Federal government funding distribution among Canada's post-secondary education institutions: Distribute to diversify!

Brief submitted to the Standing Committee on Science and Research for the study on the distribution of federal government funding among post-secondary institutions

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Recommendations

1. Increase funding in traditional research council programs to provide more opportunities for researchers, particularly early-career researchers and employees of non-research-intensive universities.
2. Ensure that the percentage of applications funded does not fall below the 20% threshold for any of the programs, to make Canada's research funding system more efficient.
3. Recognize the diversity of types of Canadian universities and rethink the evaluation criteria to ensure that no university is placed at a disadvantage.
4. Better consideration of the diversity of researcher profiles, disciplinary fields and types of scientific contributions in evaluating grant applications.
5. Better support for francophone researchers in preparing and submitting grant applications, and ensure that grant evaluations respect Canada's linguistic duality.
6. Initiate federal, provincial and institutional discussions on a potential core funding mechanism for all researchers until they receive a grant.

Introduction

Canada's higher education systems are internationally recognized for their diversity as well as for the quality of their instruction, research and community service. When universities contribute significantly to the fulfilment of these three missions, it is because they are financially supported by the provincial governments, which have jurisdiction over education, and by the Government of Canada, whose programs are pillars of support for research and graduate students.

However, while statistics over the past two decades confirm an increase in total funding invested in higher education-conducted research (see Table 1 on higher education expenditures on research and development, Statistics Canada, 2024), Canada is no exception to the international trend in which research funding is increasingly concentrated in the hands of a smaller percentage of researchers and universities, particularly research-intensive ones.

Categorizing universities in Canada is a major challenge. In 1991, *Maclean's* provided its first university rankings but, well aware of the institutional diversity in Canada, it had grouped institutions into three categories: undergraduate, comprehensive and medical/doctoral (universities with a high percentage of doctoral students and/or a faculty of medicine). This categorization reflects a concept of the time, "horizontal" diversity, in that these categories are perceived as being distinct but of equivalent quality. In the same year that the first ranking was released, the 10 Canadian universities receiving the largest shares of research funding came together to form an organization that was called, at that time, the G10, later, the G13 and, finally, the U15. Members of this group (U15 2024) represent the elite of Canada's academic institutions (as they come in highest in the international rankings), have 70% of graduate students enrolled in them, and receive 80% of the federal research funding, which enables them to spend $8.5 billion on research (U15 2024).

It is true that, in a number of countries, the release of the first international university rankings resulted in a shift from horizontal differentiation to vertical differentiation, according to which all institutions can be compared using the same criteria, and that those that rank highest are, by definition, superior (Hazelkorn 2013; Marginson 2006; Musselin 2017). While research acknowledges the flaws and limitations of these rankings (e.g., Gingras 2014), researchers, universities and governments have increased their strategies for improving their position and gaining recognition. One such strategy involves the creation of excellence funding. Germany's *Exzellenzinitiative* was, in 2005, an investment of €4.6 billion over 10 years (Turney 2019), France's IDEX/I-SITE have represented investments of more than €57 billion since 2010 (Government of

France 2017) and, after projects 985 and 211, China announced the Double First-class Initiative worth more than US$6 billion (Peters and Besley 2018). Canada, like the United States and Australia, prefers so-called "competitive" funding mechanisms, in which all the researchers compete freely with each other for European or Chinese types of funding, where certain universities are selected in advance and receive considerable sums of money. However, a number of studies show a similar concentration trend in that, year after year, fewer and fewer researchers (and universities) are receiving an ever-increasing share of the total funding (Bégin-Caouette et al. 2023; Bloch and Sørensen 2015; Polster 2018). As early as 2010, Larivière et al. showed that, in some disciplines, 10% of researchers could monopolize up to 80% of the research funding available to them.

While some may applaud the fact that "elite" researchers and universities are able to obtain larger amounts of money to carry out the largest research projects, a number of studies (Aagard et al 2020; Katz and Matter 2020; Mongeon et al. 2016) suggest that over-concentration can adversely affect scientific output and the advancement of knowledge. For example, the concentration can (1) hinder the career advancement of young researchers, (2) cause inefficiencies in the funding system, (3) threaten institutional diversity and (4) reduce scientific output in French. It is around these four observations that this brief is organized and six recommendations are made.

Support for early-career professors

The career advancement of research professors at Canadian universities is intrinsically linked to their tendency to obtain research funding. According to Statistics Canada (2024), the number of full-time academic employees increased from 36,429 in 1990 to 48,258 in 2022.

However, as noted in the Naylor report (2017), the number of grants traditionally awarded by granting agencies has not experienced the same growth. Nonetheless, granting agencies have made progress with the different funding programs, enabling young researchers to apply as soon as they are hired in programs with smaller amounts but higher acceptance rates (SSHRC's Insight Development Grants, NSERC's Discovery Grants and CIHR's Open Programs), giving them the opportunity to develop innovative ideas and their own research agendas. While, according to the Thomas theorem, the likelihood of receiving a research grant increases with each grant obtained, competitive and open funding programs enable young researchers who are developing their research agendas to subsequently move on to larger programs.

However, in some fields, particularly health ones, only 15.6% of young researchers manage to obtain these first grants (Canada Research Coordinating Committee 2023). In the case of the humanities

and social sciences, although success rates are more favourable, a university-by-university analysis shows that, of the 82 universities that participated in the 2022-2023 Insight competitions, 59% of the projects funded and 61% of the amounts awarded were for researchers from U15 universities (see appended Table 2).

In addition, the hierarchy of funding mechanisms seems to be unbalanced, as the amounts awarded by traditional programs grow less quickly than those of excellence funding programs (e.g., Canada Research Chairs, Canada Excellence Research Chairs, Canada 150 Research Chairs, the Canada First Research Excellence Fund and the New Frontiers in Research Fund). However, given that these funds clearly have lower success rates than traditional ones, they hinder the career advancement of young Canadian researchers and their ability to diversify research projects and innovate. Authors have also pointed out that, when success rates are low, researchers tend to reproduce models of "winning" research projects, which creates a deficit in cognitive diversity in that the topics studied and the methodologies used become more similar (Aagaard et al. 2020). We therefore recommend the following:

Recommendation 1: Increase the pool of funded researchers, particularly early-career researchers and employees of non-U15 universities, through increased support for traditional tri-council funding programs.

Efficiency of the funding systems

The number of grant applications has increased since 1997 and, in some programs, grant success rates have decreased significantly. According to the Canadian Association for Neuroscience report (n.d.), the success rate for Canadian Institutes of Health Research (CIHR) grant applications declined from 31% in 2005 to less than 19% in 2021. Unfortunately, numerous studies in multiple settings show that a rate of less than 20% creates significant system inefficiencies. To start, the number of applications that researchers have to submit before obtaining a grant is increasing, and the time taken to complete these applications is time that cannot be spent on research (Fang, Bowen and Casadevall 2016; Naylor 2014).

In addition to the psychological, cognitive and emotional resources demanded from applicants, the writing and evaluation of applications (by council staff and other researchers) represent financial resources that might otherwise have contributed to Canada's scientific output (Leclerc et al. 2017; Duchesne et al. 2020). We therefore recommend the following:

Recommendation 2: Ensure that the percentage of applications funded does not fall below the 20% threshold for any of the programs, to make Canada's research funding system more efficient.

In addition to success rates, it is important to note that, as with any investment, concentrating research funding among a limited number of institutions or researchers creates inefficiencies. For example, as Mongeon et al. have shown (2016), after a certain threshold (which varies by discipline), the number of scholarly articles produced per dollar invested decreases.

In the United States, Bloch and Sørensen (2015) found that smaller grants from the National Institute of Health (NIH) and the National Science Foundation (NSF) generated more papers per dollar invested than very large grants. It can thus be inferred that, while respecting the cost curves for scientific output, which vary significantly between disciplines, it is more efficient to award a higher number of grants to a greater diversity of researchers than to concentrate funding among a few researchers, teams or institutions.

Lastly, if the likelihood of obtaining a grant increases with each grant obtained, this likelihood is magnified when the previously obtained grant is large and based on a low success rate. Using Germany as an example, Münch (2014) showed that certain natural sciences researchers would rack up grant after grant, thereby monopolizing funding that could have been used by other researchers from other disciplines, who study other topics and use other methodologies. The German sociologist also gives the name "parasites" (what a strong term!) to those researchers who, with their multiple concurrent grants, divert a significant share of the public funding and thereby impose their research topics and methodologies. While Canada differs from Germany on a number of levels, Canadian researchers (Dauman et al. 2023; Polster and Amsler 2017) have shown that the Canadian system favours a winner-takes-all mindset. Like Leclerc et al. (2017), we believe that funding programs that better consider the diversity of researcher profiles, research fields and scholarly contributions could reduce the above trend. We cannot address all of these diversity criteria, but it should be noted that, even today, women account for 52% of Tier 2 Research Chairs but only 38% of Tier 1 Research Chairs, the percentage being lower in the natural sciences and engineering (Statistics Canada 2019, para. 2). In terms of scholarly contributions, although applications and institutional performance are evaluated largely based on the number of articles published in scholarly journals, nearly 70% of all scholarly contributions from university professors in Canada are of a different nature (see appended Table 4). Thus, in addition to increasing traditional funding (Recommendation 1) and raising success rates (Recommendation 2), our third recommendation involves recognizing diversity in science:

Recommendation 3: Better consideration of the diversity of researcher profiles, disciplinary fields and types of scientific contributions in evaluating grant applications.

Diversity of academic institutions

Canada's research-intensive universities remind us that their researchers receive close to 80% of the federal research funding (U15 2024). In addition, the funding success rate is higher among applicants working at major research universities (Naylor et al. 2017). These universities have a structural competitive advantage that stems from the fact that they are often the country's oldest universities (which contributes to cumulative reputations), that they were among the first to award doctorates (and still receive the highest percentage of doctoral students), that they are supported by the largest endowment funds, that they have a large student population (which increases their funding from provincial governments) and that they have a faculty of medicine and/or engineering, two fields held in particularly high regard by various national and international recognition mechanisms (Lacroix and Maheu 2015). In many respects, these universities resemble other so-called "world-class" universities and therefore do well in international rankings. However, in a number of European and Asian countries, world-class universities have formed oligopolies that have called for differential treatment from public authorities in order to, among other things, compete on equal terms with their rivals in other countries (Münch 2014; Zhi and Meng 2015). In Canada, there also appears to have been some calls from the U15 (2015) for the Government of Canada to treat its members differently because of their distinction as research-intensive universities. Some organizations, such as the Canada Foundation for Innovation (CFI), and programs, such as the Excellence Fund and the Canada Research Chairs, may have actually strengthened hierarchies among institutions (Polster 2015; Side and Robbins 2007). Guppy et al. (2013) noted that, as early as 2009, Canada's five largest universities had received 39% of the total funding provided by the Canada Foundation for Innovation (CFI). In 2020, a CFI report indicated that, while Canada has more than 100 universities, 84% of the funds it had provided had been for U15 universities and their affiliated hospitals. Similarly, 69% of Canada Research Chairs are awarded to professors from these same universities (Canada Research Chairs 2024). It is important to note that, with the indirect research costs resulting from each grant received, these universities also rely on advanced research support services and on experienced professionals who are able to assist applicants in writing highly complex funding applications, which gives them an advantage over their colleagues from smaller universities.

Canadian higher education systems are nevertheless rich in institutional diversity. In addition to research-intensive universities, comprehensive universities and undergraduate universities, Canada has virtual universities (e.g., Université TELUQ and Athabasca University), specialized institutions (e.g., the École nationale d'administration publique or Polytechnique Montréal), universities belonging to Indigenous communities (e.g., the First Nations University of Manitoba) and francophone communities (e.g., the Université de l'Ontario français), as well as a number of universities that are the only ones with study or research programs in specific fields (such as midwifery at UQTR or sexology at UQAM). We are concerned that, if grant allocation mechanisms are based solely on traditional criteria involving the number of publications in high-impact journals or the number of citations, some aspects of Canada's scholarly vitality will erode. We are also concerned that overfunding the same types of institutions will widen a gap that could adversely affect regional equity in Canada, the quality of education available to Canadian citizens and the pursuit of science, which thrives on diversity. Our recommendation is therefore as follows:

Recommendation 4: Recognize the diversity of universities and rethink the evaluation criteria to ensure that no university is placed at a disadvantage.

Linguistic duality in Canada

St-Onge et al. (2021) noted that 5% to 10% of CIHR, NSERC and CFI funding applications were written in French. In addition, the success rate of applications submitted in French was lower (29%) than that of applications submitted in English (39%). In their research on the place of French in Quebec higher education, Bégin-Caouette et al. (2023) noted that half of the funding applications submitted to Canadian granting agencies by French-speaking Quebec researchers were written in English. Interviews with university professors also revealed that, in seeking to have their projects evaluated fairly, some applied for research grants in English because it is difficult to find evaluators in their fields of research. As stated by one participant: [TRANSLATION]

> You know, the problem in providing a list of people who can review and discuss grant applications is that we know everyone who speaks French. We've already worked with them because they're in Quebec. So, it's often very difficult to get a French application evaluated. We have almost no choice but to do it in English (UP2, female, applied sciences professor).

Therefore, our fifth recommendation is as follows:

Recommendation 5: Better support for francophone researchers in preparing and submitting grant applications, and ensure that grant evaluations respect Canada's linguistic duality.

Innovation and equity: core funding

There are diverse funding mechanisms (Bégin-Caouette et al. 2017): some programs award grants through calls for projects on specific topics, others are through open competitions, some are intended to fund a research agenda over a longer period of time and, lastly, some so-called "core" mechanisms are designed to grant funds to all researchers without requiring them to submit an application. Although decreasing, this funding appears to have contributed to research excellence in some Scandinavian countries in the early 2000s (ibid). At a time when so-called "excellence" programs are multiplying and success rates remain problematic for a number of programs, adding an unconditional component could support early-career researchers with atypical profiles, diversify research topics and methodologies and, since grants are widely used to support graduate students, provide better support for the next generation of scientists in Canada. Studies (e.g., Gordon and Poulin 2009) even suggest that this type of mechanism may be more efficient than existing programs whose indirect administrative costs, not to mention the hours spent by applicants and reviewers, exceed the amounts that are awarded to researchers. Such core funding for all researchers is a mechanism that is difficult to apply in Canada because it is at an intersection of responsibilities among universities, provincial governments and the federal government. For that reason, our last recommendation is instead the following invitation:

Recommendation 6: Initiate federal, provincial and institutional discussions on a potential core funding mechanism for all researchers until they receive a grant.

This universal grant could be awarded to all regular professors at Canadian universities who have not received another grant. The amount of this core grant could not be particularly high, but it could be sufficient for emerging researchers and those seeking to develop new research topics to carry out some minor research and subsequently strengthen a larger funding application. This, combined with competitive grant programs with higher success rates, could increase the efficiency of the Canadian funding system and further enhance the variety of researcher profiles and types of institutions in Canada.

Conclusion

The intent of this brief is to the draw readers' attention to the importance of supporting high-quality research and a form of excellence that we could describe as inclusive in all Canadian universities. This definition of research excellence necessarily includes respect for the principles of equity, diversity and inclusion, as well as the promotion of better collaboration among researchers,

institutions and society, prerequisites for making progress in the great collective endeavour that is science. In this context, our recommendations focus on a series of measures that aim to challenge the concentration of research funding. We hope that our six recommendations will contribute to a more equitable distribution of funds (even in less prestigious universities), diversification of the research projects and profiles of researchers supported, better networking among early-career researchers and established researchers, and enhancement of the linguistic, cultural and disciplinary diversity that characterizes the Canadian ecosystem.

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Appendices

Table 1: Higher education expenditure on R&D (HERD) in Canada by province - years 2001-2011-2021 ($M)

Provinces	2001	2011	2021
Newfoundland and Labrador	89	209	337
Prince Edward Island	16	38	42
Nova Scotia	209	367	499
New Brunswick	88	157	207
Quebec	1,778	3,090	4,442
Ontario	2,576	4,862	6,624
Manitoba	206	339	458
Saskatchewan	236	286	383
Alberta	665	1,236	1,709
British Columbia	562	1,248	1,911
Canada	**6,424**	**11,832**	**16,624**

Note: Adapted from the Institut de la statistique du Québec (Statistics Canada 2024)

Table 2: 2022–2023 Insight program results by province. Percentage of applications, projects funded and amounts awarded to U15 universities.

	Applications		Grants		Funding total□		U15
Institutions	#	%	#	%	$	%	% Total $
British Columbia							
New Brunswick							
Newfoundland and Labrador							
Nova Scotia							
Prince Edward Island							
Quebec							
Unknown							
Unknown							
U15							

Note: Adapted from the Excel spreadsheet for the 2022–2023 Insight competition of the Social Sciences and Humanities Research Council (SSHRC) https://www.sshrc-crsh.gc.ca/results-resultats/stats-statistiques/index-eng.aspx

Table 3: Cost estimate for the 2007 Discovery program of the Natural Sciences and Engineering Research Council of Canada (NSERC)

Source: Gordon and Poulin (2009), p. 28

Table 4: Type of scientific contribution over three years (APIKS), n = 2968, 2017–2018

Type of contribution	Amount	Percentage

For more information: https://www.oise.utoronto.ca/hec/academic-work