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Federal Funding of Basic Research

Introduction and main findings

This paper focuses on recent trends in federal funding of basic research¹, which is primarily provided through the three granting councils: the Canadian Institutes for Health Research (CIHR), the Natural Sciences and Engineering Research Council (NSERC), and the Social Sciences and Humanities Research Council (SSHRC).

Overall, federal support for basic research has slowed significantly over the past six years as the Conservative government put in place a new direction for science and technology policy in Canada. This has been characterized by a decline of funding for basic research and a targeting of new funding to projects that appear to offer the promise of immediate commercial value. The prestigious journal *Nature* summarized the Conservative government's record in the following way:

Governments come and go, but scientific expertise and experience cannot be chopped and changed as the mood suits and still be expected to function. Nor can applied research thrive when basic research is struggling. (*Nature*, issue 487, pp. 271–272, 19 July 2012)

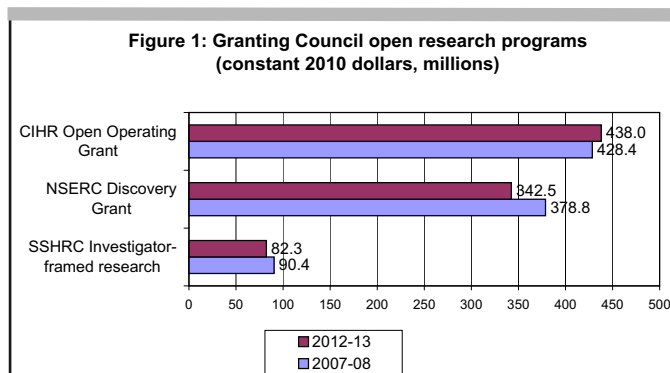
The main findings of this paper include the following:

- Adjusted for inflation, granting council funding has been in serious decline since 2007-08. Funding for SSHRC has fallen by

over 10 per cent in real dollars, while core support for NSERC and CIHR are down 6.4 per cent and 7.5 per cent respectively. Support for the indirect costs of research has declined by 7.9 per cent. Overall federal support for the granting councils is down 7.5 per cent in inflation-adjusted dollars since 2007-08.

- Federal support for the granting councils has lagged even as the number of university-based researchers in Canada has grown by 9.5%, from 38,313 in 2007-08 to 41,934 in 2010-11. As a result, funding for basic research available per faculty member fell by 5.5 per cent from \$20,854 to \$19,708 between 2007 and 2011. While funding available per faculty member has dropped across the country, the sharpest decline is in British Columbia and the Prairies at 34.6 per cent and 15.6 per cent respectively.
- The 2012 and 2013 Federal Budgets earmarked and fettered all new research funding to “academic-industry” partnerships. The government's attempt to direct university-based research towards quick commercial results is most clearly reflected in NSERC's reorientation of research funding. In 2008-09, NSERC spent \$121 million more in inflation-adjusted dollars for its flagship basic research program, the discovery grant program, than it did on targeted, fettered research initiatives. Since 2012-13, NSERC has started to spend more on fettered research such as academic-industry partnerships (see Figure 2).
- Reduced investments in basic research combined with significant growth in the

number of university-based researchers has meant a marked decline in the number of promising research projects that can be funded. Between 2007 and 2013, the success rate for NSERC’s discovery grant has fallen from 70 per cent to 59 per cent. SSHRC’s standard research grant (now called the Insight Grant) saw a drop in the success rate from 33 per cent in 2007-08 to 27 per cent in 2012-13. For CIHR, the percentage of successful applicants for its flagship open operating grant program is just 9 per cent in 2013, down from 28 per cent in 2007. SSHRC and CIHR peer-review committees consistently show the significant gap between the two-thirds of applications that merit funding and the insufficient funds available to fund just a fifth of applications.



7.9 per cent less in real dollars than in 2007-08. Overall, as the government has bypassed the peer-review mechanism of the granting councils in favour of targeting funding directly to institutes and agencies, the granting councils have 7.5 per cent less inflation-adjusted funding than they did in 2007-08.

General Trends: Granting Council Funding

Table 1 shows that granting council base funding in inflation-adjusted dollars has been in decline since 2007-08. Between 2007-08 and 2013-14, funding for SSHRC has fallen by over 10 per cent in real terms. NSERC funding is down 6.4 per cent, while CIHR funding has declined by 7.5 per cent. Funding for the indirect costs of research is

Open research funding

Canada’s flagship basic research grant programs have been seriously affected as a result of both underfunding and government decisions to fetter research funding to industry or other partners deemed strategically important. As illustrated in Figure 1, scientists have seen the amount of funding available through NSERC for basic research decline by 9.6 per cent since 2007-08.

	2007-08	2008-09	2009-10	2010-11	2010-11	2012-13	2013-14	Change (2007-14)
SSHRC	383.7	358.1	368.1	359.4	355.6	351.5	344.8	-10.1%
NSERC	1057.9	1051.5	1042.3	1050.2	1030.8	1018.9	990.3	-6.4%
CIHR	1017.8	989.8	1020.1	1026.9	953.0	969.4	941.4	-7.5%
Indirect costs	327.9	335.7	330.9	324.9	322.6	318.9	302.0	-7.9%
Total	2787.2	2735.0	2761.5	2761.4	2662.1	2658.7	2578.4	-7.5%

Source: SSHRC, NSERC, and CIHR Departmental Performance Reports, Budget 2012 and Budget 2013

Similarly, researchers in the social sciences and humanities face 9 per cent less funding for investigator-framed research. Only CIHR has seen a modest 2.2 per cent increase in its Open Operating Grant, primarily by reallocating unspent funds in other program areas, such as the Canada Research Chairs program, to the Open Operating Grant program.

The impacts of inadequate funding are exacerbated as the number of academic researchers and scientists in universities increased over the past decade. Between 2007-08 and 2010-11, the number of professors increased by 9.5 per cent, from 38,000 to 41,000. As the government has eliminated funding for Statistics Canada’s University and College Academic Staff Survey (UCASS) after 2010-11, it will be impossible to determine funding levels after 2010-11. As it is, thousands of research applications are rejected every year not on the basis of merit, but simply due to inadequate funding.

Table 2 shows the differential impacts of the decline in basic research funding by region. While per faculty research funding has declined 5.5 per cent nationally, there is great variation among the regions. Only Quebec saw a modest increase of 3 per cent, while funding for Ontario and the Atlantic

region saw a minor decline at -0.3 per cent and -0.8 per cent respectively. By contrast, basic research funding per academic researcher in the Prairies fell sharply by over 15 per cent in the Prairies, while in British Columbia faculty saw a steep decline of nearly 35 per cent.

Targeting research funding

While providing inadequate support for basic research since the 2006 election, the federal government has targeted new investments in directed research that allegedly hold the promise of immediate commercial value. This is a shortsighted and narrow view of scientific progress and poses particular dangers to the public interest. In the area of medical research, for instance, the obsession with commercial outcomes has encouraged an emphasis on minor modifications to existing drugs and devices, rather than fundamental explorations of illness and prevention. The commercialization of research can also undermine the integrity of public research. Industrial partners, interested in preserving their commercial interests, have attempted to suppress or delay the publication of research results and to steer research away from

Table 2² Tri-Council open research funding* per faculty member, by region

2010 constant \$	2007-08	2008-09	2009-10	2010-11	% change per faculty
Atlantic	\$10,798.7	\$11,881.7	\$11,124.7	\$10,709.5	-0.8%
Québec	\$30,063.1	\$29,766.6	\$29,241.2	\$30,978.0	3.0%
Ontario	\$25,312.0	\$24,300.1	\$26,046.0	\$25,241.5	-0.3%
Prairies	\$21,034.2	\$19,558.3	\$15,839.3	\$17,750.0	-15.6%
British Columbia	\$28,404.7	\$27,827.9	\$23,070.9	\$18,564.7	-34.6%
Canada	\$20,854.3	\$20,875.4	\$20,802.6	\$19,708.4	-5.5%

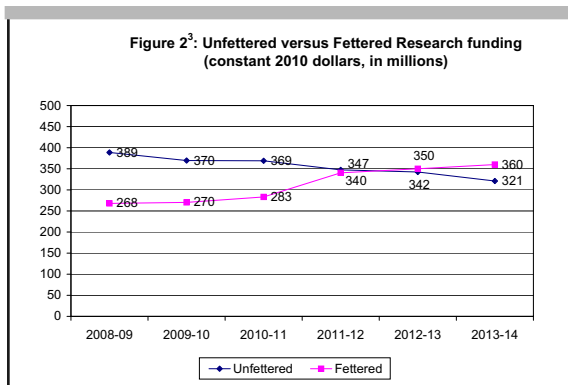
*Includes SSHRC Investigator-framed funding, NSERC Discovery Grant funding, and CIHR Open Operating Grant funding

Source: SSHRC program expenditures, CIHR search engine, NSERC search engine

inquiry that promises public benefit but little commercial profit.

NSERC’s shift in funding from basic research towards research partnerships provides the clearest expression of the government’s fixation on immediate results. As overall funding for the granting councils has declined, funding within NSERC has effectively been shifted away from basic research towards fettered research as shown in Figure 2.

New boutique programs created within NSERC’s research partnerships portfolio underscore the extent of this shift. The Engage Grant program was created in 2009 to “give companies that operate from a Canadian base access to the unique knowledge and expertise available at Canadian universities [...] aimed at addressing a **company-specific problem** in the natural sciences or engineering fields.”⁴ The program operates without a peer review process, while success rates for the grant are virtually guaranteed at just over 90 per cent since inception. The program offers a grant that is, on average, just five hundred dollars shy of the maximum amount of \$25,000 per grant. In comparison, the success rates for a Discovery Grant fell from 71% in 2008-09 to just 58% in 2011-12, while the average grant at just \$31,000 remained unchanged over the period. The funding allocated to the Engage Grant program in

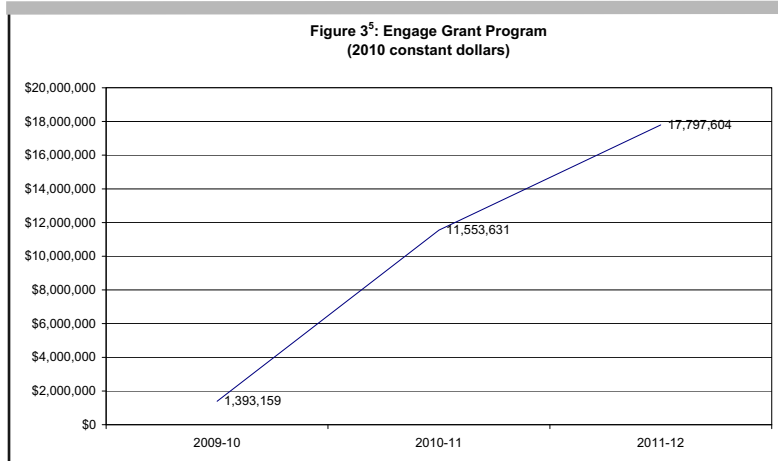


2011-12 could have funded 560 Discovery Grants and have reversed the decline in success rates.

Impacts of inadequate funding for basic research

The main impact of underfunding and undervaluing of basic research has been a marked decline across the granting councils in the number of promising research projects that can be funded. As demonstrated in Table 3, the success rate for NSERC’s Discovery Grants has fallen from 71 per cent in 2007-08 to 62 per cent in 2012-13. The success rate for SSHRC’s standard research grant, now called insight grant, has dropped from 33 per cent in 2007 to 27 per cent in 2012. For CIHR, the percentage of successful applicants for the Open Research Grant

	2007-08	2008-09	2009-10	2010-11	2011-12	2012-13
SSHRC Standard Research Grant / Insight Grant	33%	33%	33%	36%	37%	27%
NSERC Discovery Grant	70%	71%	64%	58%	58%	62%
CIHR Open Research Grant (OOGP program only)	22%	21%	18%	17%	18%	9%



program was just 9 per cent in 2012-13, down from 22 per cent in 2007-08.

It is important to underline that many unsuccessful applications merited funding from a scientific perspective, but could not be funded due to inadequate resources. SSHRC and CIHR provide information on the number of applications that were deemed to be scientifically important enough to be funded but for which no funding was available. Both SSHRC and CIHR peer-review committees report that two-thirds of applications for their basic research grants merit funding but the agencies have the ability to fund just a fraction of those. As a result, thousands of important research projects are unable to be pursued.

Conclusion

Basic scientific research in Canada is under serious pressure. Since 2006, the federal government has underfunded and undervalued basic research. Recent federal budgets have redirected funding and priorities to perceived short-term commercial gains.

The irony is that failing to invest in basic research actually undermines major innovations. The history of scientific progress reveals that the most fundamental advances in knowledge that lead to new products and applications have their origins in basic scientific research with no predicted commercial outcomes.

This is not to say that the federal government should not fund applied research. Rather, the key is to find the appropriate balance of basic and applied research funding. In this respect, policymakers and stakeholders need access to better and more transparent information about the proportion of unfettered and fettered research provided through the granting councils. At present, this information is often unclear.

In short, the federal government needs to make basic research a priority. The first step is to erase the inflation-adjusted erosion of support through significant new investments. Beyond this, the government must also refrain from directing research. In recent federal budgets, the government has bypassed the traditional peer review process of determining what is scientifically important and instead made announcements about what projects and institutes will receive funding. The truth is that research priorities are best identified by the scientific community, not by politicians or industry. Fettering research funding to commercial interests, as evidenced in programs such as NSERC's Engage Grant, can undermine the public interest, as private interests come to exert greater influence over university researchers, threatening both the integrity and independence of research.■

Notes:

¹ Basic research refers to experimental and theoretical work undertaken with the primary aim of acquiring new knowledge, and not necessarily with any particular application or use in view. The objective of basic research is to gain more knowledge and understanding of the subject under study. Although basic research may not have specific applications as its goal, the most important scientific discoveries have typically come from basic research driven by a quest for knowledge.

² Includes SSHRC Researcher-framed funding, NSERC Discovery Grant funding, and CIHR Open Operating Grant funding

³ The lack of transparency in Granting Council reporting means that it is impossible to disentangle definitively basic research from targeted research. The terms used in this section are “fettered” and “unfettered”, reflecting the distinction that “unfettered” research is investigator-driven. The term “fettered” comes from former University of Toronto president David Naylor in a presentation to the Empire Club of Canada, March 7, 2013: <http://www.president.utoronto.ca/secure-content/uploads/2013/03/David-Naylor-Empire-Club-Address.pdf>. Fettered research funding includes funding for NSERC’s Research Partnerships area: Strategic areas, university-industry-government partnerships, and commercialization initiatives. Data for unfettered research funding is based on NSERC’s Discovery Grant program.

⁴ http://www.nserc-crsng.gc.ca/Professors-Professeurs/RPP-PP/Engage-engagement_eng.asp (retrieved 4 July, 2013). Emphasis added.

⁵ Engage grant funding based on most recent data available from NSERC:
<http://www.outil.ost.uqam.ca/CRSNG/Outil.aspx?Langue=Anglais>

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