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Evaluation of the Tri-Agency Indirect Costs Program

Final report

Prepared for

The Interagency Evaluation Steering Committee
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This evaluation study was conducted independently by R.A. Malatest and Associates Ltd. and Circum Network Inc. The contents of this report reflect the findings and conclusions of the evaluation study team, and not necessarily those of the Social Sciences and Humanities Research Council of Canada, the Canadian Institutes of Health Research, and the Natural Sciences and Engineering Research Council of Canada.

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Executive Summary

The present evaluation study of the Indirect Costs Program (ICP) was conducted in preparation for the renewal of its terms and conditions. It was conducted for the presidents of the Canadian Institutes of Health Research (CIHR), the Natural Sciences and Engineering Research Council of Canada (NSERC) and the Social Sciences and Humanities Research Council of Canada (SSHRC).

Indirect Costs. Indirect costs of research are diffused costs generated by a postsecondary institution's research activities, but that are not attributable to a single research project. Under the ICP, indirect costs include: the costs of providing well-equipped research facilities, the costs of providing research resources, the costs of managing and administering the institution's research enterprise, the costs of meeting regulatory and accreditation requirements, and the costs to effectively manage the intellectual property generated by research activities.

Purpose of the Program. The purpose of the ICP is to help universities, colleges, hospitals and affiliated research institutes create a research environment allowing them to make best use of all federal agency funding for university research. As such, the program intends to contribute to the attractiveness of the Canadian research environment, compliance with regulatory requirements, the transfer of knowledge and commercialization, and ultimately, to Canada's economic growth, improved quality of life, and Canadian research excellence and capacity.

Program Budget. The ICP provides an annual grant to universities, colleges and research hospitals to compensate them for a portion of their indirect costs of research. With some exceptions, federal agency research grants do not cover the full financial cost of research, but only a part of the direct costs. In most cases, ICP funding is a proportion of direct research funding received by institutions. The December 2001 federal

budget provided a one-time investment of \$200 million to help alleviate financial pressures associated with federally-supported research at universities and research hospitals. The 2003 federal budget created the ICP as a regular program and provided \$225 million per year through the granting agencies, beginning in 2003-04. The ICP budget increased to \$245 million in 2004-05, then \$260 million in 2005-06, and \$315 million in 2006-07 and 2007-08. In 2008-09, an additional \$15 million was added to ICP funding for a total of \$329 million. The 2009 federal budget, however, announced a reduction of \$15 million over three years, bringing the ICP budget to \$325 million in 2009-10, \$322 million in 2010-11 and \$315 million in 2011-12. The creation and growth of the ICP took place in a context of generally increasing federal support to postsecondary research.

Evaluation Issues. The evaluation study was mandated to answer four questions:

- To what extent is the ICP still needed given the changes in the recipients' rates of indirect costs as a proportion of direct costs and given the level of support of other sources for indirect research costs?
- How successfully does the program achieve its objectives?
- How efficient is the program delivery?
- Has the ICP provided value for money?

Evaluation Approach. This evaluation is based on a combination of qualitative and quantitative evidence—with the former taking a predominant role because of the difficulty of isolating quantitative impacts of program investments taking a variety of forms. The evaluation study gathered evidence from several sources:

- existing documentation and databases, in particular outcomes reports produced by recipient organizations, administrative data from the program and from granting agencies, and secondary data from Statistics Canada, CAUBO and OECD;
- a self-administered survey of presidents and vice-presidents of research of recipient organizations that produced an overall institutional response rate of 69 per cent and the representation of 83 per cent of program expenditures;
- case studies with eight recipient organizations that incorporated and synthesized information from documents, site visits, interviews, data requests, the administrator survey, secondary data and data analysis including outcome reports;
- in-depth interviews conducted outside of the case studies with 29 individuals from 15 organizations; and,
- statistical analyses in the form of multivariate modelling of program effects and interrupted time-series of international data.

Results and Recommendations. Evaluation results deal with the need for the program, program success, program delivery and program cost-efficiency.

Need for the Program. The first evaluation issue is labelled as follows: "To what extent is the Indirect Costs Program still needed given the changes in the recipients' rates of indirect costs as a proportion of direct costs and given the level of support of other sources for indirect research costs?" It is addressed by establishing the following facts:

- globally, the ICP funds indirect costs of research at a level of 26 per cent of the direct grants;
- actual indirect costs of research incurred by universities are very difficult to quantify precisely;
- few research funders accept to defray even a small portion of indirect costs;
- if the ICP did not exist, there would be no obvious alternative source for funding indirect costs associated with agency-funded research.

The conclusion of this analysis is that there is little doubt that there is a need for ICP funding within postsecondary institutions in receipt of direct federal agency research funding, and that the resources of the program are not excessive. This evaluation study produced no evidence that program benefits were used for purposes other than those intended by the program. Also, very little evidence is found of displaced provincial funding of indirect costs of research as a result of the inception of the ICP.

Program recipients claim that the program provides insufficient levels of support. Research-intensive universities (who receive a three-year average of more than \$7 million in direct federal agency research funding) claim that the proportion of indirect cost funding they get should increase to 30 per cent (and then to 40 per cent). In 2007-08, these institutions received \$283.6 million from the ICP, compared to \$1.176 billion in direct federal agency research grants; this is a proportion of 24.1 per cent. To bring this proportion to 30 per cent would have required a total of \$352.8 million in ICP funding to research-intensive universities and \$383 million in total in the ICP budget (a budget increase of 22 per cent).

Program Success. The second key evaluation issue focused on the success of the program in achieving its objectives.

Impact on Expenditures in Each Cost Category of the Program. By and large, one-third of program expenditures were invested in research facilities (e.g. renovations), one third in the administration and management of the research enterprise (e.g. support to proposal writing), one-fifth in research resources (e.g. libraries), one-twentieth into

compliance with regulations (e.g. animal care) and one-twentieth into the management of intellectual property (e.g. patenting, spinoffs). Smaller institutions invested more heavily in administration and management of research (upwards of 50 per cent of their expenditures) while larger institutions put more emphasis on facilities (37 per cent of their expenditures.)

With regard to research facilities, research resources, research administration and management, compliance with regulatory requirements and intellectual property management, in the aggregate, program recipients indicated that their institutions rated somewhat below "average" in 2003. In all five areas, globally, representatives of recipient institutions indicated that the situation improved to above "average" since the inception of the ICP (2003-08). The improvement was two notches on a scale from 0 to 10. This perceived improvement took place over the course of the program but we cannot attribute it directly to the program action.

Displacement of Previous Spending to Other Uses. Before the inception of the ICP, postsecondary institutions receiving research grants from federal granting agencies employed a mix of two strategies to defray the indirect costs of the research performed using these funds: first, they would postpone indirect costs that did not require immediate attention; and, second, they would pay for mandatory indirect costs and some portion of indirect costs that could be deferred through their operating budget.

With the arrival of the ICP, they were able to reallocate part of the funds from their operating budget that went to indirect costs back to other research and teaching uses, and they were able to tackle parts of the non-mandatory indirect costs that were left ill-attended before the ICP. The reallocated portion does not lead to incremental impacts in the traditional program evaluation sense, since the impact is felt in areas other than indirect costs of research; the second part is incremental in the traditional sense.

It is not possible to say what proportion of the \$1.3 billion of ICP expenditures between 2003-04 and 2007-08 went to allowing reinvestment in teaching and what proportion went to improved research environments. Both effects can be seen as incremental, although only the latter responds to the initial purpose of the program.

Impact on Wxcellence/Sustainability of Research. Qualitative evidence from case studies and interviews suggests that ICP funds allowed postsecondary institutions to maximize the benefits derived from direct funding of research. For example, indirect cost funding can ensure that experimental

equipment is up and functioning, allowing research to take place when direct funding and other research resources are available. It can also support the upkeep of buildings that, in turn, are key components of the ability to perform quality research. Indirect cost funding contribute to efficient research budget administration that, in turn, enables optimal expenditure management and reporting.

Research administrators indicate that the amount of research conducted in their institution increased markedly between 2003 and 2008, that the quality of the result improved and that the number of active researchers increased. Research administrators also report positive change in the extent of use of research results and in the competitiveness of their organization on the world stage. Because many aspects of institutional research environments changed between 2003 and 2008, in particular, the level of direct funding for research and research equipment, we cannot attribute these improvements solely to the ICP.

The evidence is that the program addresses an important need of the postsecondary research system and that it has produced positive and desirable outcomes.

Recommendation 1. That the Government of Canada maintain the ICP for college and university research.

Program Delivery. Two program delivery issues were addressed.

Efficiency of the Third-Party Model. Placing affiliated hospitals under the umbrella of their host universities was identified as an irritant in the mid-term evaluation of the ICP. Based on the interviews conducted as part of the case studies, this is no longer the case.

Recommendation 2. That, in the absence of compelling evidence suggesting that change is required, the existing approach used in dealing with affiliated health research centres be maintained.

Small Institution Funding Premium. Small institution progressive funding has been raised by large institutions as an inappropriate provision; large universities claim that research funds should be reserved for research environments that are most apt at producing excellence in research. Others indicate that small institutions do not benefit from economies of scale in managing the research enterprise, whereas large institutions do. For example, setting up a research office would require an amount of

resources that would be proportionately larger in smaller institutions than in larger ones. They add that small institutions conduct research that is distinct from that valued in large institutions, e.g. regionally relevant and significant research.

According to the account of the research heads in recipient organizations, the research environment of small institutions (up to a \$100,000 three-year average in base, but also those up to \$1 million) has indeed improved during the five years of existence of the ICP, but not as much as that in larger institutions. So, while they did produce positive outcomes, smaller institutions were less effective at translating research funding into research results.

This information must be put in context. It was shown that small institutions (with up to \$1 million in direct federal agency research funding per year) represent 59 per cent of ICP recipient organizations and get 1.7 per cent of ICP funding as well as 0.7 per cent of direct research funding. The rate of indirect cost funding to institutions with direct federal agency research grants in excess of \$1 million would have increased to 25.2 per cent from 24.8 per cent between 2003-04 and 2007-08 if no funding had been extended to smaller institutions; each large institution would have received \$90,000 more per year on average. Based on these numbers, it is reasonable to think that the loss of this funding by small institutions would be noticed far more by them than the gain it would generate for large institutions.

Recommendation 3. That the current funding formula, which provides for a progressive range of funding rates, be maintained.

One program delivery issue surfaced during the evaluation study. We discussed outcomes reports with finance officers from 13 universities (arguably among the larger institutions). A majority indicated that ICP funds are integrated into general revenues and cannot be traced back at the end of the year; the others stated that ICP grants are managed more or less as a separate fund and attributed to specific expenses such that the use of the grant can be reported faithfully.

In many cases, we were told that the activities listed in the outcomes reports were more or less illustrative of what could possibly have been done with ICP funds. Many case study informants could not positively indicate whether the activities noted in the outcomes reports would have taken place in the absence of ICP funding. Some agreed that, if they had

to produce a similar report for provincial funding of indirect costs, the same results could be attributed to another funding program.

Outcomes reports constitute the main tool for ICP performance reporting. The information they contain is often illustrative at best and should not be assumed to properly reflect the extent of program impacts on local research systems. In the case of the ICP, program impacts have been defined to include both maintaining existing levels of service in the face of increased demand and increasing the level of service to the research enterprise.

Recommendation 4. That questions in the reporting form be reviewed to better assess the incremental impact of the program.

Whereas outcomes reports attempt to identify program effects through institutional self-assessment, this evaluation study endeavoured to measure the impacts of the ICP on equipment and support systems in Canada in a quantitative manner. This task was made difficult by the absence of a baseline study on the state of the research support ecosystem in Canadian institutions. Lack of availability of pre-measures to assess the impacts of the ICP means that trade-offs need to be made with respect to indicator availability and pertinence to the evaluation.

Considering the complexity of the environment in which this program takes place, independent assessment of program effects can only be established by comparing the situation with a factual baseline measurement (as opposed to asking institutions to provide a record of activities that they attribute to ICP funding). Establishing this baseline would surely be a complex endeavour—and one that exceeds the mandate of this evaluation. For example, it could include the calculation of the amount of accumulated deferred maintenance, the measurement of equipment availability time, the number of ethical reviews performed, performance against regulated standards and the percentage of intellectual property management actions taken compared to the number that it would have been desirable to take.

Recommendation 5. That, in collaboration with postsecondary institutions, the granting agencies support the development of a methodology to establish a baseline measurement of the state of research environments.

Cost-Efficiency. The costs to administer the ICP are quite low. Per \$1 million grant expenditures that are distributed through the program, only

slightly over \$2,910 (or 0.3 per cent) has to be spent on administering the program. This is more than one order of magnitude lower than the operating costs documented in the evaluation of the Networks of Centres of Excellence for the Canadian Foundation for Climate and Atmospheric Sciences, the NCE program and selected CIHR institutes—which, arguably, all use extensive peer-review processes whereas the ICP does not. Within an overall context of impacts, where key informants across Canada reported that the ICP has been important to their ability to maintain and expand their current research enterprise, there is no evidence that ICP administration costs are excessive.

However, observations from the 2008 ICP Audit Report regarding the size of the management team, the risk associated with vacancies, and the extent of management work required to conform to accepted management practices point to the possibility that this efficiency comes at the cost of a reduced ability to oversee and monitor program operations and outcomes.

Recommendation 6. That the operating funding of the ICP be reassessed to ensure that sufficient resources are available to continue to meet due diligence, program oversight and monitoring requirements.

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Abbreviations

CAUBO	Canadian Association of University Business Officers
CECR	Centres of Excellence for Commercialization and Research
CFI	Canada Foundation for Innovation
CGS	Canada Graduate Scholarships
CIHR	Canadian Institutes of Health Research
CRC	Canada Research Chairs
ICP	Indirect Costs Program
IP	Intellectual property
NCE	Networks of Centres of Excellence
OECD	Organization for Economic Cooperation and Development
NSERC	Natural Sciences and Engineering Research Council of Canada
RMAF	Results-based Management and Accountability Framework
SSHRC	Social Sciences and Humanities Research Council of Canada

Chapter 1

INTRODUCTION

The present evaluation study of the ICP was conducted in preparation for the renewal of its terms and conditions. It was conducted for the ICP Steering Committee which includes the presidents of the Canadian Institutes of Health Research (CIHR), the Natural Sciences and Engineering Research Council of Canada (NSERC) and the Social Sciences and Humanities Research Council of Canada (SSHRC), and the deputy minister of Industry Canada. It was managed by the Interagency Evaluation Steering Committee which is composed of program and evaluation representatives from all three agencies.

An evaluation framework¹ completed in July 2008 identified key evaluation issues, informational requirements and core research methodologies. Its preparation involved representatives from granting agencies, other government officials, research and scholarly associations, scholars and research administrators, and private researchers/think tanks.

¹ *Evaluation Assessment of the Indirect Costs Program*, prepared by the Corporate Performance, Evaluation and Audit Division of the Social Sciences and Humanities Research Council of Canada, with the assistance of Dr. Kenneth Watson and The Rideau Strategy Consultants Ltd , dated July, 2008.

The mandate given to the evaluation team was "to address the evaluation issues and questions presented in the evaluation assessment report. The primary focus of the evaluation is the continued relevance of the program and its cost-effectiveness as well as its results, expected outcomes and impacts." (*Terms of Reference, August 2008*). The contract to conduct the evaluation study was awarded in September 2008. The design of the study, including all questionnaires and guides, was completed in December 2008. Data collection took place in December 2008, January 2009 and February 2009. Technical reports on the various components of the study were delivered in February and March 2009. Consecutive drafts of the evaluation report were delivered starting in February 2009.

This document is structured as follows: Chapter 2 provides a description of the program, including a brief overview of program activities, outputs and outcomes, as well as the context in which the program operates; Chapter 3 of this report describes the evaluation issues and the study approach and methodology; Chapters 4 to 7 deal with the study issues, such as program need, success, delivery, and cost-efficiency; and, Chapter 8 concludes the study with overall findings and recommendations.

Chapter 2

PROGRAM DESCRIPTION

Portions of the program description are reproduced from the *Evaluation Assessment of the Indirect Costs Program Framework* (July 2008) and from the *Indirect Costs Program Progress Report for April 1, 2007 to March 31, 2008*.

Indirect Costs of Research

Academic research requires four types of resources:

- researchers and highly qualified personnel (HQP) directly involved in the design and implementation of research—people;
- buildings, labs, equipment to house and enable the research—infrastructure;
- consumables and time that are used by individual research projects—the direct costs of research; and,
- a wide variety of resources that cannot as easily be pinned down to the research enterprise (e.g. budget administration) or that cannot be attributed to a given research effort (e.g. technology transfer office)—the indirect or institutional costs of research.

From the point of view of the ICP, the eligible indirect costs can be grouped into five categories. Exhibit 2.1 lists these five categories and the associated types of eligible costs.

EXHIBIT 2.1 Types of Indirect Costs of Research

Categories of eligible indirect costs	Types of costs
Costs to maintain well-equipped research facilities	<ul style="list-style-type: none"> • Renovation and maintenance of research facilities • Upgrade and maintenance of equipment • Operating costs (custodial, security, maintenance, utilities, leasing, capital planning, insurance on research space)
Costs of providing research resources	<ul style="list-style-type: none"> • Acquisition of library holdings (journals, books, collections, periodicals, Canada National Site Licensing project, etc.) • Improvements to electronic information resources (access to databases, telecommunications systems, information technology systems, research tools) • Library operating costs and administration (custodial, security, maintenance, utilities, leasing, capital planning, staff salaries) • Insurance on research equipment and vehicles
Costs of managing and administering the institution's research enterprise	<ul style="list-style-type: none"> • Institutional support for the completion of grant applications / research proposals • Acquisition, maintenance and/or upgrade of information systems to track grant applications, certifications, and awards • Eligible training of faculty and research personnel • Human resources and payroll • Financial and audit costs • Research planning and promotion, public relations
Costs of meeting regulatory and accreditation requirements	<ul style="list-style-type: none"> • Creation and support of regulatory bodies • Training of faculty and other research personnel in health and safety, animal care, ethics review, handling radiation and biohazards, and environmental assessments • International accreditation costs related to research capacity • Upgrades and maintenance to facilities and equipment to meet requirements • Technical support for animal care, handling of dangerous substances and biohazards
Costs to effectively manage the intellectual property generated by research activities	<ul style="list-style-type: none"> • Creation, expansion, or sustenance of a technology transfer office or similar function • Administration of invention patent applications • Support for technology licensing • Administration of agreements and partnerships with industry • Development of incubators • Support for the creation of spinoff companies • Outreach activities undertaken to transfer knowledge through venues not eligible for funding under other federal programs • Marketing of teaching materials, scientific photo libraries, survey instruments, statistical packages, data sets and databases, software, computer models, and other tools

Indirect costs of research are peculiar in that:

- some are not compressible without putting the research enterprise in jeopardy in the very short-term (e.g. if an institution does not conform to regulatory requirements, it could be excluded from funding by granting agencies) but others can be compressed without immediate effect (e.g. some facility maintenance or insurance costs) although failure to address them may have long-term consequences;
- many of them are not immediately apparent to the observer of the academic research enterprise;
- they often cannot be attributed to a given research effort (e.g. heating must be supplied throughout a building where several research projects are conducted); and,
- institutional accounting systems are rarely organized in a way that allows for their measurement.

The Indirect Costs Program

The ICP provides an annual grant to universities, colleges and research hospitals to compensate them for a portion of the indirect costs associated with the research funded by federal granting councils. With some exceptions, federal agency research grants do not cover the full financial cost of research, but only a part of the indirect costs.

The December 2001 federal budget provided a one-time investment of \$200 million to help alleviate financial pressures associated with federally-supported research at universities and research hospitals. The 2001 budget also committed the government to working with the university community to find predictable, affordable and incremental ways of providing ongoing support for the indirect costs of research. The terms and conditions for the one-time payment were approved in February 2002.

The 2003 federal budget provided \$225 million per year through the granting agencies, beginning in 2003-04, to help fund the indirect costs associated with federally-supported research at universities, colleges and research hospitals. The terms and conditions for the new permanent ICP were approved in July 2003.

Some \$20 million was added in 2004, increasing the program's annual budget to \$245 million. The 2005 budget received an additional \$15 million, bringing total funds for the ICP to \$260 million a year. A further \$40 million was added in 2006, and then \$15 million more in 2007-08, bringing the program's yearly budget close to \$315 million. In 2008-09, an additional \$15 million was added to ICP funding for a total of \$329 million. The 2009 federal budget, however, announced a reduction of \$15 million over three years, bringing the ICP budget to \$325 million in 2009-10, \$322 million in 2010-11 and \$315 million in 2011-12.

Program Context

Universities are the second largest producer of research in Canada¹: in 2007, universities accounted for 36 per cent of the R&D activities (\$10.4 billion out of \$30 billion). This is more than the OECD average of 17 per cent. According to Statistics Canada², 54 per cent of these university expenditures in research were funded by university partners and 46 per cent were funded by universities using their own resources. Of the portion funded by partners, 49 per cent of the funds were direct transfers from the federal government.³ All in all, the Government of Canada financed about one-quarter of university research in Canada in 2007.

ICP was instigated as a regular program in 2003-04 and, in the five years between 2003-04 and 2007-08, the program distributed some \$1.3 billion to Canadian postsecondary institutions. This investment in indirect costs of university research took place in a context of profound change. Exhibit 2.2 presents the breakdown of federal expenditures focused on university research and training, for the period of 1999-00 to 2007-08.

¹ Association of Universities and Colleges of Canada, *Momentum, the 2008 report on university research and knowledge mobilization*, 2008, page 9.

² Cited in AUCC, *op. cit.*, page 13.

³ These figures exclude large transfers made to provinces by the Government of Canada under "Canada Health and Social Transfer Payments," some part of which probably makes its way to universities and colleges and would be accounted for under internal university resources in this paragraph.

According to the AUCC, in 1997-1998, universities expended about \$5 billion in research, in 2003-04, the volume of activity exceeded \$8 billion, and it passed \$10 billion in 2007-08.¹ Thus, the level of university research doubled over ten years.

The level of funding of university research and training by the Government of Canada increased from \$1.2 billion in 1999-00 to \$3 billion in 2007-08 (including the ICP), or 150 per cent. As Exhibit 2.3 shows, this increase has been relatively steady through the years.

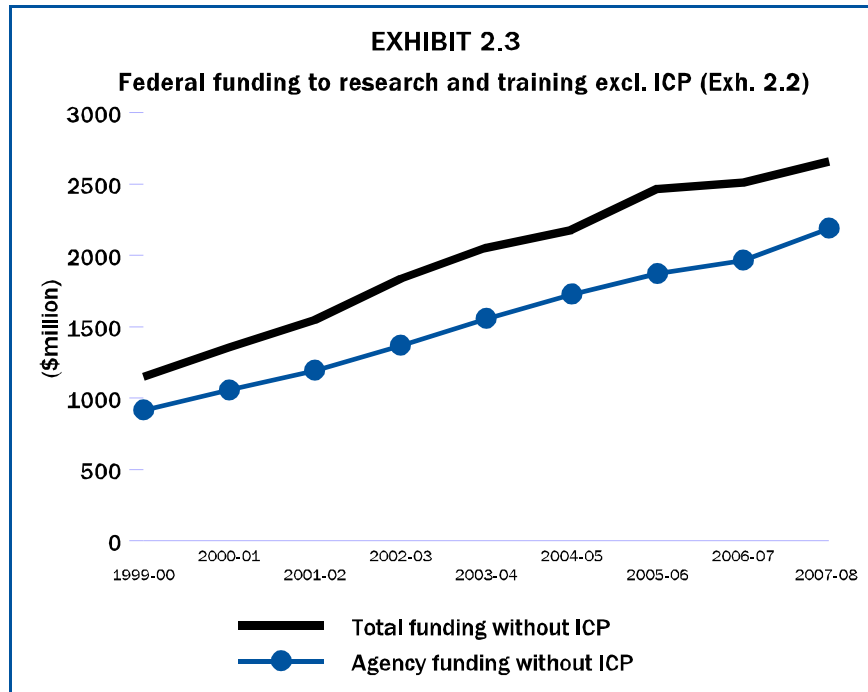
EXHIBIT 2.2
Government of Canada Funding for University Research and Training
1999-00 to 2007-08 (\$ million)

	1999-00	2000-01	2001-02	2002-03	2003-04	2004-05	2005-06	2006-07	2007-08
SSHRC ¹	115	129	144	167	212	253	290	305	343
NSERC ¹	527	539	556	616	697	766	821	855	970
CIHR ¹	275	390	495	587	650	711	765	808	879
Total agency without ICP	917	1058	1195	1370	1559	1730	1876	1968	2192
ICP	—	—	200	—	224	244	259	298	314
CFI ¹	114	183	231	325	349	263	427	360	298
Other Government departments and agencies ²	120	116	124	142	149	187	164	184	172
Total	1151	1357	1750	1837	2281	2424	2726	2810	2976

¹ Source: Public accounts for each granting agency and Annual Reports for the Canada Foundation for Innovation (CFI). Granting agencies expenditures include funding for grants, scholarships and fellowships but exclude operating expenditures. SSHRC expenditures exclude the total of ICP expenditures..

² Source:Tremblay, Yvonne. *Federal Government Expenditures and Personnel in the Natural and Social Sciences 1995-96 to 2004-05*. Statistics Canada, catalogue no. 88F0006XIE—No. 001. Table 14. Federal Government Payments to the Higher Education Sector for S&T, by Department or Agency, page 25. Data going from 1997-98 to 2002-03 ; *Statistics Canada - Federal Scientific Activities*. Catalogue no. 88-204-X. Table 3-3: Federal extramural expenditures; On science and technology in the higher education sector, by major departments and agencies, page 22. Data going from 2003-04 to 2007-08.

¹ AUCC, *op. cit.*, page 7.



As will be seen later, generally, universities do not collect the full cost of the funded research. By 2003-04, the regular increase in funded research, and in federally-funded research in particular, stretched the capacity of universities to defray the institutional or indirect charges associated with the research enterprise. This led to the inception of the ICP as a regular program.

The context of the ICP also includes provincial granting programs aimed at supporting universities in facing the indirect costs of research. More will be said about this later.

Over the past decade, and over the life of the ICP, the context of university research also changed in qualitative manners. Research projects are more multi-disciplinary and multi-institutional now than they were years ago. The financing of research projects also tends to be more complex, including a variety of funding partners with various and diverging interests instead of a limited number of them. Regulatory requirements have become more stringent and demanding, for example in the areas of animal care, human

research ethics and the handling of hazardous materials. Finally, funding organizations, the federal government in particular, have been asking for more detailed accountability measures which have added to the cost of managing the research enterprise.

It is in this context of increasing research activity and increasing pressures on the university research production systems that the ICP was initiated.

Program Objectives

The purpose of the ICP is to help universities, colleges, hospitals and affiliated research institutes create a research environment allowing them to make best use of all federal agency funding for university research. As such, the program intends to contribute to the attractiveness of the Canadian research environment, compliance with regulatory requirements, the transfer of knowledge and commercialization, and ultimately, to Canada's economic growth improved quality of life, and Canadian research excellence and capacity.

Because it is tasked with managing the ICP, only SSHRC includes the program in its program activity architecture. It fits within SSHRC's first strategic outcome: "A First-Class Research Capacity in the Social Sciences and Humanities". The ICP is also associated with CIHR's second strategic outcome ("Outstanding Researchers in Innovative Environments—Strong health research community able to undertake outstanding research") and NSERC's second strategic outcome ("High quality Canadian-based competitive research in the natural sciences and engineering").

Governance and Administrative Structure

The ICP is housed within the Canada Research Chairs Secretariat, which is administered by SSHRC. SSHRC, NSERC, CIHR, and the secretariat of the Networks of Centres of Excellence (NCE) provide data on their annual funding to eligible postsecondary institutions and their affiliated hospitals and institutes. They also assist the Canada Research Chairs Secretariat in responding to requests for that data.

The ICP is managed by a steering committee that is mandated to oversee the program's management and provide advice on its general policy approach. The steering committee includes the presidents of SSHRC, NSERC and CIHR, as well as the deputy minister of Industry Canada. The president of SSHRC heads the steering committee.

The Canada Research Chairs Secretariat, which reports to the president of SSHRC, administers the program. The secretariat manages the program's operation, including grants and operating budgets, and provides liaison with the universities, Industry Canada, and provincial health and education ministries. It undertakes performance measurement, evaluations and audits, and reports on program activities to the minister of industry, the Treasury Board Secretariat and, ultimately, Parliament. Together with SSHRC, the secretariat provides other administrative services, such as communications.

Eligible Institutions

An institution may receive an ICP grant if it is a degree-granting or diploma-granting Canadian postsecondary institution whose researchers have received research grants from one of the three federal granting agencies during the previous three federal government fiscal years.¹

Only colleges and universities are eligible. However, research grants to their affiliated organizations (research hospitals and research institutes) are taken into account in calculating each ICP grant. Institutions that meet the eligibility criteria and are affiliated with one or more research hospitals are required to demonstrate that they have a formal agreement with their affiliated hospitals dealing with the distribution of the indirect costs grant between the different responsibility centres.

¹ Institutional eligibility is subject to the following: (1) the institution must be authorized by a provincial or territorial government to grant university degrees, applied degrees or postsecondary diplomas; (2) the institution must offer its own degrees or diplomas, and not simply certify that a student is qualified to receive a degree or diploma from another institution; (3) the institution must have awarded degrees or diplomas over the past two years or have students registered in the current calendar year or the three subsequent years; (4) the researchers of the institution and the research hospitals and other institutes affiliated with it must have received research funding from at least one of the three granting agencies in the three most recent fiscal years for which data is available; and (5) in the case of a public institution, the institution must receive the funds for its operating budget directly from a provincial or federal government, and not through another institution. In the case of a private institution, the institution must be not-for-profit and not receive its funding through another institution.

Funding Formula

The value of individual ICP grants is calculated according to a formula based on the three-year average of direct research grants that each institution received from the federal granting agencies. The funding formula attributes a rate of indirect cost funding of 80 per cent on the first \$100,000 of direct research funding from federal granting agencies; the formula then applies a progressively decreasing rate of funding, as expressed in Exhibit 2.4.

EXHIBIT 2.4 Funding Formula

Three-year average of direct research grants from agencies	Funding level
First \$100,000	80%
Next \$900,000	50%
Next \$6,000,000	40%
Beyond \$7,000,000	Balance of the available budget prorated according to the three-year average of direct research grants

EXHIBIT 2.5 ICP Funding Results, 2003-04 to 2007-08

Institutions grouped according to the three-year average of direct research grants from agencies	Percentage of ICP grants from 2003-04 to 2007-08	Percentage of ICP funding from 2003-04 to 2007-08
Institutions receiving up to \$100,000	45%	0.3%
More than \$100,000 up to \$1,000,000	14%	1.3%
More than \$1,000,000 up to \$7,000,000	19%	9.1%
Beyond \$7,000,000	23%	89.3%
TOTAL	100%	100.0%

Source: ICP program data (control sheets) based on 590 grants.

Reporting by Institutions

Eligible institutions submit a request for an indirect costs grant in March each year. In the request, the applicant provides an expenditure estimate in each of the five cost categories eligible to the ICP (see Exhibit 2.1). The request lists affiliated hospitals and health research institutes and attests that there is a current agreement between the applicant and these affiliates to govern sharing the ICP grant.

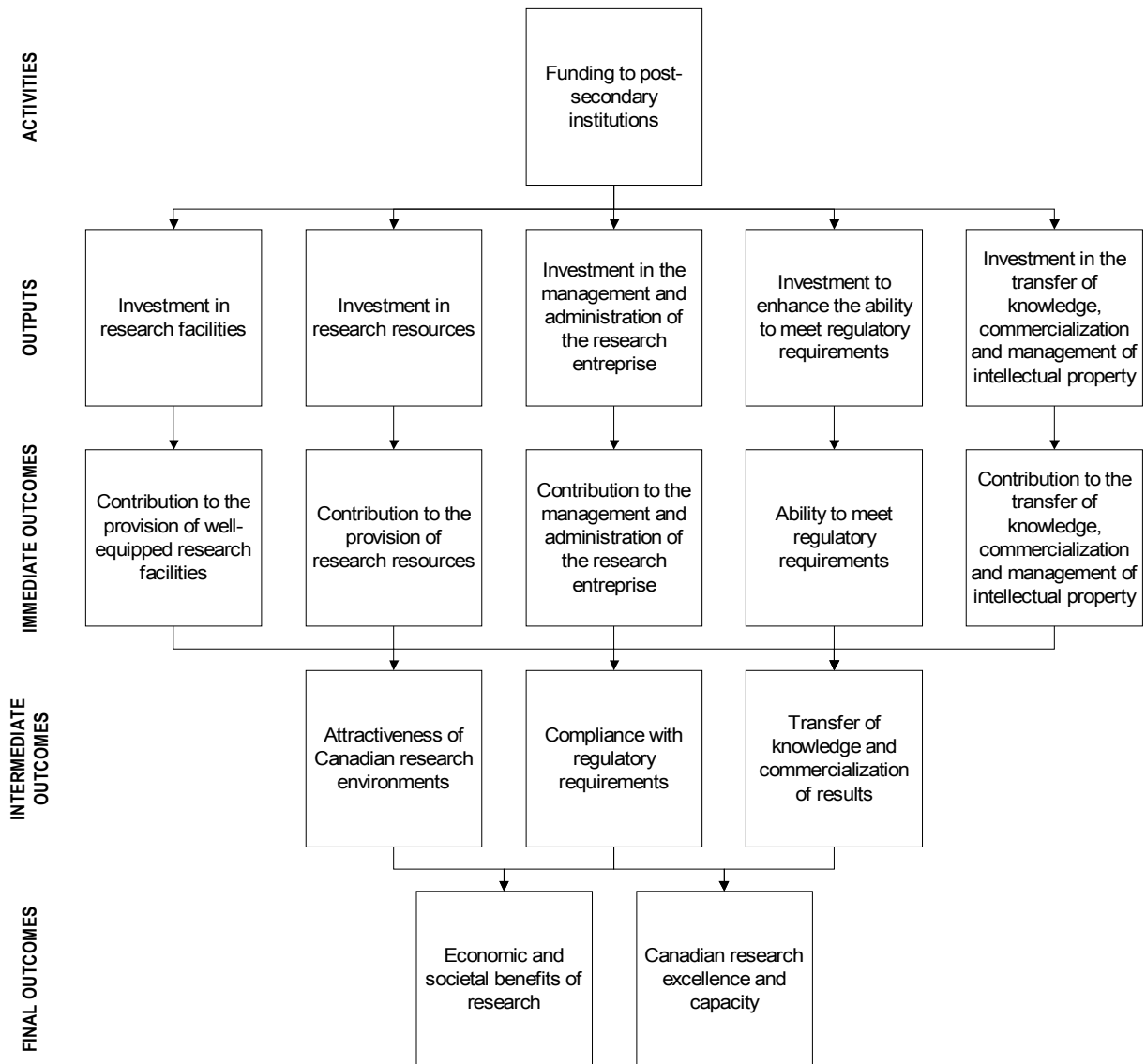
Each year at the end of June, the recipient institution submits an "Indirect Costs Program Outcomes Report" for the previous year. This report lists actual expenditures of ICP grant monies in each of the eligible cost categories of the ICP. In addition to a few close-ended questions, the outcomes report contains five open-ended questions, one for each eligible cost category. These questions ask how the ICP grant monies have allowed the institution and its affiliates to maintain and/or enhance its research capacity. Finally, the grant recipient is asked to report on overall impacts and to provide comments on them.

Recipient institutions are free to use ICP funds as they see fit as long as it is for eligible expenses. Institutions are not required to maintain a separate account for this grant.

Program Logic

The logic of the ICP is fairly simple. It is depicted in Exhibit 2.6. Funding to postsecondary institutions trigger investments in the five areas of eligible costs: research facilities (mainly buildings and labs), research resources (mainly libraries and databases), management of the research enterprise (mainly support to proposal writing, contract management and reporting), meeting regulatory requirements (mainly animal care and human research ethics), and intellectual property management (mainly knowledge transfer and IP protection).

EXHIBIT 2.6 • ICP Logic Model



The immediate impacts of these investments are improved research systems (improved facilities, improved resources, improved management systems, improved compliance with regulations and improved IP management). This leads to more attractive Canadian research environments (which allow for the recruitment and retention of high-level researchers and HQP), compliance with regulations, knowledge transfer and the commercialization of research results.

Ultimately, the chain of effects should contribute to the economic and social benefits of research on Canadian society and on Canadian research capacity and research excellence. These ultimate outcomes are not addressed in this evaluation because the ICP would contribute only one small share among a number of influences on such large-scale goals.

The logic of the ICP, coupled with the financial reality of the postsecondary sector in Canada, has raised the issue of the definition of "contribution" or "incrementality" of the program. What is expected to happen as a result of the ICP? Should additional expenditures take place in the five areas of indirect costs that would not have taken place if the program had not existed? ICP management has defined incrementality in the following way:¹

The Indirect Costs Program is intended to sustain the existing research enterprise and to generate improvements, efficiencies and innovations in its management [...]. Incrementality can be achieved by maintaining the existing level of service and support in spite of the increased demand on an institution's resources. Institutions are required to demonstrate in their annual reports how the indirect costs grants were used to sustain and to improve their research capacity.

In addition, in November 2004, the directors of finance and administration of the granting agencies in a memorandum to research institutions, said: "The concept of incrementality remains at the heart of the program but now also includes the concept of sustainability."

The issue of what change can be attributed to the existence of the ICP will be addressed later in this report, but it can be stated already that there

¹ *Indirect Costs Program: Financial Reporting and Monitoring Procedures, Revision November 2004.*

are considerable challenges to establishing such incremental effects: some provincial grants for the indirect costs of research may have been adjusted downwards as a result of the inception of the ICP; it is possible that ICP funds allowed some institutions to simply fund needs that were not addressed earlier; ICP funds may have allowed some institutions to return funds meant for teaching that were used for research costs or to use research-related funding (e.g. from endowments) for direct research costs; and, the sometimes intangible nature of needs addressed with indirect research cost funding challenge accounting and reporting systems—they are not currently accounted for in public reporting of postsecondary finances. Because of the lack of a thorough baseline study of the funding of indirect costs of research at the inception of the program, the task of establishing program effects was made difficult.

Chapter 3

EVALUATION APPROACH

This chapter explains the evaluation approach and methodology. The evaluation study is based on a combination of qualitative and quantitative evidence gathered from documentation, databases, key informant interviews and survey research.

3.1 Evaluation Issues

The issues and questions for the present evaluation were identified during an evaluation planning process, which resulted in the *Evaluation Assessment of the Indirect Costs Program* dated July, 2008. Here are the evaluation issues, as presented in the assessment report. Details on issue 1 are presented in Chapter 4, issue 2 in Chapter 5, issue 3 in Chapter 6, and issue 4 in Chapter 7.

- 1) To what extent is the ICP still needed given the changes in the recipients' rates of indirect costs as a proportion of direct costs and

given the level of support of other sources for indirect research costs?

- 1.1. What are the indirect costs of research at Canadian universities, colleges and teaching hospitals?
 - 1.2. What are the sources of funds to cover them?
- 2) How successfully does the program achieve its objectives? What have the results (intended and unintended) of the ICP been?
- 2.1. Impact on expenditures by cost category
 - well-equipped research facilities;
 - research resources;
 - managing and administering the institution's research enterprise;
 - regulatory and accreditation requirements; and,
 - managing intellectual property
 - 2.2. Displacement of previous spending to other uses
 - 2.3. Displacement of provincial funding
 - 2.4. Impact on excellence/sustainability of research
- 3) How efficient is the program delivery?
- 3.1. Third-party program delivery efficiency
 - 3.2. Small institution progressive premium
- 4) Has the ICP provided value for money?

3.2 **Evaluation Design**

This evaluation is based on a combination of qualitative and quantitative evidence—with the former taking a predominant role because of the difficulty of isolating quantitative impacts of program investments taking a variety of forms (e.g. from renovations to intellectual property management, from animal care to instrument repairs).

Qualitative evidence of program impacts have been gathered in the context of in-depth case studies, key informant interviews and a survey of

university research administrators centred on a self-assessment of the situation of research in recipient institutions.

Quantitative evidence was sought through an analysis of multi-national time-series and multivariate modelling of recipient program data and results measurements.

The key issues raised by the summative evaluation of the ICP are related to outcomes and, in particular, incremental impacts and the counterfactual hypothesis: what would have happened in the absence of the program?

The design of the research around this issue is constrained by two factors:

- the absence of baseline data (pre-dating the program) relative to intended impacts; and,
- the universal nature of the program—all eligible institutions receive funding under the program and non-eligible institutions are systematically different from eligible ones.

The evaluation design also offered three levels of perspectives on program impact, ranging from a micro view to a macro perspective. The most micro level is provided by case studies where small variations in each institution can be reported and analyzed as to whether or not they are related to incremental impacts of the program. The second level is the meso level where each institution is portrayed on a statistical basis and multivariable models may uncover relationships that are not specific to the idiosyncrasies of a particular institution. The most macro view relates the variations through time in overall program effort to national indicators of research outputs; here, institutions disappear in favour of the global picture.

3.3 ***Documentation and Administrative Data***

The documentation reviewed included statistical reports and administrative data relevant to the evaluation. Data extracted from the program documents listed below are important to several evaluation issues.

Outcomes reports provide descriptions of how the grant was expended by institution as well as quantitative data on selected measures (e.g. research space per active researcher). They are key to this evaluation. A review of the data from the outcomes reports suggested that data quality varies from institution to institution; for some institutions, very limited descriptions are provided of how program funds were spent in some categories. Also, data maintained electronically are limited.

Administrative data from the ICP, as well as data from the three federal granting agencies, were a necessary data source for the evaluation. The following administrative information was requested:

- from granting agencies:
 - the number and value of applications for agency research grants;
 - the number and value of agency research grants; and,
 - the number of funded research proposals requiring ethical clearance;
- from the program:
 - the three-year average of direct research grants from agencies;
 - program funding classes;
 - the amount of ICP funding; and,
 - the proportion of ICP funding devoted to each of the five eligible cost areas.

Secondary data were also compiled and utilized for the current evaluation. The following sources of data were reviewed:

- OECD Science, Technology and R&D Statistics;
- Statistics Canada on intellectual property commercialization;

- CAUBO/Statistics Canada, University and college revenue and expenditures; and,
- Statistics Canada, Survey of Intellectual Property Commercialization in the Higher Education Sector.

3.4 **Interviews**

A total of 29 people from 15 organizations were interviewed between January 15 and February 19, 2009. They belonged to the following three categories:

- associations or research professionals, university representatives (18 individuals, including from the Association of Universities and Colleges of Canada, the Canadian Association of University Business Officers, the Alliance for Commercialization of Canadian Technologies, the Canadian Association of Research Libraries, the Canadian Association of University Research Administrators, the Canadian Council on Animal Care, the Health Charity Coalition of Canada);
- governmental organizations (4 individuals); and,
- granting agencies and ICP administrators (5 individuals).

Interviews were either in person or on the telephone. They lasted between 30 and 75 minutes. Key questions addressed during these interviews included:

- the role of the ICP in the current mix of federal agency research funding programs;
- the importance of the ICP relative to other federal agency research funding programs in impacting the quality of the research environment in Canada;
- the impact of the ICP on the way institutions finance indirect costs of federally-funded research;
- the situation of smaller institutions; and,
- the relationship between institutions and affiliated hospitals or research affiliates.

3.5 **Survey of Program Recipients**

Questionnaire. A self-administered questionnaire was addressed to administrators (presidents, vice-presidents of research, deans and department heads) active in each of the ICP recipient institutions. Each section of the questionnaire focused on an area of indirect cost and requests ratings of the state of the university system in 2003 (at program inception) and in 2008. An additional battery of questions asked for ratings of change between 2003 and 2008 with regard to a series of possible outcomes associated with the program.

Pre-test. The questionnaire was pre-tested in early December 2008. Adjustments were made to the invitation message and the questionnaire introduction to highlight the content of the questionnaire (which is not related to the ICP) and down tone references to the program—because some pre-test non-respondents indicated that their non-response was due to a lack of information about the program whereas knowledge of the program was not necessary to fill out the questionnaire. Some other small changes were made.

Sampling. The original plan for this survey was to address it to university presidents and vice-presidents of research in all institutions supported by the program. In the course of refining the design of the evaluation, it was decided to offer deans and department heads from the same institutions the possibility to contribute with their points of view.

Lists of these populations were delivered by each of the agencies. A single list was compiled by the consultant; it was purged of duplicate names and e-mail addresses. The ensuing list included 1,824 individuals. We had no means of validating the list—from an organizational or disciplinary standpoint.

The evaluation design included the development of case studies of eight universities. Individual contacts took place with representatives from these universities. In six of them, updated lists of presidents, vice-presidents of research, deans and department heads were supplied by the institution

and inserted into the survey database. Duplicate e-mail addresses were deleted. In the end, these lists included 324 additional individuals, bringing the total to 2,148.

Protocol. On December 16, 2008, potential respondents from the agency-supplied lists received an e-mail invitation to complete the survey via the Web. Invitations were extended between December 18, 2008 and January 13, 2009, to individuals found on additional lists offered by institutions.

Respondents were provided with a secure link to a personalized questionnaire. All communications between the respondent and the server were SSL-encrypted. Respondents could stop answering the questionnaire and resume on the same questionnaire page in another sitting.

Respondents were provided with an e-mail address to ask questions or voice concerns. A few dozen such messages were handled by the Malatest hotline service.

Telephone reminders were initiated early in January 2009 with individuals identified as presidents and vice-presidents of research and with individuals associated with case study locations.

Field Results. As of February 23, 2009, 342 questionnaires had been completed including 64 from presidents, 44 from vice-presidents of research, 92 from deans and 143 from department heads. Institution by institution, participation varied but never exceeded 25 per cent.

Considering the lacklustre rate of response of deans and department heads,¹ concerns raised about the representativeness,² completeness³ and

¹ 16 per cent and 11 per cent respectively.

² Of the initial 3,126 names received from agencies, including duplicates, 43 per cent were from SSHRC, 49 per cent were from NSERC and 8 per cent were from CIHR.

³ For example, In one case, there were 70 names in the initial sample while the institution sent an up-to-date list containing 206 additional names. Therefore, the initial list comprised only 25 per cent of the target population. Lists were updated by institutions in 7 cases.

recency of the sampling list with regard to these categories, and the high concentration of dean and department head responses in a few institutions,¹ it was decided to use only responses offered by presidents and vice-presidents of research (i.e., to return to the original plan) where the response rate was high and the quality of the list was good. Where an answer was provided by both the president and vice-president of research of an institution, the latter was retained because a few questions were addressed only to vice-presidents of research. Also, in conversations with respondents, it was indicated that vice-presidents of research were often tasked by presidents to submit a response for the institution, in the president's name. On that basis, 96 institutions out of 140 completed the questionnaire.

Response. Among presidents and vice-presidents of research, the overall institutional response rate was 69 per cent (96/140). Differences between the distributions of participating and non-participating institutions according to region and size are not sufficient to reach a significance level of 95 per cent. Therefore, we conclude that the group of institutions that completed the questionnaire is a representative cross-section of the population of ICP client organizations.

Additionally, the group of participating organizations received 83 per cent of all funds distributed by the ICP between 2003 and 2008—making it a significant cross-section of program recipients.

3.6 **Case Studies**

Case studies are central to the evaluation methodology. Eight case studies were conducted. They involved the following institutions:

- Atlantic Canada:
 - Acadia University;
- Quebec:
 - Université Laval; and

¹ 38 per cent of the Dean and Department Head responses were from 3 institutions; 51 per cent were from 7 institutions.

- École Polytechnique;
- Ontario:
 - University of Toronto; and
 - Queen's University; and
- Western provinces:
 - The University of British Columbia;
 - University of Alberta; and
 - Brandon University.

These institutions were selected to represent small and large institutions and institutions from across Canada. Also, six of the eight institutions had been the object of case studies in the context of the ICP third-year review.

Case studies incorporated and synthesized information from documents, site visits, interviews, data requests, the administrator survey, secondary data and data analysis including outcome reports from the institutions. The case studies document the experience of each institution in-depth for the five years 2003-07.

Key informant interviews conducted during the site visits were particularly important. They varied in number from five to 15 individuals, depending on the size and complexity of the sites. For example, visits to sites with affiliated health research centres included interviews with representatives of these centres. They typically involved the most senior administrator responsible for research (e.g. the vice-president of research), representatives from the offices of research services, technology transfer offices, finance departments, research hospitals, and institution departments (across the social sciences and humanities, natural sciences, and health disciplines).

Work on the case studies spanned the entire project period, but the site visits took place in January and February 2009.

3.7 **Meso-Level Analysis**

The meso-level analysis intended to document the relationship between program participation (the independent variable) and research outcomes (the dependent variable) using data from each of the participating institutions.¹

The relevant unit of measurement in this case was the institution. Because no eligible institution remained unfunded, all postsecondary institutions and their affiliated research hospitals and institutes were relevant units of observation. Since all eligible institutions received funding, the independent variable was defined as the level of effort expended by the program. The simplest form of measurement of this level of effort is the annual amount paid to each institution; however, this variable has the disadvantage of being naturally correlated with dependent and intervening variables expressed in dollar amounts. Therefore, we have preferred to measure program effort using the ratio of ICP funding over all institution revenues; this variable has very limited natural correlation with other conceptual variables in the models. Everything else being equal, the hypothesis is that more indirect cost funding leads to more research outputs.

There are several dependent variables of interest in this evaluation. Key domains of expected impacts include immediate impacts (improvement of the research environment in the five eligible cost categories) and intermediate impacts (increase in the research activity).

Finally, the statistical modelling must take into account institutional characteristics that may explain some of the variations in the dependent variables but that are exogenous to the relationship between program effort and research outputs. One obvious such intervening variable is the size of the institution; another one is other sources of indirect cost funding. We wanted also to isolate the effects associated with the special treatment extended to small institutions by adding a dummy variable to the

¹ More methodological details are presented in Appendix A.

model to identify them. Other intervening variables include the proportion of ICP funding invested by institution authorities in each of the five program funding areas.

The data were analyzed using multiple regression techniques. Some variables were transformed to ensure a relatively normal distribution. Due consideration was given to the issues of multicollinearity and heteroscedasticity; some variables were excluded from the models because they were redundant with other, more conceptually interesting variables. The results are focused on the existence of a statistically significant coefficient on the measurement representing the independent variable of program effort, after statistically controlling for differences in the other variables inserted in the models.

3.8 *Multinational Analysis*

Time-series of key indicators from OECD countries were used to attempt to estimate the contribution of the ICP to the health of the university research system.¹

We used data from Statistics Canada on intellectual property commercialization (e.g. number of FTEs engaged in intellectual property management, patents issued and held, license agreements, and spinoff companies), OECD indicators (number of patents, research funding as a percentage of GDP, total researchers, growth in productivity, etc.), and CAUBO/Statistics Canada (financial information on indirect costs funding and total research funding). These data will be used to isolate the incremental impact of the ICP using time-series data on research productivity indicators, as well as the incremental funding input represented by the ICP.

The need for the ICP was partially measured by looking at the growth in federal granting agency direct funding for research, since the original motivation for the ICP was to support escalating financial pressures

¹ More methodological details are presented in Appendix B.

associated with federally-supported research activities. Administrative data was also put to contribution to address several impact questions, such as whether the ICP has contributed to regulatory and accreditation requirements and whether it has had an impact on the volume of Canadian research.

To estimate the impact of the ICP, data were analyzed using an interrupted time-series design that compares multiple observations before and after the implementation of the ICP. Data points prior to the implementation of the program were covered by annual OECD data on science, technology and R&D indicators, as well as available CAUBO/Statistics Canada data. Data points since the implementation of the program were covered by ICP administrative data as well as OECD and CAUBO/Statistics Canada data.

One of the challenges in using such an approach for the current evaluation is the relatively short time period since the implementation of the program. Using annual data would therefore result in relatively few data points for the post-implementation period, which could affect the robustness and validity of the results. Where possible, more frequent observations (less than annually) were used to arrive at a sufficient number of data points. Analysis was performed based on the autoregressive moving averages (ARIMA) model, which allows for modelling serially correlated data (data where change from one time period to the next is associated with the past behaviour of the data) and asymmetric panels (groups of data, for example, data prior to the intervention and data during or after the intervention, that are measured at unequal time intervals).

3.9 Challenges Associated with Addressing Impact Issues

The purpose of a summative evaluation is to assess a recent program's success in achieving its stated goals. The current evaluation will be used to provide information on the extent to which the ICP has met its objectives and expected outcomes since it was established in 2003-04. The evaluation will be used to inform decisions on program design for the next term of operating the program.

One of the main evaluation challenges is the measurement of the incremental impact of the ICP on Canadian research and capacity compared to other sources of funding in the Canadian research system. The impacts of the ICP on equipment and support systems in Canada is difficult to measure quantitatively because there is no objective and factual baseline study on the amount or quality of plant, equipment, and support systems in Canadian institutions. It is also difficult to track changes in funding uses because institutions often administer program funds as part of one central budget as opposed to a separate fund. Furthermore, as noted earlier, it is difficult to assess the net impact of the program as it may, to some extent, replace other funding sources that previously could have supported such facilities.

Lack of availability of pre-measures to assess program impacts means that trade-offs need to be made with respect to indicator availability and pertinence to the evaluation. Measurement of the incremental impact of the ICP was approached by using interrupted time-series analysis to determine whether the addition of ICP funds to the Canadian research system over time is related to increases in research productivity, increases in the volume of research proposals to the three granting agencies, etc. Identifying an incremental impact of the ICP on these macro-level indicators would give strong evidence of the incrementality of the ICP, particularly since other research investment (net of estimated displacements) would have been controlled for in the model. The meso-level analysis attempted a similar type of modelling but, instead of using interrupted time-series, it focused on variations among institutions. Both approaches encountered significant technical and data challenges that are explained in appendices. They were worthwhile endeavours but they did not bear much fruit.

It may be difficult to quantitatively isolate the incremental impact of the ICP, even given the substantial and sharp nature of the ICP introduction into the Canadian research environment, in an environment of substantial R&D growth overall in Canada. In the Canadian context, where total (private and public) R&D investment is estimated at \$29 billion¹, the ICP

¹ AUCC, *op.cit.*, page 4

represents a small fraction of the total. As a result, it was critical to supplement aggregate, quantitative analyses with qualitative assessments of the impact of the ICP using case studies and key informant interviews as central methodologies.

Case studies have limitations, in that it is difficult to capture a large representative sample of institutions due to the resource intensity of case studies. Case studies can, however, provide quantitative data, albeit at a smaller set of institutions.

The survey of institution representatives was successful in reaching a large proportion of very senior representatives (presidents and vice-presidents of research) but much less successful at getting the views of deans and department heads. Moreover, responses to the institution questionnaire reflect recipient opinions about the state of the research environment in their institution—not fact-based measurement and not an independent quantification of the changes attributable to the program.

These are the challenges that this evaluation faced. Let us now turn to the findings of this evaluation study.

Chapter 4

NEED

The first issue raised by this evaluation is "To what extent is the Indirect Costs Program still needed given the changes in the recipients' rates of indirect costs as a proportion of direct costs and given the level of support of other sources for indirect research costs?" Sub-questions include: "What are the indirect costs of research at Canadian universities, colleges and teaching hospitals?" and "What are the sources of funds to cover them?"

The issue of need for the program will be addressed by first identifying the rate at which the ICP subsidizes indirect costs and how this rate has evolved over the first five years of the program. Then, we will offer evidence regarding actual indirect costs incurred by postsecondary institutions in performing research. Finally, we will present information on the sources of funding available to universities to defray the indirect costs of research.

4.1 **ICP Level of Support**

As explained earlier, the rate of support offered by the ICP is higher for smaller institutions: the institutions with the least research activity (up to

\$100,000 of federal granting agency funding in the previous three years on average) get 80 per cent of the value of direct grants in indirect cost funding. The proportion is 50 per cent for up to \$1 million and 40 per cent for up to \$7 million. Institutions with a three-year average of direct grants in excess of \$7 million share the balance of the budget proportionately to their level of direct funding.

Exhibit 4.1 reports on the percentage of support extended to each category of institution (by size) through the first five years of program existence.

EXHIBIT 4.1
Percentage that the ICP Grant Represents of Direct Agency Grants According to Institution Size, by Year

Institutions grouped according to the three-year average of direct research grants from agencies	2003-04	2004-05	2005-06	2006-07	2007-08	ALL YEARS
Up to \$100,000	80%	80%	80%	80%	80%	80%
More than \$100,000 up to \$1,000,000	57%	58%	56%	58%	59%	57%
More than \$1,000,000 up to \$7,000,000	46%	46%	45%	47%	45%	46%
Beyond \$7,000,000	25%	25%	23%	25%	24%	24%
ALL	27%	26%	25%	26%	25%	26%

Source: ICP program data. Entries are the ratios of the total value of ICP grants to the total value of direct grants to institutions. Note that the ICP grants are not calculated on the basis of these percentages (see the information on the funding formula at page 11).

From year to year, the percentage of support offered by the program has been fairly stable, thanks to a program budget that grew along with the increases in direct funding of university research. The exception to this observation is the slow erosion of the rate of support to large institutions that fell from 27 per cent to 25 per cent over the first three years of the program and recuperated in the fourth and fifth years (because of injections of funds). Because the category of largest institutions share the balance left after fixed percentages of support are allocated to smaller institutions, this is where variations in program funding makes a difference.

There are really two stories in this table. The first one is that of institutions in receipt of up to \$7 million of direct research grants (three-year

average). The program assures them of at least 40 per cent in indirect costs (see the details at Exhibit 2.3). They represent 76 per cent of grants (457 out of 590 grants over the course of the first five years of the program), and 10 per cent of the total funding.

The second story is that of institutions in receipt of more than \$7 million in direct research funding (three-year average). Over the first five years of the program, they have collectively received 24 per cent in indirect cost funding. This group comprises 25 to 28 institutions depending on the year and claim 90 per cent of the program budget.

4.2 *Indirect Costs Incurred by Postsecondary Institutions*

Now that the level of support offered by the ICP to its recipients has been established, we can compare this support with the costs actually incurred by postsecondary institutions in performing research. The logic of the argument is that the need for the program and the resources put by the program in ICP's pillars can be substantiated if need (expenses generated by agency-sponsored research) is no less than the funding extended.

While there are issues of nuance, we encountered little disagreement through interviews and case studies with the definition of indirect costs of research used by the ICP. As illustrations, here are three definitions encountered during the evaluation study. The program defines these costs as:

The term "indirect costs" is a collective one that applies to the central and departmental administration costs that underpin the institution's research activities, but are not attributable to a single research project. Indirect costs include: costs to provide well-equipped research facilities, [...] costs of providing research resources, [...] costs of managing and administering the institution's research enterprise, [...] costs of meeting regulatory and accreditation requirements, [...] costs to

effectively manage the intellectual property generated by research activities.¹

AUCC prefers to label them "institutional" costs and defines them as:

The institutional costs of research are those costs that are not directly associated with a specific research project, but that are necessary if a university is to provide an accountable and internationally competitive environment for its researchers. These costs are associated with operating and maintaining facilities and resources (e.g. laboratories, libraries and computer networks), managing the research and knowledge mobilization process (e.g. research coordination, grant applications and management of intellectual property) and regulation and safety compliance (e.g. research involving humans, animal care, biohazards and environmental assessment).²

University of Alberta offers the following succinct definition: "Expenditures incurred in the conduct of research that are not readily or effectively traceable to specific expense activities, yet are real costs that must form part of the budget for a research project."³

While there are only limited debates as to what constitute indirect costs of research, there is no commonly accepted methodology to measure how much these costs amount to. For example, to estimate the proportion that indirect costs represent of direct costs of research, the AUCC resorts to examples of calculations performed in Canada and abroad, all using different approaches, hypotheses and methodologies.

Instead of attempting to offer a definitive methodology, we have also resorted to identifying a number of examples derived by various stakeholders. Note that the various sources likely use different definitions

¹ Grants Program to Canadian Postsecondary Institutions to Defray a Portion of the Indirect Costs of Federally Supported Research at Colleges, Universities and their Affiliated Research Hospitals and Institutes; Results-based Management and Accountability Framework and Risk-Based Audit Framework, June 2003

² AUCC, *op.cit.*, page 24.

³ University of Alberta, *Indirect Costs of Research Policy*,
https://www.conman.ualberta.ca/stellent/groups/public/@research/documents/policy/pp_cmp_057464.hcsp

of indirect costs of research, different accounting assumptions, and different methodologies; they also refer to different policy and research contexts as well as different levels of government and governance. These caveats highlight the need for caution in the interpretation of the information offered below. Here are examples of estimates of indirect costs of research.

- Université de Sherbrooke has published a statement indicating that indirect costs of research in the private sector can reach 100 per cent to 270 per cent.¹
- The Conseil du Trésor du Québec has established budget rules used to calculate operating grants of Quebec universities. These calculations use indirect costs of research of 50 per cent to 65 per cent in year 2007-08.²
- University of Alberta issued a public statement on their policy regarding indirect costs of research that states they represent 51 per cent of direct costs.³
- University of Toronto issued a public statement that "For every research dollar received, U of T spends 50 cents on the indirect costs of research—everything from keeping the lights on in labs to paying the salaries of administrators who make sure that the research meets ethical standards."⁴
- In its 2008 report on university research and knowledge mobilization, AUCC indicates that indirect costs of research reach 40 per cent of direct costs.⁵
- The Ministère de l'Éducation du Québec has issued budget rules that demand that universities collect indirect costs of at least 30 per cent of the value of the direct costs associated with research contracts

¹ <http://www.usherbrooke.ca/recherche/fr/partenariats/pour-les-chercheurs/recherche-en-partenariat/frais-indirects-de-recherche/#c5812>

² CT no 205601 du 2007-11-06

³ *Schedule A - Indirect Cost Recovery Distribution*,
https://www.conman.ualberta.ca/stellent/groups/public/@research/documents/infodoc/cmp_057463.doc

⁴ <http://www.research.utoronto.ca/investment/>

⁵ *Momentum, the 2008 report on university research and knowledge mobilization*, 2008, page 20.

carried out for the private sector and 15 per cent of direct costs of research grants received from the private sector.¹

- The Nova Scotia government put together the *University Assistance Vote* which offers 30 per cent of funding for indirect costs.²
- The Ontario Research Fund Research Excellence program funds indirect costs of research at the level of 28.6 per cent.³

This is a fairly wide range of estimates of the real indirect costs of research—in addition to which, some may argue that only marginal costs are to be accounted, not the entire costs of research projects. Also, there are variations from discipline to discipline and, within disciplines, some types of projects generate more indirect costs than others.

The fact that there are such wide variations in actual estimates of indirect costs incurred in the research activity suggests that, while there are few conceptual debates on what indirect costs are, there are substantially different points of view regarding the measurement of these costs. With such lack of standardization over the measurement, it is no surprise that the rigorous establishment of the level of the need is difficult.

In conclusion, the information available shows that universities and colleges in receipt of direct federal research grants have a need for assistance to defray the indirect costs generated by these grants—although estimates of these costs vary widely because there is no agreed-upon method of calculating them. The ICP was designed to make a partial contribution to indirect cost needs. This evaluation is not in a position to conclude that indirect costs amount to a particular figure but rather that, in reality, indirect costs most likely exceed the level of support extended by the program on average. With average ICP funding level at 26 per cent over its first five years of existence, evidence suggests that

¹ Règles budgétaires et calcul des subventions de fonctionnement aux universités du Québec pour l'année universitaire 2004-2005 et Règle concernant l'octroi d'une subvention relative au recomptage de l'effectif étudiant 2004-2005, CT 202094 du 2005-03-22

² *Evaluation Assessment of the Indirect Costs Program*, page 25

³ <http://www.mri.gov.on.ca/english/programs/orf/re/guidelines.asp>

program funding has not exceeded costs realistically generated by direct federal agency funding of research.

4.3 Sources of Funding of Indirect Costs of Research

Based on case studies and key informant interviews, we have concluded that the two main sources of funding for indirect costs of research are institution operating budgets and tuition fees (that is the sum of money handed out to universities by provincial governments and students for their teaching, research and community service missions) and ICP funds. We cannot establish which of these two sources is most prolific because institutions themselves have no hard data on costs incurred from which they could derive estimates of their own funding of indirect costs. It is very possible that operating budgets are the main source for some institutions while ICP funds are the main source for other institutions.

It is important to note that universities have repeatedly stated in recent years that their operating budgets are under severe strain because of the limited growth in funding clashing with ever increasing costs and expectations:

Until very recently, universities' general operating and special purpose and trust funding—and consequently, unsponsored research—did not keep pace with either the direct funding for research or the rapid increase in enrolment. Furthermore, the demands on universities to engage in R&D and to increase enrolments (at least at an aggregate national level) are not likely to abate over the decade to come. The fact that per student funding for teaching is lower than in the past could be undermining the joint outcomes of teaching and research. The section on international trends, which highlighted comparisons with the U.S., U.K. and Australia revealed the impact of combined funding trends for teaching and research in Canada. [...]

Recent increases in general operating and special purpose and trust revenues from all sources, when adjusted for inflation and enrolment growth, have begun to reverse the long-term decline in per student funding for teaching and research costs not

covered by external sponsors. As demonstrated in Figure 3.8, in 2006-07, per student funding amounts to \$15,000, which is \$500 higher per student than in 2001-02, but also \$6,000 per student less than at the beginning of the 1980s, and \$2,000 per student less than at the beginning of the 1990s.

In conclusion, while universities' per student revenues to support teaching and research costs not covered by external sponsors have stabilized since about 2000, they remain at historical lows.¹

Other sources of funding for indirect costs of research include: federal government ministries and agencies other than granting agencies, provincial government indirect cost programs, private sector partners, and endowments and foundations.

Federal government ministries and agencies other than granting agencies typically do not pay indirect costs of research. Public Works and Government Services Canada appears to do so but others have pointed to Treasury Board policy that would prevent this from happening. We could not trace such a policy.

Some provincial governments have made clear allotments for the indirect costs of the research they fund directly. This is the case for Quebec, Ontario and Alberta, at least. As a point of comparison, the Quebec government budgeted \$66.5 million in 2007-08 for indirect costs of university research it subsidizes directly² while the ICP expended \$85.8 million dollars in Quebec-based institutions during the same year.

Some private sector research partners accept to pay substantial indirect costs for the research they contract to universities. In fact, the Quebec government has established as policy that universities must charge 30 per cent in indirect costs of research contracts and 15 per cent in indirect costs of research grants from sources other than the federal government (that the Quebec government considers covered by ICP funds), the

¹ Association of Universities and Colleges of Canada, *Trends in higher education, volume 3, Finances*. 2008, pages 28-29.

² Secrétariat du Conseil du Trésor du Québec, *Règles budgétaires et calcul des subventions de fonctionnement aux universités du Québec pour l'année universitaire 2007-2008*, CT no 205601 du 2007-11-06, Tableau F.

provincial government and a list of organizations for which the Ministry of Education pays indirect costs of 50 per cent to 65 per cent. Some informants indicated that reaching 30 per cent of indirect cost funding from contracts is a tall order for some types of organizations (e.g. small businesses or community organizations) while it is quite acceptable for others (e.g. pharmaceuticals).

Finally, endowments and foundations typically refuse to defray the indirect costs of the research they fund. The Health Charities Coalition of Canada articulated the reason behind this position in the following manner:

[...] the member charities of the HCCC consider that funding for the indirect costs of research (i.e. for the costs to the institutions of hosting research programs and laboratories) is the role of government and is not the role of the national health charities. Through gifts received from donors across Canada—donors who contribute their after-tax dollars to find cures for diseases—the national health charities are committed to providing continued, strong support for the **direct costs** [emphasis in the text] of university and hospital-based health research.¹

4.4 **Conclusion**

The first evaluation issue was labelled as follows: "To what extent is the Indirect Costs Program still needed given the changes in the recipients' rates of indirect costs as a proportion of direct costs and given the level of support of other sources for indirect research costs?" It was addressed by establishing the following facts:

- globally, ICP funds indirect costs of research at a level of 26 per cent of the direct grants;
- actual indirect costs of research incurred by universities are very difficult to quantify precisely;

¹ Health Charities Coalition of Canada, *Position Statement on Indirect Costs of Research*, May 14, 2007.

- few research funders accept to defray even a small portion indirect costs; and
- if the ICP did not exist, there would be no obvious alternative source for funding indirect costs associated with agency-funded research.

The conclusion of this analysis is that there is little doubt that there is a need for ICP funding within postsecondary institutions in receipt of direct federal agency research funding, and that the current ICP resources are not excessive.

Chapter 5

SUCCESS

The second key evaluation issue is as follows: "How successfully does the program achieve its objectives? What have the results (intended and unintended) of the ICP been?" The evaluation framework identified four areas of particular interest:

- impact on expenditures in each of the five eligible cost categories of the program;
- displacement of previous spending to other uses;
- displacement of provincial funding; and
- impact on excellence/sustainability of research.

Much of the demonstration offered in this chapter stems from a comparison of the state of the institutional research systems in 2003, at the inception of the ICP, and in 2008, the reference year for this evaluation study. This comparison is performed on the rated judgements supplied by institution presidents and vice-presidents of research in the context of a structured survey. It must be acknowledged that these measurements are self-assessments, not factually-based measures, and that changes other than the start of the ICP funding took place over the period, as explained in Chapter 2.

5.1 Impact on Expenditures

There are five eligible cost categories recognized by the ICP: research facilities, research resources, management of the research enterprise, meeting regulatory requirements and intellectual property management. Each will be reviewed in turn.

In each case, we will present the expenditure amounts reported by institutions as part of their outcome reports, the views of research administrators as to the state of each category of indirect costs and the change since the inception of the program, and examples of realizations reported by recipients.

Exhibits 5.1 and 5.2 break down expenditures by cost category and by institution size (5.1) and year (5.2).

Research Facilities

The ICP results-based management and accountability framework (RMAF) defines the first area of indirect costs as follows (page 1): "Costs to provide well-equipped research facilities, including: the costs of renovation and upgrade of research spaces, equipment and facilities; the costs of providing technical support for laboratories, offices, animal care and other facilities; custodial, security, utility, leasing and capital planning costs."

Over the first five years of the program, some \$485 million were expended by postsecondary institutions on research facilities (Exhibit 5.2); this sum represents 37 per cent of all expenditures under the program.

EXHIBIT 5.1
Program Recipient Expenses by Cost Category and Institution Size

	Three-year average of direct research grants from agencies				
	Up to \$100,000	More than \$100,000 up to \$1,000,000	More than \$1,000,000 up to \$7,000,000	Beyond \$7,000,000	ALL
Reported expenditures in \$ million between 2003-04 and 2007-08					
Research facilities	0.6	3.7	42.8	438.1	485.2
Research resources	0.9	3.1	27.3	246.4	277.7
Management and administration	2.5	8.7	37.7	370.3	419.2
Regulatory requirements	0.1	0.7	5.6	70.5	77.0
Intellectual property	0.1	0.7	4.7	64.4	69.8
TOTAL	4.3	16.8	118.2	1189.8	1329.0
Per cent distribution of reported expenditure within institution size groups between 2003-04 and 2007-08					
Research facilities	14%	22%	36%	37%	37%
Research resources	22%	19%	23%	21%	21%
Management and administration	60%	51%	32%	31%	32%
Regulatory requirements	3%	4%	5%	6%	6%
Intellectual property	1%	4%	4%	5%	5%
TOTAL	100%	100%	100%	100%	100%

Source: program administrative data. Totals may not reproduce annual expenditures exactly because of some missing data in outcomes reports.

EXHIBIT 5.2
Program Recipient Expenses by Cost Category and Year

	2003-04	2004-05	2005-06	2006-07	2007-08	ALL
Reported expenditures in \$ million						
Research facilities	84.0	89.1	95.8	105.7	110.6	485.2
Research resources	47.1	54.3	56.8	62.2	57.4	277.7
Management and administration	60.4	75.5	80.2	96.6	106.6	419.2
Regulatory requirements	9.9	12.6	12.6	19.4	22.5	77.0
Intellectual property	12.0	12.9	13.6	15.2	16.1	69.8
TOTAL	213.5	244.4	259.0	299.1	313.1	1329.0
Per cent distribution of reported expenditure within years						
Research facilities	39%	36%	37%	35%	35%	37%
Research resources	22%	22%	22%	21%	18%	21%
Management and administration	28%	31%	31%	32%	34%	32%
Regulatory requirements	5%	5%	5%	6%	7%	6%
Intellectual property	6%	5%	5%	5%	5%	5%
TOTAL	100%	100%	100%	100%	100%	100%

Source: program administrative data. Totals may not reproduce annual expenditures exactly because of some missing data in outcomes reports.

Smaller institutions have tended to invest proportionately less in research facilities than larger ones (Exhibit 5.1). Institutions with direct grants up to \$100,000 have elected to put 14 per cent of their ICP grants in this area. Institutions with direct grants up to \$1 million invested 22 per cent of their ICP funds in facilities while the proportion increases to 36 per cent and 37 per cent for institutions with larger research budgets. This may be a reflection of the amount of accumulated deferred maintenance borne by each type of institution.¹

Vice-presidents of research and presidents of recipient institutions provided judgements concerning the state of research facilities in their organization in 2003 and in 2008. Average ratings on scales running from 0 to 10 are

¹ In 2000, the Canadian Association of University Business Officers wrote, in *The Point of No Return: The Urgent Need for Infrastructure Renewal at Canadian Universities*: "The Canadian-wide estimate to eliminate [accumulated deferred maintenance] at universities is \$3.6 billion. Experience indicates that this figure is likely an underestimate."

presented in Exhibit 5.3; 0 meant "extremely bad condition", 10, "world class" and 5, "average condition".

Illustration

An example of improvements to facilities that was mentioned during several site visits to case study institutions was improvements to animal care facilities. This was brought up as a key topic during the site visits at UBC, Queen's University, Laval University and Acadia University. While at each institution it was reported that the contributions from the ICP had been instrumental in addressing much needed upgrades to these facilities, it was during the UBC site visit that this topic emerged as a key impact of the ICP. During a site visit in 2004, the Canadian Council on Animal Care found that the state of the animal care facilities at UBC was unacceptable and required substantial upgrades to the extent that an entirely new facility had to be built in order for UBC to retain their license to conduct animal research. For a large institution like UBC with a focus on research in the life sciences, losing their ability to conduct animal research would have been disastrous. ICP funds were used to address this emergency situation. Funds were invested in upgrading the old animal care facility to allow animals to remain there until the new facility is completed. In addition, ICP funds are now used to operate the new facility. It was stated during the site visit that the institution could not have afforded to lose their license to conduct animal research and that without the ICP, addressing this emergency would have resulted in significant budget cuts and even lay-offs across the institution.

With regard to research facilities, program recipients indicated that their institutions rated 3.9 or one step removed from "average" in 2003. With reference to the situation in 2008, they now rate the state of research facilities at 5.9 or one point above the "average" mid-point of the rating scale. Therefore, program recipients self-assessed that research facilities in their institution improved by two points on an 11-point scale, moving from slightly below average to slightly above average condition.

Within the area of research facilities, research equipment and research spaces appear to have seen the most improvement; technical support for laboratories and for offices, while still said to have improved, did not show as much change.

It is clear that the university research environment has changed in important ways between 2003 and 2008, and in ways unrelated to the ICP. The program context outlined in Chapter 2 testifies to this. Therefore, it would be inappropriate and misleading to attribute all the change felt among program recipient institutions to the ICP. Hence, we attempted to disentangle ICP effects from other contextual variables using multivariate modelling.¹ Since the amount of the ICP grant represents a varying proportion of overall revenues of recipient institutions, we tried to establish whether a higher relative level of contribution by the program translates into a larger self-assessed change in research facilities. Such a statistical relationship was not found.

¹ Technical details of the multivariate analysis are presented in Appendix A.

EXHIBIT 5.3
Vice-Presidents of Research and Presidents Judgements
on Their Research Environment in 2003 and in 2008

Average ratings of state on scale from 0 to 10	2003	2008	Change
Research spaces	3.9	5.9	2.0
Research equipment	4.1	6.3	2.2
Technical support for laboratories	4.1	5.5	1.4
Technical support for offices	4.3	5.5	1.2
Other research facilities	3.9	5.8	2.0
RESEARCH FACILITIES	3.9	5.9	2.0
Libraries	4.8	6.4	1.6
Databases	4.1	6.4	2.3
Telecommunications	4.8	6.6	1.8
Information technologies	4.9	6.6	1.8
Other research resources	4.3	6.0	1.7
RESEARCH RESOURCES	4.5	6.4	1.9
Research planning and promotion	3.8	6.0	2.2
Assistance in preparing research proposals	3.5	6.0	2.5
Public relations	3.5	5.6	2.1
Financial and administrative services	3.9	5.8	1.9
Other research management and administration items	3.7	5.9	2.2
RESEARCH ADMINISTRATION AND MANAGEMENT	3.7	5.9	2.2
Existence of ethics boards	4.1	6.7	2.6
Training of faculty and other personnel in reg. req.	3.9	6.2	2.3
Technical support for animal care	4.2	6.4	2.2
International accreditation	3.5	5.9	2.4
Other items related to compliance	4.2	6.3	2.1
COMPLIANCE WITH REGULATORY REQUIREMENTS	4.1	6.4	2.3
Services of a technology transfer office	3.2	6.1	2.8
Assistance in patent applications	3.3	6.1	2.9
Assistance in licensing	3.2	6.0	2.8
Assistance in spinoff company creation	2.9	5.6	2.7
Other items related to IP management	3.1	5.8	2.7
INTELLECTUAL PROPERTY MANAGEMENT	3.0	5.7	2.7
n	39-89	41-96	37-89

Source: survey of vice-presidents of research and presidents of recipient organizations. All change values are statistically significantly different from zero at the 95 per cent confidence level.

We also analyzed the statistical relationship between program funding as a proportion of overall revenues and the increase in expenditures on facility renovations (not research-specific) from CAUBO data. We applied the statistical controls required to isolate program effect if it existed. We found that the relationship was negative: the more funding an organization received from the ICP between 2003 and 2008 as a ratio of its total revenues, the less of an increase was found in facility renovations. This may be explained by the pattern of investments found in Exhibit 5.1: smaller institutions tended to invest their ICP funds in the research management and administration area much more so than in research facilities.

Research Resources

The ICP RMAF defines the second area of indirect costs as follows (page 1): "Costs of providing research resources, such as libraries, databases, telecommunications, information technologies, systems and research tools, including acquisition, custodial, security, utility, leasing and capital planning costs."

Over the first five years of the program, some \$278 million were expended by postsecondary institutions on research resources (Exhibit 5.2); this sum represents 21 per cent of all expenditures under the program.

Illustration

The site visits to case study institutions revealed a key difference between small and larger institutions in the area of research resources. Representatives of small institutions stressed that investments in library resources, in particular access to on-line journals, were seen as a key impact of the ICP with significant impacts on the entire institution, benefiting faculty and students. At Brandon University, for example, key informants reported that prior to the ICP, the institutions library provided access to only a basic stock of journals and that if researchers needed access to other journals or resources, they had to wait for the information to be ordered through interlibrary loans or, as was often the case, drive two and a half hours to Winnipeg to access the resources at the library of the University of Manitoba. This scenario meant that researchers had to spend significant amounts of time to access resources that provide the foundation for all research. It was reported that since the implementation of the ICP, the library at Brandon University now provides access to over 20,000 journals (compared to approximately 1,000 journals prior to the ICP), enabling researchers to access the information at their desktop.

Institutions of all sizes have tended to invest equally in research resources (Exhibit 5.1): the share of this area of expenditure varies from 19 per cent to 23 per cent according to institution size.

With regard to research resources, program recipients indicated that their institutions rated 4.5 or half a step removed from "average" in 2003. With reference to the situation in 2008, they now rate the state of research resources a 6.4 or one and a half points above the "average" mid-point of the rating scale. Therefore, program recipients self-

assessed that research resources in their institution improved by almost two points on an 11-point scale, moving from slightly below average to slightly above average condition.

Within the area of research resources, databases appear to have seen the most improvement; other resources (libraries, telecommunications and information technologies), while still said to have improved, did not show as much change.

Illustration

Representatives from Laval University indicated that accelerated developments in information technology have led to unexpected expenditures in the field of research resources, particularly with regards to technical support to researchers to manage and stock immense quantities of data. Furthermore, new library resources, such as geomatics and geo-referenced maps, are increasingly used in numerous disciplines; as these research resources require complex processing before being made available, significant costs are attached to them; the on-site interviews revealed that the ICP helps fund those advances.

Here again, we attempted to disentangle ICP effects from other contextual variables using multivariate modelling.¹ We found that the institutional self-assessments of improvement in research resources did not correlate with the amount of the ICP grant as a proportion of overall revenues of recipient institutions once appropriate statistical controls were applied.

We also analyzed the statistical relationship between program funding as a proportion of overall revenues and the increase in expenditures on library acquisitions (not research-specific) from CAUBO data. We applied the statistical controls required to isolate program effect if it existed. We found that the relationship was positive: the more funding an organization received from the ICP between 2003 and 2008 as a ratio of its total revenues, the more of an increase was found in library acquisitions. This is a positive finding of program effect since, as shown in Exhibit 5.1, smaller and larger institutions spent similar proportions of their ICP funds on research resources (contrary to the case of research facilities where the relationship between funding and results was tainted by divergences in investment priorities of institutions according to their size).

Management of the Research Enterprise

The ICP RMAF defines the third area of indirect costs as follows (page 1 and 2): "Costs of managing and administering the institution's research

¹ Technical details of the multivariate analysis are presented in Appendix A.

enterprise, including: research planning and promotion; assisting researchers in the preparation of research proposals; public relations; financial and other administrative services including information systems to track grant applications, certification and awards; human resources and payroll; purchasing, audit, health and safety."

Illustration

The University of Alberta's Research Services Office's current development of Grants 2.0. is a database designed to manage all research grant activity, from pre-award through to the completion of the research project. The database will ultimately streamline, standardize, and eliminate any duplication of administrative work associated with research grants awarded to researchers and faculty at the university. Currently (prior to the launch of Grants 2.0), the university's Research Services Office is working with four different databases, each associated with a different aspect of the grant, none of which "talk to each other". The ICP funds have allowed the university to hire contractors and project stewards to develop Grants 2.0. The university expects that the database will revolutionize the way research grants are tracked and administered, as it will be more efficient and transparent for researchers. The increasing complexity of grants and grant applications has resulted in the need for this type of database. Other universities such as Queen's have heard about it, and have visited the University of Alberta to look at what they are doing. The U of A believes that Grants 2.0 will lead the way for all other universities, and the development of the database would not have been possible without the ICP funds.

Over the first five years of the program, some \$419 million were expended by postsecondary institutions on research management and administration (Exhibit 5.2); this sum represents the second largest area of expenditures after research facilities with 32 per cent of all expenditures under the program.

Smaller institutions have tended to invest proportionately more heavily in research management and administration than larger ones (Exhibit 5.1). Institutions with direct grants up to \$100,000 have elected to put 60 per cent of their ICP grants in this area. Institutions with direct grants up to \$1 million invested 51 per cent of their ICP funds in research management and administration while the proportion increases to

32 per cent and 31 per cent for institutions with larger research budgets. This may be a reflection of the weak level of institutional systems in place in small institutions prior to program inception.

With regard to research administration and management, program recipients indicated that their institutions rated 3.7 or more than one step removed from "average" in 2003. With reference to the situation in 2008, they now rate the state of research administration and management a 5.9 or one point above the "average" mid-point of the rating scale. Therefore, program recipients self-assessed that research management and administration in their institution improved by more than two points on an 11-point scale, moving from slightly below average to slightly above average condition.

Within the area of research administration and management, assistance in the preparation of research proposals appears to have seen the most improvement; financial and administrative services, and public relations, while still said to have improved, did not show as much change.

Here again, we attempted to disentangle ICP effects from other contextual variables using multivariate modelling.¹ We found that the institutional self-assessments of improvement in research administration and management did not correlate with the amount of the ICP grant as a proportion of overall revenues of recipient institutions once appropriate statistical controls were applied

Illustration

During site visits, some larger institutions reported efforts to establish efficient database systems that enable full and efficient control over all research projects at the institution with respect to ensuring that regulatory requirements are met at the outset and throughout the lifespan of a research project. While databases are covered in this report in more detail in the section on research resources, the example of the Researcher Information Services (RISe) system developed at UBC illuminates the interconnectedness of the different areas of priority in which ICP funds can be spent. Starting in 2005, RISe has been rolled out in modules and replaced the old research tracking system ORSIL. RISe has allowed for significant improvements in efficiency of research management and administration. Key informants from the Office of Research Services noted that while under ORSIL, it took approximately 10 minutes to ensure that compliance with all ethics and safety requirements was in place for a project, it now takes 10 seconds to access the same information. In addition, research accounts under RISe cannot be opened unless full compliance is achieved, which contributes to risk management at the institution. Key informants noted that RISe has been so successful, that the Michael Smith Foundation for Health Research is currently working with UBC to explore options of launching the system province-wide. In addition, institutions from other jurisdictions, like the University of Alberta, have signalled interest in establishing the same or a similar system. At a Tri-Council and CFI monitoring visit in 2008, the RISe system was found to be an ideal practice in Canada in terms of managing compliance with ethics, health and safety requirements of research.

Meeting Regulatory Requirements

The ICP RMAF defines the fourth area of indirect costs as follows (page 2): "Costs of meeting regulatory and accreditation requirements, including: the creation or support of regulatory bodies, and the training of faculty and other personnel in animal care, ethics review, radiation and biohazard; the costs of meeting international accreditation, e.g. accreditation from the American Veterinary Medical Association."

Over the first five years of the program, some \$77 million were expended by postsecondary institutions on meeting regulatory requirements (Exhibit 5.2); this sum represents 6 per cent of all expenditures under the program.

Although the differences are only in individual percentage points, smaller institutions have tended to invest proportionately less in meeting regulatory requirements than larger ones (Exhibit 5.1). Institutions with direct grants up to

¹ Technical details of the multivariate analysis are presented in Appendix A.

\$100,000 have elected to put 3 per cent of their ICP grants in this area. Institutions with direct grants up to \$1 million invested 4 per cent of their ICP funds in compliance with regulatory requirements while the proportion increases to 5 and 6 per cent for institutions with larger research budgets. This may be a reflection of the type of research conducted by smaller and larger institutions and the weight of ensuing regulations.

Illustration

Key informants at the University of Alberta mentioned that as a result of the increases in regulatory compliance, the Research Services Office has been able to bolster the Research Ethics Office (REO). Today, the REO serves as a one-stop shop for all ethics approvals and applications. In essence, the office is an amalgamation of eight separate ethics boards that were scattered throughout the university. The most significant initiative undertaken by the REO has been the implementation of the Human Ethics Research Online (HERO) initiative. HERO is a "cradle to grave" online ethics application system that has been operational since May 2008. This online tool has made obtaining compliance and regulatory certification easier as it has helped standardize the application and processing system across the entire campus. Informants acknowledged that while it is too early to see the efficiencies of using HERO, the initiative would not exist if it were not for the ICP funds, and so far it has received positive feedback from its users.

With regard to compliance with regulatory requirements, program recipients indicated that their institutions rated 4.1 or one step removed from "average" in 2003. With reference to the situation in 2008, they now rate the state of compliance with regulatory requirements a 6.4 or one and a half points above the "average" mid-point of the rating scale. Therefore, program recipients self-assessed that compliance with regulatory requirements in their institution improved by more than two points on an 11-point scale, moving from slightly below average to slightly above average condition.

Within the area of compliance with regulatory requirements, the existence of research ethics boards has seen the most improvement; other aspects of regulatory compliance (international accreditation, training of personnel and technical support for animal care) improved as well, but slightly less than human ethics.

Here again, we attempted to disentangle ICP effects from other contextual variables using multivariate modelling.¹ We found that the institutional self-assessments of improvement in regulatory compliance did not correlate with the amount of the ICP grant as a proportion of overall revenues of recipient institutions once appropriate statistical controls were applied.

We also analyzed the statistical relationship between program funding as a proportion of overall revenues and the increase in the number of research

¹ Technical details of the multivariate analysis are presented in Appendix A.

proposals made to federal granting agencies that required ethical clearance according to the application form. We applied the statistical controls required to isolate program effect if it existed. We found that the relationship was positive: the more funding an organization received from the ICP between 2003 and 2008 as a ratio of its total revenues, the more of an increase was found in grant applications requiring ethical clearance. This is a positive finding of program effect: ICP funding may have been shown to allow research in ethically more delicate contexts.

Intellectual Property Management

The ICP RMAF defines the fifth area of indirect costs as follows (page 2): "Costs to effectively manage the intellectual property generated by research activities, including: costs of creating, expanding or sustaining the Technology Transfer Office or similar function; costs of reports of invention patent applications, licensing, spinoff company creation."

Illustration

Technology, Entrepreneur and Company Development (TEC) Edmonton—a joint partnership that was developed in 2004 between the University of Alberta and the Edmonton Economic Development Corporation—was born with the help of ICP funds. According to one of the key informants interviewed during the site visit at the University of Alberta, TEC Edmonton, has increased its profile in the province such that companies are now approaching the university to work in collaboration and to develop new products. One of the emerging initiatives is the "Entrepreneurs in Residence," which helps move technology from the university to spinoff companies, and has people in these spinoff companies come back to the university to help others with the further creation of spinoff companies. These people help see spinoff companies succeed, and make a real impact on the economy.

Over the first five years of the program, some \$70 million were expended by postsecondary institutions on intellectual property management (Exhibit 5.2); this sum represents 5 per cent of all expenditures under the program.

Small institutions have invested proportionately much less in intellectual property management than larger ones (Exhibit 5.1). Institutions with direct grants up to \$100,000 have put 1 per cent of their ICP grants in this area compared to 4 to 5 per cent for larger institutions. Larger institutions have more of a history in intellectual property

management than smaller institutions: for example, the University of Toronto Innovation Group was first established in 1980 and the University of Alberta Industry Liaison Office was first established in 1994.

With regard to intellectual property management, program recipients indicated that their institutions rated 3.0 or two steps removed from "average" in 2003. With reference to the situation in 2008, they now rate the state of intellectual property management a 5.7 or almost one point

above the "average" mid-point of the rating scale. Therefore, program recipients self-assessed that intellectual property management in their institution improved by 2.7 points on an 11-point scale, moving from slightly below average to slightly above average condition—the largest change reported in the survey of administrators.

Within the area of intellectual property management, all components received equally high scores of change.

Here again, we attempted to disentangle ICP effects from other contextual variables using multivariate modelling.¹ We found that the institutional self-assessments of improvement in intellectual property management did not correlate with the amount of the ICP grant as a proportion of overall revenues of recipient institutions once appropriate statistical controls were applied.

5.2 ***Displacement of Previous Spending to Other Uses***

If an institution is going to do research (and postsecondary institutions, particularly universities, self-define in part through their research activity), some indirect costs of research will be simply unavoidable while others can be omitted. For example, paying for utilities, animal care or a financial system that allows reporting to funding agencies is mandatory. Whether or not funding agencies contribute to paying indirect costs of the research they subsidize, these costs must be faced by the institution. Without

funding for indirect costs of research, these unavoidable costs are covered through the institution's operating budget—at the expense of other activities that could have or should have been carried out using these resources.

On the other hand, some indirect costs can be foregone—for some time and with consequences, but they can be. Drafty windows can remain drafty;

Illustration

For example, the University of Toronto's chemistry building is the most expensive building on campus to operate, according to one key informant. The nature of the research that is conducted in the building's labs is such that the building's air needs to be changed eight to ten times a day, which in itself runs up a huge electricity bill. The building costs millions of dollars to run, accounting only for electricity and heat. These activities and expenses cannot be foregone as they are essential to the health and safety of all those who work and learn in the building.

¹ Technical details of the multivariate analysis are presented in Appendix A.

researchers may work without proposal support; intellectual property can be left unmanaged. Eventually, the absence of attention to these indirect costs will impact the institution, but in the short term, they can be put on the back burner.

Before the inception of the ICP, postsecondary institutions receiving research grants from federal granting agencies employed a mix of two strategies: first, they would postpone indirect costs that did not require immediate attention; and second, they would pay for mandatory indirect costs and some portion of indirect costs that could be deferred through their operating budget.

With the arrival of the ICP, they were able to reallocate part of the funds from their operating budget that went to indirect costs back to other research and teaching uses, and they were able to tackle parts of the non-mandatory indirect costs that were left ill-attended before the ICP. The reallocated portion does not lead to incremental impacts in the traditional program evaluation sense, since the impact is felt in areas other than indirect costs of research; the second part is incremental in the traditional sense.

In conclusion, based on case studies and key informant interviews, there is no doubt that ICP funds have allowed for the displacement of funds previously used to defray indirect costs of research and are now used for other uses. The reason for this certainty is in the nature of the indirect costs of research and in the sources of funding available to pay for them.

5.3 *Displacement of Provincial Funding*

The issue of displacement of provincial funding points to the possibility that, in response to the addition of the ICP in 2003, some provinces may have retreated from funding indirect costs of research, thereby leaving postsecondary institutions in no better a position than before the ICP fund influx.

The Third-Year review of this program concluded that Atlantic provinces had reduced their funding by \$400,000 per year and Manitoba, by \$1 million per year. It indicated that Alberta had increased its funding to 18 per cent from 15 per cent for indirect costs and that Quebec had changed its indirect cost funding from 15 per cent across the board to between 50 per cent and 65 per cent for research funds provided by Quebec funding agencies.

This evaluation bases its observations concerning possible displacement of provincial funding on information collected as part of the case studies and key informant interviews. These sources indicated that, in British Columbia, Alberta, Manitoba and Nova Scotia, there was no change in the treatment of indirect cost funding before and after the inception of the ICP. This information may not be entirely reliable since it does not completely correspond to what was established in the Third-Year Review via interviews with provincial representatives. The cases of Ontario and Quebec warrant additional information.

Ontario was cited as an example of increased provincial involvement in the funding of indirect costs of research. We have not been able to confirm from documentation a causal relationship between the Ontario government decision and the inception of the ICP. However, key informants from both case study institutions in Ontario confirmed that the availability of ICP funding to cover indirect costs has had an impact on the provincial government and their awareness of the true costs of research. In fact, it was noted that the Ontario Ministry of Research and Innovation has taken a leadership role in establishing a minimum 30 per cent overhead fee to be paid to postsecondary education institutions in the province on government sponsored research. While it was mentioned that not all ministries and government departments in the province have followed suit, key informants stressed that the fact that the federal government acknowledges the existence and impact of indirect costs on universities by implementing the ICP has been an important leveraging factor for the developments within the provincial government with respect to overhead fees.

The second case is the Quebec government grants to universities for indirect costs of research. Up to 2001, the Ministry of Education of

Quebec defrayed indirect costs of all research performed by Quebec universities, including research funded by federal granting agencies. The rate of indirect cost funding was 15 per cent. In 2000-01, the indirect cost of research budget was \$41.5 million¹.

When the federal government announced its intention to defray part of the indirect costs of the research it subsidizes, the Quebec government indicated that it would stop its 15 per cent funding on the same direct grants to avoid paying double.

In 2004-05, the Ministry of Education's new funding policy established that they would contribute 50 per cent toward the indirect costs of research provincial bodies and accredited not-for-profits subsidize in "light" disciplines and 65 per cent for "heavy" disciplines. This translated into an indirect costs of research budget for 2004-05 of \$35.9 million.² This policy still stands; the budget for 2007-08 was \$44.3 million.³

Moreover, in 2004-05, the Government of Quebec created a transitional and decreasing grant to support Quebec universities' indirect costs of research until the recuperation of indirect costs of research improves.

[The Ministry of Education] compensates the reduction in revenues produced by the reform in the short term in some institutions, in two ways:

- via a transitional base grant that will be adjusted according to increases in indirect cost revenues, in particular from the federal government; and
- via the funding, during the transitional period, of new research spaces under the "Land and buildings" line in

¹ Secrétariat du Conseil du Trésor du Québec, *Calculs définitifs des subventions de fonctionnement aux universités du Québec pour 2000-2001*, CT no 197671 du 2002-02-13, Tableau E.

² Secrétariat du Conseil du Trésor du Québec, *Règles budgétaires et calcul des subventions de fonctionnement aux universités du Québec pour l'année universitaire 2004-2005 et Règle concernant l'octroi d'une subvention relative au recomptage de l'effectif étudiant 2004-2005*, CT 202094 du 2005-03-22, Tableau F. The document does not define "light disciplines" (*disciplines légère*) and "heavy disciplines" (*disciplines lourdes*) but examples of the former include sociology and literature, and examples of the latter include engineering and medicine.

³ Secrétariat du Conseil du Trésor du Québec, *Règles budgétaires et calcul des subventions de fonctionnement aux universités du Québec pour l'année universitaire 2007-2008*, CT no 205601 du 2007-11-06, Tableau F.

2004-05, and under a specific transitional grant since 2005-06.¹

This transitional grant was budgeted at \$25.9 million in 2004-05 and \$20.4 million in 2007-08.

In conclusion, very little evidence points in the direction that there has been displacement of provincial funding.

5.4 ***Impact on Excellence and Sustainability of Research***

It is difficult to establish a causal relationship between ICP funding and the condition of the very objects the program is intended to support: research facilities, research resources, management of the research enterprise, compliance with regulatory requirements and intellectual property management. The difficulty stems from the fungibility of the funds (i.e., their ability to take many various shapes once inserted in a postsecondary institution system) and from the displacement effects discussed earlier.

Illustration

Interestingly, almost all key informants during the site visits put a particular emphasis on the impact of the ICP on attracting or retaining world-class researchers to their institutions and with that improving global competitiveness not only of the individual institution but of Canadian research as a whole. Particularly at the most research-intensive institutions like University of Toronto, The University of British Columbia, University of Alberta, Queen's University and Laval University, many key informants reported that the ability to provide an adequate research infrastructure, good facilities, new equipment and good administrative support systems has been a key factor in hiring negotiations and retention battles with leading researchers at those institutions. A representative at Queen's University stated that "researchers today think globally; if they can't get a lab or a piece of equipment they need for their research here, they will go to MIT, Harvard or Berkley and find it there." Similar comments were made at almost all case study institutions.

It is even more difficult to project causality of the program farther into the territory of impacts on excellence and sustainability of research. This evaluation study has attacked this challenge via qualitative evidence gathered from case studies and the survey of administrators, and through quantitative evidence in the form of multivariate models of program effects and an interrupted time-series analysis of OECD data.

¹ *Idem*, page 10. Our translation of the French version: "[Le Ministère de l'Éducation] compense la baisse de revenus occasionnée à court terme par la réforme dans certains établissements, et ce, de deux manières : [1] par une subvention de transition de base qui sera modulée en fonction de la croissance des revenus de FIR, provenant notamment du gouvernement fédéral; [2] par le financement, pendant la période de transition, des nouveaux espaces de recherche sous la fonction « Terrains et bâtiments » en 2004-2005, puis par une subvention spécifique de transition depuis 2005-2006."

We were not overly surprised to discover that the two quantitative methods did not bear fruit. By the time all other significant impacts on such remote concepts as research excellence and sustainability of research are accounted for, the expectations that ICP funds could be associated with these ultimate results were low. Various limitations of the actual data also contributed to our incapacity to uncover a clear quantitative pattern of causal relationship between the ICP and excellence and sustainability.

Therefore, we turn to the other sources of evidence, more qualitative in nature.

Exhibit 5.4 presents the average ratings supplied by program recipients with regard to the changes they perceived in their institutional environment between 2003 and 2008 with regard to some key research indicators. Over that period, administrators indicated that the amount of research conducted in their institution increased markedly (a rating of 5 would indicate that the amount of research "increased substantially"; the actual rating is 2.6), that the quality of the result improved and that the number of active researchers increased.

Research administrators also report positive change (but somewhat less than in the first category listed above) in the extent of use of research results and in the competitiveness of their organization on the world stage.

The lowest but still positive scores of change went to the capacity of the institution to attract world-class researchers and researchers' satisfaction with the research environment.

Note again, that we found that the institutional self-assessments of improvement in the research outputs did not correlate with the amount of the ICP grant as a proportion of overall revenues of recipient institutions once appropriate statistical controls were applied.

EXHIBIT 5.4
Vice-Presidents of Research and Presidents Judgements
on Change in the Research Environment Between 2003 and 2008

Average ratings of state on scale from 0 to 10 where 0 means "Decreased substantially since 2003", 10 means "Increased substantially since 2003" and 5 means "Stayed the same"	Change between 2003 and 2008 (score minus 5)
Amount of research conducted in your institution	+2.6
Quality of research conducted in your institution	+2.6
Number of active researchers in your institution	+2.4
Extent of utilization by others of research results produced in your institution	+2.1
Competitiveness of your institution on the world stage	+1.9
Capacity of your institution to attract world-class researchers	+1.8
Researchers' satisfaction with their research environment	+1.6
n	75-87

Source: survey of vice-presidents of research and presidents of recipient organizations. All change values are statistically significantly different from the mid-point at the 95 per cent confidence level.

5.5 **Conclusion**

The second key evaluation issue focused on the success of the program in achieving its objectives. Four areas of interest were identified.

Impact on Expenditures in Each Cost Category of the Program. By and large, one-third of program expenditures were invested in research facilities (e.g. renovations), another third in the administration and management of the research enterprise (e.g. support to proposal writing), one-fifth in research resources (e.g. libraries), one-twentieth into compliance with regulations (e.g. animal care) and one-twentieth into the management of intellectual property (e.g. patenting, spinoffs). Smaller institutions invested more heavily in administration and management of research (upwards of 50 per cent of their expenditures) while larger institutions put more emphasis on facilities (37 per cent of their expenditures.)

With regard to research facilities, research resources, research administration and management, compliance with regulatory requirements, and intellectual property management, in the aggregate, program recipients indicated that their institutions rated somewhat below "average" in 2003. In all five areas, globally, representatives of recipient institutions indicated that the situation improved to above "average" since the inception of the ICP (2003-08). The improvement was two notches on a scale from 0 to 10. This perceived improvement took place over the course of the program but we cannot attribute it directly to the program action.

Displacement of Previous Spending to Other Uses. Before the inception of the ICP, postsecondary institutions receiving research grants from federal granting agencies employed a mix of two strategies to defray the indirect costs of the research performed using these funds: first, they would postpone indirect costs that did not require immediate attention; and second, they would pay for mandatory indirect costs and some portion of indirect costs that could be deferred through their operating budget.

With the arrival of the ICP, they were able to reallocate part of the funds from their operating budget that went to indirect costs back to other research and teaching uses, and they were able to tackle parts of the non-mandatory indirect costs that were left ill-attended before the ICP. The reallocated portion does not lead to incremental impacts in the traditional program evaluation sense since the impact is felt in areas other than indirect costs of research; the second part is incremental in the traditional sense.

It is not possible to say what proportion of the \$1.3 billion of ICP expenditures between 2003-04 and 2007-08 went to allowing reinvestment in teaching and what proportion went to improved research environments. Both effects can be seen as incremental, although only the latter responds to the initial purpose of the program.

Impact on Excellence/Sustainability of Research. Qualitative evidence from case studies and interviews suggests that ICP funds allowed postsecondary institutions to maximize the benefits derived from direct funding of research. For example, indirect cost funding can ensure that

experimental equipment is up and functioning, allowing research to take place when direct funding and other research resources are available; indirect cost funding supports the upkeep of buildings that, in turn, are key components of the ability to perform quality research; and indirect cost funding contributes to efficient research budget administration that, in turn, enables optimal expenditure management and reporting.

Research administrators indicated that the amount of research conducted in their institution increased markedly between 2003 and 2008, that the quality of the result improved and that the number of active researchers increased. Research administrators also report positive change in the extent of use of research results and in the competitiveness of their organization on the world stage. Because many other aspects of institutional research environments changed between 2003 and 2008, in particular, the level of direct funding for research and research equipment, we cannot attribute these improvement solely to the ICP.

Displacement of Provincial Funding. Very little evidence was found of displaced provincial funding of indirect costs of research as a result of the inception of the ICP.

Chapter 6

PROGRAM DELIVERY

Two program delivery issues were raised in the evaluation framework: "Is the third-party model of program delivery efficient?" and "Is the small institution progressive funding premium warranted?"

The first question refers to the program requirement that funding to affiliated hospitals and health research centres be funnelled through accredited institutions. The second addresses the program design feature, whereby small institutions receive a larger rate of funding than larger ones.

A third issue of program delivery surfaced during the implementation of the evaluation study. It concerns accountability and reporting under the ICP.

6.1 *Affiliated Hospitals and Health Research Centres*

Institutions eligible for ICP funding who have affiliated health research centres (typically hospitals) must declare these affiliations when submitting a proposal for an ICP grant. They must also demonstrate that they have a formal agreement with their affiliated health research centres dealing with the distribution of the indirect costs grant among the different

responsibility centres. The eligible institution receives the entire ICP grant and is responsible for making the appropriate distribution to affiliated centres. Often times, that translates into sharing the ICP grant among affiliated centres and the institution according to the value of the direct research funding received. Again, often, the eligible institution keeps a percentage of the amount thus identified for affiliated centres to cover corporate costs such as the library or the financial management systems.

This mechanism has the advantage of avoiding direct exchanges between federal agencies and provincially regulated entities (hospitals) and it reduces the administrative load on the program. It may even foster a culture of common, efficient services rather than the proliferation of parallel systems. Some key informants acknowledged that this mechanism creates additional work for universities because they have to negotiate the agreements, monitor how the centres spend the money, report, etc.

After a somewhat difficult initial installation phase around 2003-04, stakeholders appear to have settled into this protocol. We heard few voices questioning the current mechanism. For example, some representatives from affiliated health research centres have complained that universities may take a long time to transfer the funds. All in all, the treatment of affiliated health research centres did not register as a significant issue at this point.

6.2 *Small Institution Progressive Funding Premium*

As explained in Chapter 2, the value of each ICP grant is calculated on the basis of the three-year average of direct research grants received from the federal granting agencies by the eligible institution over the previous three years (this value is called the "base"). The value of the grant is the sum of four values:

- 80 per cent of the first \$100,000 of the base—an eligible institution with a base of \$50,000 receives \$40,000 of ICP funding;

- 50 per cent of the next \$900,000 of the base—an eligible institution with a base of \$150,000 receives \$80,000 of ICP funding for the first \$100,000 and \$25,000 for the next \$50,000;
- 40 per cent of the next \$6 million;
- a share of the balance of the ICP budget prorated to all institutions with a base larger than \$7 million, on the basis of their relative base.

This funding formula benefits small institutions because they get proportionately larger ICP funding than larger institutions. We have not seen written documentation of the rationale of this aspect of the funding formula. Many key informants were of the view that there are certain fixed costs that need to be covered regardless of the size of the institution, such as those related to research offices and ethics committees. In that sense, while larger institutions clearly have greater needs in the absolute than smaller universities, they can realize some economies of scale that are not available to small institutions. Some informants mentioned that small universities carry out some types of research (e.g. regionally-relevant research) that large universities would not take responsibility for—research that is nonetheless socially significant.

Other stakeholders, however, argue that larger universities have greater proportional indirect costs, in that they tend to attract large infrastructure and large research projects, which come with additional indirect expenditures. Some quoted that the 20 largest Canadian universities undertake 90 per cent of research, and yet get less than 30 per cent in funding of indirect costs.¹ In addition, they allege that smaller institutions sometimes act as free riders, using larger universities' services and installation without providing full compensation. Very small institutions may also get ICP funding by virtue of having one of their researchers on a research team without actually incurring indirect costs for research conducted in the team principal's larger institution; more on that later.

Granting agency representatives mentioned that smaller institutions are generally content with the current mode of calculation, but that some are

¹ Note that the largest institutions also get 89 per cent of the ICP funding (Exhibit 2.5).

starting to voice concern about the sliding scale as their research budget increases. Larger institutions are less receptive to the formula.

What is the extent of the issue? Exhibit 2.5 established that 45 per cent of program recipients, those receiving a three-year average of direct federal agency grants up to \$100,000, total 0.3 per cent of total ICP funding in the first five years of the program (and 0.1 per cent of the direct research funding). The second group of institutions, who receive a three-year average of up to \$1 million in direct federal agency research grants, account for 14 per cent of recipients and 1.4 per cent of total ICP funding (and 0.6 per cent of the direct research funding). These two groups of small institutions represented \$22 million of funding in the first five years of the program, compared to \$1.3 billion for larger institutions. If these \$22 million had been distributed to larger institutions, this would have represented an additional payment of \$91,000 per year, or a 1.7 per cent total increase in their ICP funding. The rate of indirect cost funding to institutions with direct federal agency research grants in excess of \$1 million would have increased to 25.2 per cent from 24.8 per cent between 2003-04 and 2007-08.

Thus, undeniably, the sliding-scale formula costs larger institutions some funding. The extent of this cost is, however, limited. It is therefore reasonable to think that the loss of this funding by small institutions would be noticed far more by them than the gain it would generate for large institutions.

Part of the argument of large universities against the sliding-scale formula is that small universities do not perform research efficiently. We gave this hypothesis a partial test by comparing rates of improvement to the research environment observed between 2003 and 2008 in small, medium and large ICP recipient institutions—based on the assessments made by institution presidents and vice-presidents of research. Exhibit 6.1 presents the results.

The first observation is that all scores, in all size groups, are positive: improvements to the research environment, and to the excellence and sustainability of research were identified in all sizes of postsecondary institutions.

There is, however, a pattern in Exhibit 6.1 where statistically different improvement scores are found (the last column in the table), and the group of smallest institutions reports the smallest change. Regarding research resources, the smallest quantum of change (1.5) is that of the smallest institutions, with the largest institutions just slightly ahead (1.8). For four of the seven scores of improvement in excellence and sustainability of research (amount of research, quality of research, competitiveness of institution and capacity to attract researchers), the smallest institutions documented the least change. In the case of the latter two items (competitiveness of institution and capacity to attract researchers), institutions one notch larger (a three-year average of up to \$1 million in direct federal agency research funding) share lower scores as well.

These data suggest that, by the account of research heads in recipient organizations, the research environment of small institutions (up to a \$100,000 three-year average in base, but also those up to \$1 million) has not improved as much during the five years of existence of the ICP as that in larger institutions. One possible explanation of this observation, albeit a speculative conclusion, is that smaller institutions have not succeeded as well as large institutions in translating the funding received into tangible results.

One last issue was raised during case study interviews. To establish the total amount of direct research funding received by each institution, the three federal granting agencies use the information contained in their program administration files. They assign the entirety of a direct grant to an institution if all researchers associated with a research project are attached to that institution. When more than one institution is represented on the research team, the value of the grant is prorated according to the number of researchers per institution for the purpose of calculating the total direct grants from which the ICP grant is computed.

We heard from some large institutions that this method does not recognize the fact that, in research projects involving researchers from several organizations, some small and some large, the large institution(s) typically bear the indirect costs, at least in disproportionate amounts. In their view, the current system disfavours large institutions. Their suggestion would be

to apportion the value of the direct grant according to the expenses incurred by the research partners. Of course, this information is not available to the granting agencies.

EXHIBIT 6.1
Vice-Presidents of Research and Presidents Judgements
of Their Research Environment in 2003 and in 2008 Broken Down by Institution Size

Change in average ratings of state on scale from 0 to 10 between 2003 and 2008	Three-year average of direct research grants from agencies					Statistical significance Anova p(F)
	Up to \$100,000	More than \$100,000 up to \$1,000,000	More than \$1,000,000 up to \$7,000,000	Beyond \$7,000,000	ALL	
Areas of program support						
Research facilities	1.6	2.4	2.4	2.3	2.0	0.10
Research resources	1.5	2.5	2.5	1.8	1.9	0.03
Management and administration	2.1	2.6	2.4	2.1	2.2	0.84
Regulatory requirements	2.5	2.6	2.7	1.9	2.3	0.47
Intellectual property	2.5	3.0	3.3	2.6	2.7	0.62
Impact on excellence and sustainability of research						
Amount of research	+2.2	+3.4	+3.0	+3.3	+2.6	0.03
Quality of research	+2.1	+3.4	+2.9	+2.9	+2.6	0.03
Number of active researchers	+2.3	+3.1	+2.7	+2.5	+2.4	0.47
Extent of utilization of results	+1.7	+2.4	+2.5	+2.4	+2.1	0.13
Competitiveness of institution	+1.3	+1.6	+2.8	+2.8	+1.9	0.00
Capacity to attract researchers	+0.8	+1.7	+2.6	+2.8	+1.8	0.00
Researchers' satisfaction	+1.7	+1.1	+1.9	+2.0	+1.6	0.51
n	23-36	11	16-17	22-24	75-87	

Source: survey of vice-presidents of research and presidents of recipient organizations.

Note: the top pane of this table displays the differences in the average scores provided for 2003 and 2008 separately, on 10-point scales; the second pane shows average change as rated directly by respondents—since the absence of change was rated a 5 on this 10-point scale, 5 was subtracted from the average score.

Note: the statistical significance test is the probability of a larger F value in an analysis of variance. A value of less than 0.05 indicates that a statistically significant relationship exists between ratings and size groups.

6.3 ***Accountability and Reporting***

Eligible institutions submit a request for an Indirect Costs Grant in March each year. In this document, the applicant provides an expenditure estimate in each of the cost categories targeted by the ICP. The request lists affiliated hospitals and health research institutes and attests that there is a current agreement between the applicant and these affiliates to govern sharing the ICP grant.

Each year at the end of June, recipient institutions submit an ICP outcomes report for the previous year. This report lists actual expenditures of ICP grant monies in each of the five cost categories. The report also requires the recipient institution to disaggregate these expenditures into sub-categories. It also asks the research institution to indicate whether the expenditures covered the same areas that had previously been covered by an ICP grant or whether monies were used for new items not covered by the ICP grant in previous years.

In addition, the outcomes report contains five open-ended questions, one for each cost category. These questions ask how the ICP grant monies have allowed the institution and its affiliates to maintain and/or enhance its research capacity. Three questions are posed as a guide: what difference did your investment of the grant monies make?; why were these investments important to the researchers and/or to the university research administration?; and what would have happened if the investments had not been made? Finally the grant recipient is asked to report on overall impacts and to provide comments on them. Suggested impacts include attraction and retention of researchers, attraction of additional funding, redirection of funds to other uses and other overall impacts.

The details of the Outcome Report form have changed over time. This description corresponds to the 2008 version.

We discussed outcomes reports with finance officers from 13 universities (arguably among the larger institutions). A majority indicated that ICP funds are integrated into general revenues and cannot be traced back at

the end of the year; the others stated that ICP grants are managed more or less as a separate fund and attributed to specific expenses such that the use of the grant can be reported faithfully.

While we do not doubt that the activities described in the outcomes reports took place,¹ in many cases, we were told that the activities listed were more or less illustrative of what could possibly have been done with the ICP funds. Many case study informants could not positively indicate whether the activities noted in the outcomes reports would have taken place in the absence of ICP funding. Some agreed that, if they had to produce a similar report for provincial funding of indirect costs, the same results could be attributed to another funding program.

The fact that the ICP funds are often times blended into the general operating fund and that they can then serve a wide array of needs makes the identification of specific local realizations difficult for recipient institutions.

The 2008 *Internal Audit of the Indirect Costs Program* highlighted the importance of outcomes reports and recommended that the program review its established performance measures. The management response to this recommendation recognizes the challenge that performance indicators represent for this multi-faceted and highly adaptable program. It also expressed an expectation that this evaluation would provide useful suggestions regarding performance measurement.

It is the view of this evaluation team that, considering the complexity of the environment in which this program takes place, independent assessment of program effects can only be established by comparing the situation with a factual baseline measurement (as opposed to asking institutions to provide a record of activities that they attribute to ICP funding). Establishing this baseline would surely be a complex endeavour—and one that exceeds the mandate of this evaluation. For

¹ Determining whether they actually did would be work for an audit team, not an evaluation team. Based on the report of the recently completed *Internal Audit of the Indirect Costs Program* (December 2008), such an audit would not be currently possible: "Alternatively, if such due diligence is not feasible, it is recommended that the program consider whether changes to its terms and conditions may be required to enable due diligence activities (e.g. allow for recipient audits to be completed)."

example, it could include the calculation of the amount of accumulated deferred maintenance, the measurement of equipment availability time, the number of ethical reviews performed, performance against regulated standards and the percentage of intellectual property management actions taken compared to the number that it would have been desirable to take.

6.4 **Conclusion**

Two program delivery issues were addressed.

Efficiency of the Third-Party Model. Placing affiliated hospitals under the umbrella of their host universities was identified as an irritant in the mid-term evaluation of the ICP. Based on the interviews conducted as part of the case studies, this is no longer the case.

Small Institution Funding Premium. Small institution progressive funding has been raised by large institutions as an inappropriate provision; large universities claim that research funds should be reserved for research environments that are most apt at producing excellence in research. Others indicate that small institutions do not benefit from economies of scale in managing the research enterprise, whereas large institutions do: for example, setting up a research office would require an amount of resources that would be proportionately larger in smaller institutions than in larger ones. They add that small institutions conduct research that is distinct from that valued in large institutions, e.g. regionally relevant and significant research.

According to the account of the research heads in recipient organizations, the research environment of small institutions (up to a \$100,000 three-year average in base, but also those up to \$1 million) has indeed improved during the five years of existence of the ICP, but not as much as that in larger institutions. So, while they did produce positive outcomes, smaller institutions were less effective at translating research funding into research results.

This information must be put in context. It was shown that small institutions (with up to \$1 million in direct federal agency research funding per year) represent 59 per cent of ICP recipient organizations and get 1.7 per cent of the ICP funding as well as 0.7 per cent of direct research funding. The rate of indirect cost funding to institutions with direct federal agency research grants in excess of \$1 million would have increased to 25.2 per cent from 24.8 per cent between 2003-04 and 2007-08 if no funding had been extended to smaller institutions; each large institution would have received \$90,000 more per year on average. Based on these numbers, it is reasonable to think that the loss of this funding by small institutions would be noticed far more by them than the gain it would generate for large institutions.

Another issue surfaced during the evaluation study. Outcomes reports constitute the main tools for ICP performance reporting. The information they contain is often illustrative at best and should not be assumed to properly reflect the extent of program impacts on local research systems.

Chapter 7

COST-EFFICIENCY

The issue of cost-efficiency can be conceived in a number of ways. In this evaluation, it was defined in a very narrow manner by the evaluation steering committee: is the delivery of the program performed in an efficient manner?

Cost-efficiency analyses are often part of larger assessments of the value for money of specific programs that generally focus on the overall cost-effectiveness of the program. However, cost-effectiveness analyses are often plagued by a variety of difficulties with respect to establishing suitable comparators, as well as dealing with varying definitions of cost categories in the available data. Therefore, the current evaluation will be limited to a cost-efficiency analysis that focuses on an assessment of input/operating costs relative to program outputs only.

The cost-efficiency analysis undertaken for the current evaluation focused on the assessment of program administrative costs in relation to program outputs. We had planned to also compute cost-to-impact ratios but, since the quantitative approaches applied in this evaluation (the multivariate modelling of impacts and the interrupted time-series analysis) did not detect quantifiable impacts of the ICP, this was not possible.

Operating Costs

As reported in the *Third-Year Review of the Indirect Costs Program*, when the program was initiated, several options for the delivery mechanism were explored. The review of alternative delivery mechanisms indicated that a key advantage of the stand-alone option of delivering the ICP were the low administrative costs. In fact, as outlined in a *Briefing Report to the Minister April 2003 to March 2004*, the overall annual operating budget of the ICP is less than \$600,000. Exhibit 7.1 outlines the operating budget of the program broken down by areas of expenditure.

**EXHIBIT 7.1
 ICP Operating Budget**

	2003-04	2004-05	2005-06	2006-07
Salary	\$203,000	\$203,000	\$203,000	\$203,000
Employee Benefits Plan	\$41,000	\$41,000	\$41,000	\$41,000
Non-salary	\$319,000	\$208,000	\$657,000	\$657,000
Accommodation	\$26,000	\$26,000	\$26,000	\$26,000
Total	\$589,000	\$478,000	\$945,000	\$945,000

Source: *Briefing Report to the Minister April 2003-March 2004* and interview with program personnel.

Fluctuations in the overall operating budget reflect higher budgetary requirements for initial implementation of the program, as well as review activities throughout the program to ensure accountability and compliance with Treasury Board requirements.

Overall, since the implementation of the program in 2003, the total operating costs between 2003 and 2007 amount to \$2,123,000. These costs compare to program outputs of over \$1 billion in funding distributed to eligible institutions across Canada between 2003 and 2007 (see Exhibit 2.2). Table 7.2 below summarizes total grant expenditures for the years 2003-07.

EXHIBIT 7.2
ICP Operating Grant Expenditures

	Grant expenditures (\$ million)	Cumulative expenditures (\$ million)
2003-04	213.5	213.5
2004-05	244.4	457.9
2005-06	259.1	717.0
2006-07	298.9	1,015.9
Total	1,015.9	

Source: ICP program administrative data

Cost per Output

In comparing the overall operating budget of the ICP, it becomes apparent that the costs to administer the program are very low. In fact, as summarized in Exhibit 7.3, the cost per \$1 million grant expenditures distributed to Canadian postsecondary institutions overall is \$2,910 or 0.3 per cent.

EXHIBIT 7.3
ICP Cost Per Output

	Administrative cost per \$1 million in grant expenditures
2003-04	\$2,759
2004-05	\$1,956
2005-06	\$3,637
2006-07	\$3,162
Overall, 2003-04 to 2006-07	\$2,910

In the absolute, operating costs of 0.3 per cent are clearly very low. In comparison, the 2007 *Evaluation of the Networks of Centres of Excellence Program*, conducted for the Interagency Evaluation Steering Committee, calculated that the operating costs of the Canadian Foundation for Climate and Atmospheric Sciences were 3.4 per cent, those of the Networks of

Centres of Excellence (NCE) program were 3.5 per cent, and those of selected CIHR institutes were 5.8 per cent. The ICP operating costs are more than an order of magnitude smaller than those of these comparators. It must be noted that these other programs all use extensive peer-review processes whereas the ICP does not.

Costs in the Context of Impacts

The costs for administering the ICP should be viewed in relation to the impacts that have been generated. While it is not possible to provide additional quantitative analyses due to the inability to detect impacts through the quantitative lines of evidence of the evaluation, program costs can be viewed in the context of qualitative assessments of program impacts.

Qualitative findings of the evaluation that were collected through key informant interviews and case studies of eight institutions across Canada indicate the importance of the ICP for maintaining and improving the research environment in Canada's postsecondary institutions. Examples of key impacts of the program can be found for each of the five cost categories of the program.

In the area of research facilities, the ICP has allowed institutions to address crisis situations resulting from years of foregoing indirect costs of maintaining animal care facilities. For example, two case study institutions were required to invest in substantial upgrades and the construction of new animal care facilities as a result of a site visit of the Canadian Council on Animal Care who threatened to withdraw their license for conducting animal research. ICP funds allowed the institutions to address this situation without having to take the required money out of their general operating budget, which would have substantially affected resources for faculties and administration across the entire institutions.

In the area of research resources, the ICP has allowed small institutions across Canada to substantially increase their access to online journals and databases that provide the foundation for any research.

In the area of research management and administration, ICP funds have been used to develop and maintain sophisticated tracking systems that allow large institutions to provide administrative support and maintain oversight over thousands of research projects at each institution. In addition, institutions have been able to provide support to their faculty in applying for additional research funding, which has increased grant application success at each of the case study institutions that provided insight into this impact.

In the area of compliance with regulatory requirements, ICP funds have contributed to keeping up with increasing requirements with respect to research ethics, animal care and safety regulations associated with the research enterprise.

In the area of intellectual property management, ICP funds have helped institutions to explore new, innovative practices and strategies with respect to commercialization of research, resulting in immediate benefits to the local and national economy, as well as in larger benefits to society through making research results available to the population as a whole, and in many cases also to populations beyond national borders.

Costs and the Ability to Manage the Program

The 2008 *Internal Audit of the Indirect Costs Program* contained indications that the leanness of the ICP management structure may be problematic. The audit report notes that the program is managed by a "small team of staff" and that "any changes to the staffing structure in terms of vacancies or frequent turnover can create an additional burden on the other staff, and potentially impact the program's ability to complete required activities". In response to audit recommendations to develop standardized operating procedures, to resume site visits, and to review performance measures, program management indicated that such actions were ongoing but impaired by limited resources and position vacancies.

As seen earlier, ICP management is very cost-efficient, but adding this observation to the information available in the ICP Audit Report points to the possibility that this efficiency comes at the cost of a reduced ability to oversee and monitor program operations and outcomes.

Conclusion

Overall, it appears that the costs to administer the ICP are quite low. Per \$1 million grant expenditures that are distributed through the program, only slightly over \$2,910 (or 0.3 per cent) has to be spent on administering the program. This is more than one order of magnitude lower than the operating costs documented in the evaluation of the NCE for the Canadian Foundation for Climate and Atmospheric Sciences, the NCE program and selected CIHR institutes—which, arguably, all use extensive peer-review processes whereas the ICP does not. Within an overall context of impacts, where key informants across Canada reported that the ICP has been important to their ability to maintain and expand their current research enterprise, there is no evidence that the ICP administration costs are excessive.

However, observations from the 2008 ICP Audit Report regarding the size of the management team, the risk associated with vacancies, and the extent of management work required to conform to accepted management practices point to the possibility that this efficiency comes at the cost of a reduced ability to oversee and monitor program operations and outcomes.

Chapter 8

CONCLUSIONS AND RECOMMENDATIONS

This chapter summarises the conclusions reached in this evaluation and proposes recommendations for improvement to the ICP.

Need for the Program. The first evaluation issue was labelled as follows: "To what extent is the Indirect Costs Program still needed given the changes in the recipients' rates of indirect costs as a proportion of direct costs and given the level of support of other sources for indirect research costs?" It was addressed by establishing the following facts:

- globally, ICP funds indirect costs of research at a level of 26 per cent of the direct grants;
- actual indirect costs of research incurred by universities are very difficult to quantify precisely;
- few research funders accept to defray even a small portion of indirect costs; and
- if the ICP did not exist, there would be no obvious alternative source for funding indirect costs associated with agency-funded research.

The conclusion of this analysis is that there is little doubt that there is a need for the ICP funding within postsecondary institutions in receipt of direct federal agency research funding, and that the current ICP resources are not excessive. This evaluation study produced no evidence that program benefits were used for purposes other than those intended by the program. Also, very little evidence was found of displaced provincial funding of indirect costs of research as a result of the inception of the ICP.

Program recipients claim that the program provides insufficient levels of support. Research-intensive universities (who receive a three-year average of more than \$7 million in direct federal agency research funding) claim that the proportion of indirect cost funding they get should increase to 30 per cent (and then to 40 per cent). In 2007-08, these institutions received \$283.6 million from the ICP, compared to \$1.176 billion in direct federal agency research grants; this is a proportion of 24.1 per cent. To bring this proportion to 30 per cent would have required a total of \$352.8 million in ICP funding to research-intensive universities and \$383 million in total in the ICP budget (a budget increase of 22 per cent).

Program Success. The second key evaluation issue focused on the success of the program in achieving its objectives.

Impact on Expenditures in Each Cost Category of the Program. By and large, one-third of program expenditures were invested in research facilities (e.g. renovations), one third in the administration and management of the research enterprise (e.g. support to proposal writing), one-fifth in research resources (e.g. libraries), one-twentieth into compliance with regulations (e.g. animal care) and one-twentieth into the management of intellectual property (e.g. patenting, spinoffs). Smaller institutions invested more heavily in administration and management of research (upwards of 50 per cent of their expenditures) while larger institutions put more emphasis on facilities (37 per cent of their expenditures.)

With regard to research facilities, research resources, research administration and management, compliance with regulatory requirements, and intellectual property management, in the aggregate, program recipients indicated that their institutions rated somewhat below

"average" in 2003. In all five areas, globally, representatives of recipient institutions indicated that the situation improved to above "average" since the inception of the ICP (2003-08). The improvement was two notches on a scale from 0 to 10. This perceived improvement took place over the course of the program but we cannot attribute it directly to the program action.

Displacement of Previous Spending to Other Uses. Before the inception of the ICP, postsecondary institutions receiving research grants from federal granting agencies employed a mix of two strategies to defray the indirect costs of the research performed using these funds: first, they would postpone indirect costs that did not require immediate attention; and second, they would pay for mandatory indirect costs and some portion of indirect costs that could be deferred through their operating budget.

With the arrival of the ICP, they were able to reallocate part of the funds from their operating budget that went to indirect costs back to other research and teaching uses, and they were able to tackle parts of the non-mandatory indirect costs that were left ill-attended before the ICP. The reallocated portion does not lead to incremental impacts in the traditional program evaluation sense, since the impact is felt in areas other than indirect costs of research; the second part is incremental in the traditional sense.

It is not possible to say what proportion of the \$1.3 billion of ICP expenditures between 2003-04 and 2007-08 went to allowing reinvestment in teaching and what proportion went to improved research environments. Both effects can be seen as incremental, although only the latter responds to the initial purpose of the program.

Impact on Excellence/Sustainability of Research. Qualitative evidence from case studies and interviews suggests that ICP funds allowed postsecondary institutions to maximize the benefits derived from direct funding of research. For example, indirect cost funding can ensure that experimental equipment is up and functioning, allowing research to take place when direct funding and other research resources are available; indirect cost funding supports the upkeep of buildings that in turn, are key components of the ability to perform quality research; and indirect cost funding

contributes to efficient research budget administration that, in turn, enables optimal expenditure management and reporting.

Research administrators indicated that the amount of research conducted in their institution increased markedly between 2003 and 2008, that the quality of the result improved and that the number of active researchers increased. Research administrators also report positive change in the extent of use of research results and in the competitiveness of their organization on the world stage. Because many other aspects of institutional research environments changed between 2003 and 2008, in particular, the level of direct funding for research and research equipment, we cannot attribute these improvements solely to the ICP.

The evidence is that the program addresses an important need of the postsecondary research system and that it has produced positive and desirable outcomes.

Recommendation 1. That the Government of Canada maintain the ICP for college and university research.

Program Delivery. Two program delivery issues were addressed.

Efficiency of the Third-Party Model. Placing affiliated hospitals under the umbrella of their host universities was identified as an irritant in the mid-term evaluation of the ICP. Based on the interviews conducted as part of the case studies, this is no longer the case.

Recommendation 2. That, in the absence of compelling evidence suggesting that change is required, the existing approach used in dealing with affiliated health research centres be maintained.

Small Institution Funding Premium. Small institution progressive funding has been raised by large institutions as an inappropriate provision; large universities claim that research funds should be reserved for research environments that are most apt at producing excellence in research.

Others indicate that small institutions do not benefit from economies of scale in managing the research enterprise, whereas large institutions do. For example, setting up a research office would require an amount of resources that would be proportionately larger in smaller institutions than in larger ones. They add that small institutions conduct research that is distinct from that valued in large institutions, e.g. regionally relevant and significant research.

According to the account of the research heads in recipient organizations, the research environment of small institutions (up to a \$100,000 three-year average in base, but also those up to \$1 million) has indeed improved during the five years of existence of the ICP, but not as much as that in larger institutions. So, while they did produce positive outcomes, smaller institutions were less effective at translating research funding into research results.

This information must be put in context. It was shown that small institutions (with up to \$1 million in direct federal agency research funding per year) represent 59 per cent of ICP recipient organizations and get 1.7 per cent of the ICP funding as well as 0.7 per cent of direct research funding. The rate of indirect cost funding to institutions with direct federal agency research grants in excess of \$1 million would have gone from 24.8 per cent between 2003-04 and 2007-08 to 25.2 per cent if no funding had been extended to smaller institutions; each large institution would have received \$90,000 more per year on average. Based on these numbers, it is reasonable to think that the loss of this funding by small institutions would be noticed far more by them than the gain it would generate for large institutions.

Recommendation 3. That the current funding formula, which provides for a progressive range of funding rates, be maintained.

One program delivery issue surfaced during the evaluation study. We discussed outcomes reports with finance officers from 13 universities (arguably among the larger institutions). A majority indicated that ICP funds are integrated into general revenues and cannot be traced back at

the end of the year; the others stated that ICP grants are managed more or less as a separate fund and attributed to specific expenses such that the use of the grant can be reported faithfully.

In many cases, we were told that the activities listed in the outcomes reports were more or less illustrative of what could possibly have been done with the ICP funds. Many case study informants could not positively indicate whether the activities noted in the outcomes reports would have taken place in the absence of ICP funding. Some agreed that, if they had to produce a similar report for provincial funding of indirect costs, the same results could be attributed to another funding program.

Outcomes reports constitute the main tool for ICP performance reporting. The information they contain is often illustrative at best and should not be assumed to properly reflect the extent of program impacts on local research systems. In the case of the ICP, impacts have been defined to include both maintaining existing levels of service in the face of increased demand and increasing the level of service to the research enterprise.

Recommendation 4. That questions in the reporting form be reviewed to better assess the incremental impact of the program.

Whereas outcomes reports attempt to identify program effects through institutional self-assessment, this evaluation study endeavoured to measure the impacts of the ICP on equipment and support systems in Canada in a quantitative manner. This task was made difficult by the absence of a baseline study on the state of the research support ecosystem in Canadian institutions. Lack of availability of pre-measures to assess the impacts of the ICP means that trade-offs need to be made with respect to indicator availability and pertinence to the evaluation.

Considering the complexity of the environment in which this program takes place, independent assessment of program effects can only be established by comparing the situation with a factual baseline measurement (as opposed to asking institutions to provide a record of activities that they attribute to ICP funding). Establishing this baseline would surely be a

complex endeavour—and one that exceeds the mandate of this evaluation. For example, it could include the calculation of the amount of accumulated deferred maintenance, the measurement of equipment availability time, the number of ethical reviews performed, performance against regulated standards and the percentage of intellectual property management actions taken compared to the number that it would have been desirable to take.

Recommendation 5. That, in collaboration with postsecondary institutions, the granting agencies support the development of a methodology to establish a baseline measurement of the state of research environments.

Cost-Efficiency. The costs to administer the ICP are quite low. Per \$1 million grant expenditures that are distributed through the program, only slightly over \$2,910 (or 0.3 per cent) has to be spent on administering the program. This is more than one order of magnitude lower than the operating costs documented in the evaluation of the Networks of Centres of Excellence for the Canadian Foundation for Climate and Atmospheric Sciences, the NCE program and selected CIHR institutes—which, arguably, all use extensive peer-review processes whereas the ICP does not. Within an overall context of impacts, where key informants across Canada reported that the ICP has been important to their ability to maintain and expand their current research enterprise, there is no evidence that ICP administration costs are excessive.

However, observations from the 2008 ICP Audit Report regarding the size of the management team, the risk associated with vacancies, and the extent of management work required to conform to accepted management practices point to the possibility that this efficiency comes at the cost of a reduced ability to oversee and monitor program operations and outcomes.

Recommendation 6. That the operating funding of the ICP be reassessed to ensure that sufficient resources are available to continue to meet due diligence, program oversight and monitoring requirements.

APPENDIX A

Meso-Level Methodology

This appendix presents, in the form of a table, the variables used in the multivariate modelling of program effects, the transformations used and the problems encountered. It also contains a summary table of results for each dependent variable.

In this analysis, the unit of observation is the institution.

Statistical Model Composition and Data Sources

Variable	Type of variable	Data sources	Type of outcome	Transformation	Notes
Amount of ICP funding	Independent	Program administrative files	—	Not normally distributed (long right tail); transformed with a log 10	Too tautological; the other independent variable was preferred
Amount of ICP funding as a ratio of revenues	Independent	Program administrative files	—	No transformation needed	
Institution size (total revenues)	Intervening	CAUBO data	—	Not normally distributed (long right tail); transformed with a log 10	

Variable	Type of variable	Data sources	Type of outcome	Transformation	Notes
Amount of indirect cost expenditures	Intervening	CAUBO data	—		Not used as the CAUBO data was too different from the concept sought
Amount of research-related indirect cost funding	Intervening	Survey of research VPs	—		Excluded because of excessive missing data
Institution size (three-year average of direct research grants from agencies)	Intervening	Program administrative files	—	Not normally distributed (long right tail); transformed with a log 10	
Institution size (program funding classes)	Intervening	Program administrative files	—	Used as dummy variables; excluded the largest category	
Proportion of ICP funding devoted to each of the five eligible cost areas	Intervening	Program administrative files	—	Used as is; excluded facilities	
Improvements in the adequacy and condition of the research facilities	Dependent	Survey of research VPs	Immediate	Used as is	
Increase in expenditures on facilities renovations (not research-specific)	Dependent	CAUBO data	Immediate		Not used as the CAUBO data was too different from the concept sought
Improvements in the adequacy of research support	Dependent	Survey of research VPs	Immediate	Used as is	
Increase in expenditures on library acquisitions (not research-specific)	Dependent	CAUBO data	Immediate	Not normally distributed (long right tail); transformed with a log 10	
Improvements in the management and administration of the research enterprise	Dependent	Survey of research VPs	Immediate	Used as is	

Variable	Type of variable	Data sources	Type of outcome	Transformation	Notes
Improvements in compliance with regulatory and accreditation requirements	Dependent	Survey of research VPs	Immediate	Used as is	
Change in number of funded research proposals requiring ethical clearance	Dependent	Agency databases	Immediate	Not normally distributed (long right tail); transformed with a log 10	
Improvement in the management of intellectual property	Dependent	Survey of research VPs	Immediate	Used as is	
Increase in research funding	Dependent	CAUBO data	Intermediate	Not normally distributed (long right tail); transformed with a log 10	
Evolution of the share of provincial funding of research	Dependent	CAUBO data	Intermediate	Used as is	
Number and value of applications for agency research grants	Dependent	Agency databases	Intermediate	Not normally distributed (long right tail); transformed with a log 10	
Number and value of agency research grants	Dependent	Agency databases	Intermediate	Not normally distributed (long right tail); transformed with a log 10	
Increase in the number of researchers	Dependent	Survey of research VPs	Intermediate	Used as is	
Amount of research conducted in your area in your institution	Dependent	Survey of research VPs	Intermediate	Used as is	
Quality of research conducted in your area in your institution	Dependent	Survey of research VPs	Intermediate	Used as is	

Variable	Type of variable	Data sources	Type of outcome	Transformation	Notes
Extent of utilization by others of research results produced in your area in your institution	Dependent	Survey of research VPs	Intermediate	Used as is.	
Researchers' satisfaction with their research environment	Dependent	Survey of research VPs	Intermediate	Used as i	
Competitiveness of your institution on the world stage	Dependent	Survey of research VPs	Intermediate	Used as is	
Capacity of your institution to attract world-class researchers	Dependent	Survey of research VPs	Intermediate	Used as is	

Statistical Model Results

Variable	Results	Notes
Improvements in the adequacy and condition of the research facilities	Not statistically significant	No technical problem
Increase in expenditures on facilities renovations (not research-specific)	$b = -.166, t(73) = -8.55, p < .001$	Some collinearity issues
Improvements in the adequacy of research support	Not statistically significant	No technical problem
Increase in expenditures on library acquisitions (not research-specific)	Undetermined	Singular covariance matrix; possible non-independence of error
	(Excluding the dummies for institution size) $b = .029, t(75) = 2.42, p = .018$	Possible non-independence of error, and skewed residuals
Improvements in the management and administration of the research enterprise	Not statistically significant	No technical problem
Improvements in compliance with regulatory and accreditation requirements	Not statistically significant	No technical problem
Change in number of funded research proposals requiring ethical clearance	Undetermined	Singular covariance matrix; possible non-independence of error

Variable	Results	Notes
	(Excluding the dummies for institution size) b = .035, t(74) = 3.58, p = .001	Possible non-independence of error, and skewed residuals
Improvement in the management of intellectual property	Not statistically significant	No technical problem
Increase in research funding	Not statistically significant	Possible autocorrelation, non-constant variance and skew residuals, and colinearity issue.
Evolution of the share of provincial funding of research	Undetermined	Possible autocorrelation, non-constant variance and skew residuals, and colinearity issues
	(Excluding the dummies for institution size) b = .114, t(73) = 4.81, p < .001	Possible skewed residuals
Number and value of applications for agency research grants	Not statistically significant	Possible skewed residuals for both models
Number and value of agency research grants	Not statistically significant	Possible skewed residuals for both models
Increase in the number of researchers	b = -10, t(51) = -2.30, p = .025	Possible autocorrelation
Amount of research conducted in your area in your institution	Not statistically significant	Some collinearity issues
Quality of research conducted in your area in your institution	b = -11, t(52) = -2.13, p = .038	No technical problem
Extent of utilization by others of research results produced in your area in your institution	Not statistically significant	No technical problem
Researchers' satisfaction with their research environment	Not statistically significant	No technical problem
Competitiveness of your institution on the world stage	Not statistically significant	Some collinearity issues
Capacity of your institution to attract world-class researchers	Not statistically significant	Some collinearity issues

APPENDIX B

Macro-Level Methodology

One element of the valuation of the ICP is the analysis of program impacts at the macroscopic level over time. This approach was chosen to supplement information derived from the microscopic level (case studies) and the system level in order to assess the impact of the ICP at the country level. The macroscopic level analysis will provide insight into the extent to which the program has achieved intermediate and final outcomes that are outlined in the program's logic model.

Description of the Analysis

Time-series analyses generally have two main goals: identifying patterns within a series of observations and/or within forecasting, where successful forecasting relies on information derived about the existing pattern in the data and is therefore logically linked to the first goal. Identifying patterns in data series can be used to describe trend or seasonality patterns and determine impacts of specific factors or events on the series of observations over time.

Evaluating the impact of one or more discrete events on the values in the time-series requires a design focusing on the interruption of the time-series at a point or points in time when the events in question occurred. Typically, determining effects of events or intervention is done using an

ARIMA (Autoregressive Integrated Moving Averages) model (also known as Box/Jenkins model) with an intervention variable. In this design, an intervention variable coded 0=pre-intervention and 1=post-intervention is added to the general ARIMA model. The development and specification of the underlying ARIMA model is dependent on three characteristics of the raw data.

- The estimation of the autoregressive component: is there autocorrelation in the raw data, and if yes, at what lag level?
- The estimation of the integrated component: is the raw data stationary or is there a linear or non-linear trend?
- The estimation of the moving averages component: are there shocks in the data, and if yes, are observations correlated with these shocks?

These components are estimated using autocorrelation and partial autocorrelation functions (ACF and PACF). In a further step, the significance of the autoregressive and moving averages component is tested along with the significance of the independent variables in the model to fit the model. The main aim of fitting the model is to reduce or, in an ideal scenario, completely remove any autocorrelation and arrive at a random normal distribution of the residuals. Several significant ACFs and PACFs indicate a poor model fit.

A description of the model built for the current analysis of the impact of the ICP on several outcomes indicators is included in Section 2.2 of this report.

Indicators

The purpose of the time-series analysis for the current evaluation was to estimate the impact of the ICP on outcome indicators related to research activity and research outcomes in Canada. Indicators specified in the Design Report to be included in the time-series analysis are:

- number of patents;
- number of license applications and agreements;
- technology balance of payments;

- number of granting agency applications;
- research funding as a percentage of GDP;
- R&D expenditure in higher education; and
- number of R&D personnel.

These indicators are not logically connected with each other and will therefore be analyzed separately. However, in order to be able to detect an impact of the ICP, other factors that could potentially affect these indicators over time need to be controlled for to the extent possible. A key factor that needs to be controlled for in the current design is the increase in overall research funding over time. However, since postsecondary institutions attract funding from multiple sources and data on industry funding is not available on a national basis, the amount and increase in research funding that can be controlled for in the analysis will be limited to funding from the granting agencies and the Canada Foundation for Innovation (CFI).

Data Availability and Data Quality

Data for the current analysis was collected from multiple sources, including OECD data, Statistics Canada, administrative and financial data from the granting agencies as well as data available through annual reports of the CFI.

Due to the diversity of data sources, series of observations were not always available for the same periods of time. However, because indicators will be analyzed separately, disparate lengths of time-series have no effect on the analysis. A more serious challenge was missing information for some of the indicators. While ARIMA models can handle missing data in a series, empty observations need to be supplied as a placeholder, since missing data in the middle of a series would affect autoregression estimates.

There are several ways to replace missing values. Most commonly, imputing a value based on the surrounding values will provide a reasonably likely value that can be used as a placeholder. Imputation can be based on the mean of nearby points, a linear trend at the point or linear interpolation. Additionally, the placeholder could be a simple replication of

the immediately preceding data point. Each method of replacing missing values has specific effects on autoregression estimates in the analysis and could therefore affect the model fit. Using methods based on linear trends or linear interpolation could artificially inflate and therefore over-estimate the linearity of the series, which would affect the estimation of the integrated component of the ARIMA model. If, however, the series already shows strong linear trends in a visual inspection, replacing missing values using linear interpolation or trend estimates is appropriate. If no clear linear trend can be identified for the series as a whole during visual inspection of the data, replacing missing values with the immediately preceding value is a more appropriate approach, since it is not based on assumptions of linear progression or decline that could affect the model. However, using the value of an immediately preceding observation can have an impact on autoregression and model fit, which should be tested.

For the current analysis, missing values were replaced using linear interpolation in series that already displayed strong linear trends in a visual inspection. Where linear trends were not clear, missing values were replaced using the preceding value. It should be noted that the overall number of missing values was low for all indicators included in the analysis, and as such, any effect on estimation results due to replacing missing values would be limited.

Challenges and Limitations of the Analysis

The initial review of the data with respect to availability, quality and distribution, revealed a number of challenges and limitations for the current analysis.

Identification of External Shocks

In order to assess the impact of the ICP on the data series, it is important to identify whether other external shocks might have had a substantial impact on the data series that could potentially render the impact of the ICP invisible. Where possible, these other external shocks should be controlled for in the analysis. However, it is not always possible to identify which specific event might account for a visible pattern in the data, particularly when dealing with macroeconomic indicators that could be

influenced by an array of political, economic and historic events that would need to be controlled for in the analysis. How this challenge affected the analysis for the individual indicators in the analysis will be discussed in more detail below in a descriptive analysis of trends over time.

Number of Post-ICP Data Points and Resulting Robustness of the Model

A serious challenge encountered for the current analysis was the fact that the number of data points since the implementation of the ICP was very limited. For many of the indicators, data was only available up to the years 2005 or 2006, limiting the number of data points for annual series to three or four data points since the implementation of the ICP. Conventionally, in an interrupted time-series analysis it is preferable to have at least 10 post-intervention data points to allow for a sufficiently robust analysis. With only three or four post-ICP data points, the results of the analysis will be inconclusive, as it is too early to detect any clear trends in the data series since the implementation of the ICP. In order to increase the number of post-ICP data points, the research team attempted to access data sources that presented the data in less-than-annual intervals. However, such data was not available for the indicators targeted for the current analysis. Therefore, any results need to be interpreted with caution.

ARIMA Models and Results

The following ARIMA models were identified and estimated.

Univariate Models

In an initial step, univariate ARIMA models were built for all indicators with a sufficient number of data points overall. Data on patents and licenses was excluded. The following results were obtained.

Number of Granting Agency Applications

ACF and PACF estimates indicate that the raw data is autocorrelated at lag 1, with no moving averages component. The raw data indicates a linear trend.

The model identified for univariate interrupted time-series analysis for the indicator is ARIMA (1,1,0). The results of the estimation indicate that the implementation of the ICP had no significant impact on the data ($p > .096$).

Government R&D Expenditure in Higher Education—OECD data

ACF and PACF estimates indicate that the raw data is autocorrelated at lag 1, with no moving averages component. There is some indication of seasonality in the data at lag 7, suggesting the possibility of recurring impacts on the data every seven years. This might be due to electoral cycles influencing R&D expenditures with a slightly delayed effect on the actual data. However, electoral cycles in Canada are not consistent with respect to the time elapsed between elections (ranging between two to five years between 1980 and 2008), therefore, the spike in the PACF at lag 7 could be due to other factors, including economic performance cycles. Given the overall limitation in the number of years covered in the analysis, potential seasonal effects every seven years cannot be explained in the current analysis and are therefore ignored. The raw data indicates a potentially nonlinear trend, suggesting an integrative component = 1.

Two possible models were identified for univariate interrupted time-series analysis for the indicator: ARIMA (1,1,0), assuming a linear trend in the data, and ARIMA (1,2,0), suggesting an exponential trend in the data. Both models were estimated. Post-estimation diagnostics revealed a better model fit for the ARIMA (1,1,0) model.

The results of the estimation indicate that the implementation of the ICP had no significant impact on the data ($p > .89$).

Government Research Funding as a Percentage of GDP—OECD Data

ACF and PACF estimates indicate that the raw data is autocorrelated at lag 1, with no moving averages component. There is some indication of seasonality in the data at lag 6, suggesting the possibility of recurring impacts on the data every six years. This might, again, be linked to electoral cycles and changes in government spending, or changes in overall economic performance, or a combination of both aspects. Given the overall limitation in the number of years covered in the analysis, potential seasonal effects every six years cannot be explained in the current analysis and are therefore ignored. The raw data indicates a linear trend.

The model identified for univariate interrupted time-series analysis for the indicator is ARIMA (1,1,0). The results of the estimation indicate that the implementation of the ICP had no significant impact on the data ($p > .99$).

Number of R&D Personnel—OECD data

ACF and PACF estimates indicate that the raw data is autocorrelated at lag 1, with no moving averages component. There is some indication of seasonality in the data at lag 7, suggesting the possibility of recurring impacts on the data every seven years. Unlike indicators related to government spending, where spikes in the PACF could indicate a connection to electoral cycles, potential factors explaining the spike in PACF for this indicator remain unclear. Given the overall limitation in the number of years covered in the analysis, potential seasonal effects every seven years cannot be explained in the current analysis and are therefore ignored. The raw data indicates a potentially nonlinear trend, suggesting an integrative component = 1.

Two possible models were identified for univariate interrupted time-series analysis for the indicator: ARIMA (1,1,0), assuming a linear trend in the data, and ARIMA (1,2,0), suggesting an exponential trend in the data. Both models were estimated. Post-estimation diagnostics revealed a better model fit for the ARIMA (1,1,0) model.

The results of the estimation indicate that the implementation of the ICP had no significant impact on the data ($p > .84$).

Multivariate Model

Based on the findings of the univariate models and the overall trends visible in the data, detecting an impact of the ICP on the indicators included in the analysis was not possible in scenarios where potential intervening influences were not controlled. Therefore, a multivariate model was built that included factors such as tri-agency and CFI research funding and the establishment of the Canada Research Chairs program as additional independent variables. The multivariate model was estimated for the same indicators that were used in the univariate analysis. Since ACF and PACF are based on the raw data of the dependent variable, they do not change with the addition of new independent variables. As such, the same model parameters that were identified in the univariate analysis were employed in the multivariate analysis.

Note: Due to the fact that the CRC program was established in 2000, the estimates presented for the indicators are based only on the time period between 2000 and 2007. Similarly, when excluding CRC as an independent variable, the estimates are based on the time period for which all variables include data. Since funding data was available between 1999 and 2007, models where CRC was not included are based on the time period between 1999 and 2007. As a result, findings should be interpreted with caution, due to the very limited number of observations included in the analysis.

Number of Granting Agency Applications

The results of the estimation indicate that the implementation of the ICP had no significant impact on the data ($p > 1.0$). Additionally, CFI funding, tri-agency funding and the establishment of the CRC program were found to have had no significant impact on the number of applications to the granting agencies. No notable differences in the results were identified after the CRC was excluded from the model to increase the number of observations included in the analysis.

Government R&D Expenditure in Higher Education—OECD data

The results of the estimation indicate that the implementation of the ICP had no significant impact on the data ($p > 1.0$). Additionally, CFI funding, tri-agency funding and the establishment of the CRC program were found to have had no significant impact on government R&D expenditures in higher education. No notable differences in the results were identified after the CRC was excluded from the model to increase the number of observations included in the analysis.

Government Research Funding as a Percentage of GDP—OECD Data

The results of the estimation indicate that the implementation of the ICP had no significant impact on the data ($p > .77$). Additionally, CFI funding was found to have had no significant impact on the indicator. However, the coefficients for tri-agency funding and the establishment of CRC were found to have a statistically significant impact ($p < .000$), but both coefficients were very small ($+ .001$ for tri-agency funding and $+ .056$ for CRC).

When CRC as an independent variable was excluded from the analysis to increase the number of observations, the coefficient for the ICP was statistically significant ($p < .000$), but the coefficient itself was also very small ($-.02$).

Number of R&D personnel—OECD data

The results of the estimation indicate that the implementation of the ICP had no significant impact on the data ($p > 0.98$). Additionally, CFI funding, tri-agency funding and the establishment of the CRC program were found to have had no significant impact on the number of applications to the granting agencies. No notable differences in the results were identified after the CRC was excluded from the model to increase the number of observations included in the analysis.

Conclusion

The results generated through descriptive and inferential analysis indicate that the overall scope of the ICP is too small to generate detectable impacts on a macroscopic level. Even after other factors were controlled for in multivariate models, the ICP was not found to have a significant impact on the data series for the indicators that were tested. It is important to note that the analysis presented here was based on a very limited number of post-implementation data points, limiting the robustness of the models that were estimated. Results should therefore be interpreted with caution.