers. *Financial Information of Universities and Colleges 2011–2012*. Ottawa: CAUBO, 2012.

Canadian Association of University Teachers. *CAUT Almanac 2012–13*. Ottawa: CAUT, 2012.

Canadian Intellectual Property Office. *Annual Report 2010–2011: Patents*. Ottawa: CIPO, 2011.

Carneiro, Pedro, James J. Heckman, and Edward Vytlačil. *Understanding What Instrumental Variables Estimate: Estimating Marginal and Average Returns to Education*. Discussion paper, Chicago: University of Chicago, 2003.

Council of Ministers of Education Canada. *Imagine Studying in Canada*. Ottawa: CMEC, 2013.

Dahlby, Bev, and Ergete Ferede. *What Does It Cost Society to Raise a Dollar of Tax Revenue? The Marginal Cost of Public Funds*. Toronto: C.D. Howe Institute, 2011.

Dalhousie Faculty Association. *Collective Agreement 2011–2014*. <http://dfa.ns.ca/collective-agreement-2011-14> (accessed February 4, 2014).

DeVol, Ross C., Kevin Klowden, Armen Bedroussian, and Benjamin Yeo. *North America's High-Technology Economy: The Geography of Knowledge-Based Industries*. Los Angeles: Milken Institute, 2009.

Díaz, V., P. Mercier, and S. Duarte. *2012 Economic Impact Study*. Ottawa: University of Ottawa, 2012.

Emery, Herb. *Total and Private Returns to University Education in Canada: 1960–2030 and in Comparison to Other Post-Secondary Training*. Conference paper, Calgary: University of Calgary, 2004.

Ferrer, A., and W.C. Riddell. "The Role of Credentials in the Canadian Labour Market." *Canadian Journal of Economics* 35 (2002): 879–905.

Grant, Michael. *Start Me Up: Funding Canada's Emerging Innovators*. Ottawa: The Conference Board of Canada, 2014.

The Economic Impact of Post-Secondary Education in Canada

Griliches, Zvi. "Issues in Assessing the Contribution of Research and Development to Productivity Growth." In *R&D and Productivity: The Econometric Evidence*, ed. Zvi Griliches, 17–45. Chicago: University of Chicago Press, 1998.

Gu, Wulong, and John R. Baldwin. *Multifactor Productivity Measurement at Statistics Canada*. Ottawa: Statistics Canada, 2013.

Gunderson, Morley, and Harry Krashinsky. *Returns to Education and Apprenticeship Training*. Toronto: Ontario Ministry of Training Colleges and Universities, 2005.

Institute of Electrical and Electronic Engineers. *IEEE Spectrum Patent Powerhouses 2013*. <http://spectrum.ieee.org/at-work/innovation/patent-power-2013/constructing-the-patent-power-scorecard> (accessed January 19, 2014).

Lombardi, John V., Diane D. Craig, Elizabeth D. Capaldi, and Denise S. Gater. *University Organization, Governance, and Competitiveness*. The Lombardi Program on Measuring University Performance, August 2002.

Martin, Fernand. "The Economic Impact of Canadian University Research and Development." *Research Policy* 27, no. 7 (November 1998): 677–687.

Millar, Erin. *The Sneaky Way Universities Are Privatizing Teaching*. February 19, 2010. www.macleans.ca/education/uniandcollege/the-sneaky-way-universities-are-privatizing-their-teaching/ (accessed December 24, 2013).

McGill University. *Policy on Intellectual Property*. www.mcgill.ca/files///secretariat/PolicyonIntellectualProperty.pdf (accessed February 5, 2014).

McMaster University. *Joint Intellectual Property Policy*. www.mcmaster.ca/mufa/handbook/ippolicyJoint.html (accessed February 5, 2014).

Moussaly-Sergieh, Karim, and François Vaillancourt. *Extra Earning Power: The Financial Returns to University Education in Canada*. Toronto: C.D. Howe Institute, 2009.

National Survey on Student Engagement. *NSSE Annual Results 2012*. http://nsse.iub.edu/html/annual_results.cfm (accessed December 15, 2013).

Office of Faculty Relations, University of Western Ontario. *UWOFA Collective Agreement 2012–2014*. www.uwo.ca/facultyrelations/pdf/collective_agreements/faculty.pdf (accessed February 5, 2014).

Ontario Ministry of Training, Colleges and Universities. *Ontario's Proposed Differentiation Policy Framework*. Draft discussion paper, Toronto: Ontario Ministry of Training, Colleges and Universities, 2013.

Organisation for Economic Co-operation and Development. *Country Report: Education at a Glance, Canada*. Paris: OECD, 2013.

—. *OECD.Stat Extracts: Per Capita Income*. <http://stats.oecd.org/> (accessed December 5, 2013).

Owram, Doug. *Born at the Right Time: A History of the Baby Boom Generation*. Toronto: University of Toronto Press, 1996.

Palladini, Jacqueline, and Maxim Armstrong. *From Farm to Glass: The Value of Beer in Canada*. Ottawa: The Conference Board of Canada, 2013.

Psacharopoulos, George, and Harry Anthony Patrinos. "Returns to Investment in Education: A Further Update." *Education Economics* 12, no. 2 (August 2004): 111–33.

Queen's University. *Report of the Senate Ad Hoc Committee on Intellectual Property*. May 8/9, 1992. www.queensu.ca/secretariat/policies/senateandtrustees/intellectualproperty.html (accessed February 5, 2014).

Research Infosource Inc. *Canada's Top 50 Research Universities List*. 2014. www.researchinfosource.com/top50_univ.php.

Robison, M. Henry, and Kjell A. Christophersen. *Economic Contribution of Camosun College*. Victoria: Camosun College, 2013.

SECOR. *McGill University: Driving Excellence and Prosperity in Quebec*. Montréal: McGill University, 2010.

Statistics Canada. CANSIM table 032-0001. *Public and Private Investment, Summary by Sector*. www5.statcan.gc.ca/cansim/a26?lang=eng&retrLang=eng&id=0320001 (accessed October 22, 2014).

—. CANSIM table 358-0001. *Gross Domestic Expenditures on Research and Development, by Science Type and by Funder and Performer Sector*. www5.statcan.gc.ca/cansim/a26?lang=eng&retrLang=eng&id=3580001 (accessed October 22, 2014).

—. CANSIM table 358-0025. *Survey of Intellectual Property Commercialization, by Higher Education Sector Indicators*. www5.statcan.gc.ca/cansim/a26?lang=eng&retrLang=eng&id=3580025 (accessed January 20, 2014).

—. CANSIM table 379-0031. *Gross Domestic Product (GDP) at Basic Prices, by North American Industry Classification System (NAICS)*. www5.statcan.gc.ca/cansim/a26?lang=eng&retrLang=eng&id=3790031 (accessed December 10, 2013).

—. CANSIM table 477-0019. *Postsecondary Enrolments, by Registration Status, Pan-Canadian Standard Classification of Education (PCSC), Classification of Instructional Programs, Primary Grouping (CIP_PG), Sex and Immigration Status*. www5.statcan.gc.ca/cansim/a26?lang=eng&retrLang=eng&id=4770019 (accessed October 22, 2014).

—. CANSIM table 478-0004. *Postsecondary Non-University (College) Education Expenditure, by Direct Source of Funds, Type of College, and Type of Expenditures*. www5.statcan.gc.ca/cansim/a26?lang=eng&retrLang=eng&id=4780004 (accessed October 22, 2014).

—. CANSIM table 478-0007. *University Education Expenditures, by Direct Source of Funds and Type of Expenditures*. www5.statcan.gc.ca/cansim/a26?lang=eng&retrLang=eng&id=4780007 (accessed October 22, 2014).

—. CANSIM table 527-0001. *Business Dynamics Measures, by North American Industry Classification System (NAICS)*. www5.statcan.gc.ca/cansim/a26?lang=eng&retrLang=eng&id=5270001 (accessed October 22, 2014).

—. *Census Profile: Antigonish*. 2011. www12.statcan.gc.ca/census-recensement/2011/dp-pd/prof/details/page.cfm?Lang=E&Geo1=CSD&Code1=1214002&Geo2=CD&Code2=1214&Data=Count&SearchText=Antigonish&SearchType=Begins&SearchPR=01&B1=All&Custom=&TABID=1 (accessed December 23, 2013).

—. *Education and Occupation of High-Income Canadians. National Household Survey (NHS), 2011*. Cat. no. 99-014-X2011003. Ottawa: Statistics Canada, 2011.

—. *Employment, by Enterprise Size*. www.statcan.gc.ca/tables-tableaux/sum-som/I01/cst01/labr75h-eng.htm (accessed October 17, 2013).

—. *Population by Sex and Age Group*. www.statcan.gc.ca/tables-tableaux/sum-som/I01/cst01/demo10a-eng.htm (accessed December 15, 2013).

—. "Study: Generational Change in Paid and Unpaid Work." *The Daily*, July 21, 2011. www.statcan.gc.ca/daily-quotidien/110712/dq110712c-eng.htm (accessed December 15, 2013).

Sudmant, Walter. *The Economic Impact of the University of British Columbia*. Vancouver: University of British Columbia, 2009.

Tal, Benjamin. *Startups: Present and Future*. Toronto: CIBC World Markets, 2012.

Tal, Benjamin, and Emanuella Enenajor. *Degrees of Success: The Payoff to Higher Education in Canada*. Toronto: CIBC, 2013.

The Conference Board of Canada. *Centre for Business Innovation: Innovation Defined*. www.conferenceboard.ca/cbi/innovation.aspx (accessed January 22, 2014).

The Economic Impact of Post-Secondary Education in Canada

—. *Fuelling the Surge: The Role of the University of Regina in Saskatchewan's Growth*. Ottawa: The Conference Board of Canada, 2012.

—. *How Canada Performs: Innovation*. 2013. www.conferenceboard.ca/hcp/details/innovation.aspx (accessed October 23, 2014).

—. *How Canada Performs: Return on Investment in Tertiary Education*. 2013. www.conferenceboard.ca/hcp/details/education/tertiary.aspx (accessed October 22, 2013).

The Expert Panel on Business Innovation. *Innovation and Business Strategy: Why Canada Falls Short*. Ottawa: Council of Canadian Academies, 2009.

Université Laval. *Les brevets d'invention à l'Université Laval*. Regulation, Quebec City: Université Laval, June 11, 1974. www.vrr.ulaval.ca/rech/Brevets_1974.html (accessed February 5, 2014).

—. *La propriété intellectuelle à l'Université Laval*. Policy, Quebec City: Université Laval, April 22, 1980. www.vrr.ulaval.ca/rech/Reglement_1980.html (accessed February 5, 2014).

University of Alberta. *Patent Policy*. Edmonton: University of Alberta.
University of British Columbia Board of Governors. *Inventions and Discoveries*. Policy, Vancouver: UBC Board of Governors, June 2013. www.universitycounsel.ubc.ca/files/2013/06/policy88.pdf (accessed February 5, 2014).

University of Calgary. *Intellectual Property Policy*. Calgary: University of Calgary, April 29, 1994. www.ucalgary.ca/policies/files/policies/Intellectual%20Property%20Policy.pdf (accessed February 5, 2014).

University of Manitoba. *Intellectual Property*. Policy, Winnipeg: University of Manitoba, March 16, 2010. umanitoba.ca/admin/governance/media/Intellectual_Property_Policy_-_2013_10_01.pdf (accessed February 5, 2014).

University of Ottawa. *Association of Professors of the University of Ottawa Collective Agreement* (Article 35). Ottawa: University of Ottawa, May 1, 2011. www.apuo.ca/wp-content/uploads/2012/07/APUO_CA_2011-2012_Final.pdf (accessed February 5, 2014).

University of Saskatchewan. *University of Saskatchewan Principles and Policies Regarding Intellectual Property and Commercialization*. Saskatoon: University of Saskatchewan. research.sheridanc.on.ca/DB/IP/Documents/University%20of%20Saskatchewan.php.html (accessed February 5, 2014).

University of Toronto Governing Council. *Inventions Policy*. Toronto: University of Toronto, October 30, 2013. www.governingcouncil.utoronto.ca/policies/invent.htm.

University of Waterloo. *Policy 73–Intellectual Property Rights*. Waterloo: University of Waterloo, October 28, 1997. www.adm.uwaterloo.ca/infosec/Policies/policy73.htm (accessed February 5, 2014).



About The Conference Board of Canada

We are:

- The foremost independent, not-for-profit, applied research organization in Canada.
- Objective and non-partisan. We do not lobby for specific interests.
- Funded exclusively through the fees we charge for services to the private and public sectors.
- Experts in running conferences but also at conducting, publishing, and disseminating research; helping people network; developing individual leadership skills; and building organizational capacity.
- Specialists in economic trends, as well as organizational performance and public policy issues.
- Not a government department or agency, although we are often hired to provide services for all levels of government.
- Independent from, but affiliated with, The Conference Board, Inc. of New York, which serves nearly 2,000 companies in 60 nations and has offices in Brussels and Hong Kong.

Insights. Understanding. Impact.



The Conference Board
of Canada

255 Smyth Road, Ottawa ON

K1H 8M7 Canada

Tel. 613-526-3280

Fax 613-526-4857

Inquiries 1-866-711-2262

conferenceboard.ca

