U15 Canada Proposals for Budget 2024

August 2, 2023

U15 Canada

Recommendations

U15 Canada makes the following recommendations to stop the hollowing out of Canada's research ecosystem and reverse the erosion of Canada's global reputation and transform brain drain into brain gain.

In order to develop the highly-qualified talented individuals who contribute to and tap the global pool of knowledge to drive innovation:

1. **U15 Canada recommends increasing the funding for graduate scholarships, doctoral and post-doctoral fellowships by 50% and a doubling of the number of graduate scholarships, subsequently indexed to inflation,** to address the long-term decline in the value and accessibility of scholarships and fellowships and to attract and retain Canada's best hope for meeting the challenges and seizing the opportunities of the coming years.
2. **U15 Canada recommends that the federal government increase the base budgets of the granting councils (SSHRC, NSERC, and CIHR) and CFI by at least 10% annually for five years** to meet global competition in advancing the research that underpins all efforts to make a better future including the development of highly-qualified talented individuals through research assistantships.
3. **U15 Canada recommends creating 750 new Canada Research Chair positions for early and mid-career researchers (Tier II) with five years of research operating support and funds for research infrastructure** to help Canada retain and attract highly-qualified talented individuals that can drive innovation across society.
4. **U15 Canada recommends expanding undergraduate research opportunities through existing granting council programs** to enlarge the initial pool of potential talent for Canada's research and innovation ecosystem.

In order to bolster economic growth, increase productivity, drive innovation, and thereby accelerate Canada's transition to a sustainable, prosperous and just future:

5. **U15 Canada recommends expanding the Canada First Research Excellence Fund ("CFREF")** to enhance the development of hubs of excellence in emerging fields.
6. **U15 Canada recommends an investment of $200 million annually to support research in sensitive areas** to fund research projects in areas identified by Canada's Sensitive Research Areas and Sensitive Technologies lists as requiring additional national security requirements, including the application of the *National Security Guidelines for Research Partnerships*.
7. **U15 Canada recommends implementation of the Liberal platform commitment of $75 million in private sector partnerships,** including those involving support by the Canada Innovation Corporation in which businesses will often rely on collaboration with universities.

Introduction: Domestic and Global Context

Since the mid-20th century, leading countries have increasingly agreed that robust scientific and research activities underpin the pursuit of prosperous, just and resilient societies in three direct ways:

1. The guaranteed return on research investments is the development of highly-qualified talented individuals who become the drivers of innovation across society.
2. Research investments enable new insights, discoveries and breakthroughs that can lead to new products, processes and policies in all sectors.
3. Research investments ensure that a country has domestic experts who can tap the global pool of knowledge and innovation both in times of crisis such as the recent pandemic and for ongoing innovation in industries as well as civil society.

In Canada, as the impacts of climate change and the possibilities of digital transformation came into focus with the emerging knowledge-based economies in the 1990s, the federal government embarked on an ambitious program to begin building a globally-competitive research and innovation ecosystem based on highly-qualified talented people. This initiative placed universities at the ecosystem's centre in recognition of the economic importance in Canada of SMEs, foreign-owned multinationals, and industries that were not yet feeling competitive pressure to innovate their operations. Following increased research investments by successive federal governments, Canadian universities moved from domestically good to internationally acclaimed with the increased development of the highly-qualified talented individuals who advanced knowledge and drove innovation such as in the IT sector. The continuing weak competitive pressure to innovate in most sectors of the economy meant that many businesses continued without attention to research and development. [1] However those companies that did seek to innovate relied on universities as had been planned; in 2021, business expenditures on university research and development reached $1.285 billion, the highest level ever. The overall result was that Canada began making a relatively successful transition to the new economy and society of the 21st century.

Meanwhile, however, Canada has been losing domestic capacity just as increased global challenges face all societies. Extreme weather events and raging forest fires highlight the increasingly stark and dangerous reality of worsening climate change. Digital transformations now include the challenges and opportunities of generative AI, cybersecurity, and workforce composition and definition. COVID-19 exposed both increased global interconnectedness and the renewed importance of geopolitical borders. At the same time, certain foreign actors have increasingly sought to undermine Canada's institutions including our open research ecosystem.

[1] As of 2015, the percentage of higher education research and development ("HERD") financed by industry in Canada was 7.8%; this percentage trails international peers, like South Korea at 12.5% and China at 27.5%. See Council of Canadian Academies, 2018. *Competing in a Global Innovation Economy: The Current State of R&D in Canada.* Ottawa: Expert Panel on the State of Science and Technology and Industrial Research and Development in Canada. Council of Canadian Academies, p.15.

These and other profound global and domestic challenges are now increasing the pressure to innovate across all sectors in Canada. Every business, institution and community must now seek to operate sustainably, be digitally-enabled, and be prepared to face both the expected and unexpected challenges of the 21st century. Despite the increasing challenges that necessitate innovation, the ability of leading universities to support Canada's research and innovation ecosystem is now at risk for three domestic and international reasons:

1. Canada's allies and competitors are re-investing heavily in research as the foundation of their economic growth strategies. The *US Chips and Science Act* which was announced two weeks before the *Inflation Reduction Act* provides $200 billion over ten years for science ($81 billion of which is earmarked for the National Science Foundation, a $36 billion increase over the existing budget). The Atlantic Declaration, a multi-pronged partnership between the US and the UK, was announced this year; it will define an ever-closer relationship for both countries to deepen their science and technology cooperation. Japan has similarly announced a $87 billion fund to promote the country as a science and technology leader, as has the UK with a $20 billion investment. These investments threaten Canada's sovereignty by reducing our domestic capacity and national security.
2. High inflation in recent years has significantly weakened the entire research ecosystem.
3. The two consecutive Budgets of 2022 and 2023 did not include any new investment for Canada's research funding agencies for the first time since the 1990s. This absence has been especially noteworthy since the federal government came to office in 2015 with the promise to restore world-class science and research to its historic role in building a better future for Canada. After initial actions including the creation of a Minister of Science and a Chief Science Advisor, the government implemented the Naylor report with significant investments in Budget 2018. Since then, however, and despite the central role of world-class research capacity during the pandemic, the federal government has steadily lost focus on science and research. The result has been a hallowing out of Canada's research ecosystem that has been increasingly noticed and reported not only in Canada but globally; a recent article repeated the now common international observation that "after a big early funding spike for basic research, there is a growing sense of drift – and mounting concern about Canada's future."[2]

The impact of these domestic and global factors on Canada's domestic capacity and international position is already becoming evident. The value of the tri-agency scholarships and fellowships has not changed in 20 years, despite 52% inflation since 2003, and is no longer globally competitive. Canada now ranks 26th in the OECD in the proportion of those with graduate-level education. Not surprisingly, a recent Statistics Canada survey indicates that there is a national shortage of highly-educated job seekers.[3] Similarly, Canada's global rank in the

[2] Paul Basken, "Is Justin Trudeau failing the Canadian science test," *Times Higher Education* July 20, 2013.
[3] Canada. Statistics Canada. *Unemployment and job vacancies by education, 2016 to 2022*. Ottawa: Statistics Canada, 2023. Statistics Canada. Web. 23 Jul 2023.

number of researchers per 1,000 plummeted from 8th in 2011 to 18th in 2019.[4] These and other indicators emphasize that Canada must immediately renew its commitment to a robust research and innovation ecosystem to underpin the pursuit of a prosperous, just and resilient society in the rapidly changing and turbulent 21st century.

Highly-Qualified Talent

In order to increase the development of the Highly Qualified Personnel who contribute to and tap the global pool of knowledge and drive innovation, U15 Canada makes the following recommendations:

U15 Canada recommends increasing federal funding for graduate scholarships, doctoral and post-doctoral fellowships by 50% and a doubling of the number of graduate scholarships, subsequently indexed for inflation, which amounts to an increase of $1.987 billion over five years. This increase would address the long-term decline in the value and accessibility of scholarships and fellowships and would help attract and retain Canada's best hope for meeting the challenges and seizing the opportunities of the coming years. The number of CGS-M and CGS-D awards has remained relatively static since 2007 despite increasing enrolment in graduate programs. Between 2006-07 and 2013-14, the number of full-time doctoral students enrolled in Canadian universities increased by over 38%, and master's students by 32%.[5] In addition, the value of awards has not changed since the program was created in 2003, resulting in a 52% decline in value due to inflation.[6] Combined with declining funding for council-specific awards, total inflation-adjusted spending on master's scholarships has decreased significantly since 2006-07 while doctoral scholarships have remained unchanged (this despite the creation of the Vanier awards). Similarly, the council-specific doctoral awards from NSERC and SSHRC are 60% of the value of a CGS-D award and have not increased in many years.

Even with supplemental funding like teaching assistantships and university scholarships, the average full annual stipend per student is $23,750 for Ph.D. students and $19,725 for Masters students.[7] Data shows that the average stipend for graduate students should be $39,006 annually to meet the current cost of living in Canada.[8] In contrast, the equivalent doctoral scholarship administered in the USA by the NSF is valued at $65,000, compared to $21,000 for the PGS-D and $35,000 for the CGS-D in Canada.

---

[4] Bouchard, Frédéric, et al. *Report of the Advisory Panel of the Federal Research Support System*. ISED Citizen Services Centre, 2023, https://ised-isde.canada.ca/site/panel-federal-research-support/sites/default/files/attachments/2023/Advisory-Panel-Research-2023.pdf, p.45.

[5] Naylor, C. David, et al. *Canada's Fundamental Science Review*. Advisory Panel for the Review of Federal Support for Fundamental Science, 2017, https://ised-isde.canada.ca/site/canada-fundamental-science-review/sites/default/files/attachments/2022/ScienceReview_April2017-rv.pdf, p.139.

[6] Support Our Science. Briefing to the House of Commons Standing Committee on Science and Research Study on Graduate Student Scholarships and Postdoctoral Fellowships. Ottawa: 2023, p. 2.

[7] *Ibid*.

[8] Laframboise, Sarah, et al. "Analysis of financial challenges faced by graduate students in Canada." Biochemistry and Cell Biology. https://doi.org/10.1139/bcb- 2023-0021.

Post-doctoral fellowship award values have also remained static; even with the addition of the Banting Postdoctoral Fellowship in 2010, inflation-adjusted spending on fellowships across the granting councils has decreased by 20% since 2006-07.[9] One result is that research grants have been called upon to support the increasing number of post-doctoral fellows in Canada while the value of this support has been falling behind the global competition. For example, the NSF postdoctoral fellowship is valued at $106,000 CAD, compared to the $45,000 offered through the Canadian granting councils.

U15 Canada recommends that the federal government increase the base budgets of the granting councils (SSHRC, NSERC, and CIHR) and CFI by at least 10% per year for five years, which amounts to an increase of approximately $4.3 billion over five years. An increase is urgently required to maintain the health and vitality of Canada's research ecosystem by nurturing the fundamental, discovery-oriented research which is the foundation for future research success. Canada's existing world-class research enterprise rests upon the support for fundamental research provided through the granting councils and CFI. The Bouchard Report from the federal government's own advisory panel highlighted the need for further investment because of challenges facing the research ecosystem: the increase in graduate students and postdoctoral fellows in the research ecosystem, the impact of inflation on the value of funding, and the importance of nurturing globally competitive research. The Bouchard report also called for an updating of Canada's research support system. U15 Canada encourages implementation of this report including the creation of the recommended national advisory council; the development of a new governance mechanism for interdisciplinary, international, and mission-driven research; and the related recommendations to enhance efficiency including those for a road-mapping exercise for Major Research Facilities. Together, such changes and major new investments will increase the ability of researchers to collaborate freely and embark on bolder, riskier projects. Moreover, these actions will increase the crucial support for graduate students and early career researchers since at least half of grant funding supports research assistants and thereby provides both experience and financial support to develop highly-qualified talent.

U15 Canada recognizes that a 10% increase reflects minimal ambition; data shows that the lack of an increase in funding for investigator-led research in Budgets 2022 and 2023 is equivalent to a budget cut of 18% in research funding. This cut reflects inflation of 6.8% in 2022 and 5.6% in 2023 while the number of PhD students grew by 2.5% in 2022 and 2.2% in 2023.[10] These data indicate that a 15% increase per annum would re-establish Canada's research capacity at its previous baseline. U15 Canada also recognizes the call for an immediate doubling of the research granting agencies' budgets as an ambitious and full-throated response to global competition.

U15 Canada recommends creating 750 new Canada Research Chair positions for early and mid-career researchers (Tier II) with $82.5 million per year for five years of research operating support and funds for research infrastructure. Creating additional Canada Research

[9] Naylor, 2017, p.139.
[10] Patry, Gilles. *An analysis of Tri-council investments over the years (2000-2022)*. Ottawa: Gilles Patry, 2023.

Chair positions will help Canada retain highly-qualified talent and create pathways for researchers to pursue their career ambitions here in Canada. Moreover, creating additional places will help expand Canada's talent pool by giving more opportunities to equity-seeking groups, ensuring Canada's research community reflects the diversity of our country. The 2021 Liberal Party of Canada Platform included the addition of 1,000 Canada Research Chairs to help attract and retain top talent at Canadian universities and support graduate research, in keeping with the principles of equity and diversity to ensure that the program is working towards building an inclusive innovation society and economy. Created in 2000, the Canada Research Chairs Program was developed precisely to increase the domestic production and retention of those with graduate degrees and world-class research experience who could help lead Canada's charge on the knowledge-based economy and talent-based model of innovation. The return on this investment cannot be understated: those who continue in research positions benefit from their enhanced knowledge and skill, and those who leave academia play key roles in companies, communities, and the development of our societies at large.

U15 Canada recommends expanding undergraduate research opportunities through existing granting council programs. Canada's undergraduate students represent the pool of potential talent for Canada's research and innovation ecosystem. While only a small number will advance to graduate programs, the opportunity to participate in research projects as undergraduates can put students on the path to long-term success. Investments to incentivize undergraduate students can include expanding the Undergraduate Student Research Awards program.

Investments that Target Innovation

In order to bolster economic growth, increase productivity, drive innovation, and thereby accelerate Canada's transition to a sustainable, prosperous and just future, U15 Canada makes the following recommendations:

U15 Canada recommends expanding the Canada First Research Excellence Fund ("CFREF") by $200 million per year for five years. In addition to securing and enhancing Canada's pipeline for highly-qualified talent development, the increasingly ambitious approach to research funding from Canada's peers requires a strategic response from Canada to secure our position in key innovative sectors of the knowledge economy. Ensuring Canada can match the industrial challenge of global competitors must include making specific, targeted and mission-driven investments into science and research as a core component of strategies to boost productivity, foster innovation and attract capital.

If Canada is to maintain domestic capacity and national sovereignty, the federal government must act now to grow emerging sectors such as AI, quantum, EV manufacturing, critical minerals and semiconductors. Canada's research-intensive universities are ready to partner with the federal government in key sectors to promote innovation, develop deep research partnerships with industry and ensure that Canada can lead the world in emerging high-tech sectors of the future.

Canada's universities anchor global hubs of excellence in a wide range of fields, providing world-leading researchers, a pipeline of highly-qualified and experienced talent development and deep partnerships with industry which drive the process of knowledge creation central to fostering innovation. Building on the success of a successful and over-subscribed program, expanding CFREF could help the federal government compete globally by developing sustained and integrated hubs of excellence in emerging fields. As a tri-agency initiative, CFREF gives our institutions the ability to pursue the best talent and partnership opportunities to enable breakthrough discoveries, as well as advance their best strengths on the global stage. Awards delivered through CFREF will help implement transformational and forward-thinking institutional strategies, and in doing so, will help great global hubs of research excellence that place our researchers on the global stage. Federal investment here will provide the full spectrum of researchers with the resources to undertake research projects that will create new discoveries and make Canada the hub that future researchers aspire to be part of. An additional funding envelope would allow funding competitions to be held every three to four years (rather than the current seven-year cycle) and thus keep better pace with the rapidly changing domestic and global context. In addition, universities should be invited to submit an increased number of applications in order both to tap the entire pool of promising initiatives and encourage coherent and focused proposals.

U15 Canada recommends an investment of $200 million per year for five years to support research in sensitive areas. Research security is a pressing issue in our county, and it affects how Canada's researchers proceed with their work. While universities and the government of Canada continue to develop robust measures to mitigate security threats to our research ecosystem as part of a shared responsibility to ensure research is as secure as necessary and as open as possible, ensuring Canada continues to lead in critical emerging fields is vital. As research security is strengthened, efforts must be made to combat the weakening of research capacity. This grant would invest in research projects in areas identified by Canada's Sensitive Research Areas and Sensitive Technologies lists as requiring additional national security requirements, including the application of the *National Security Guidelines for Research Partnerships*. Doing so could help Canada become a global leader for secure, collaborative and cutting-edge research in fields which will be of critical importance for our future success and prosperity. Research projects would be investigator-led, early-stage projects with an identified potential future impact in one of the identified areas. This investment is critical to preventing a decline in research and talent training in the areas that the federal government has identified as strategic priorities.

U15 Canada recommends implementation of the Liberal platform commitment of $75 million per year for five years in private sector partnerships, including those involving support by the Canada Innovation Corporation. Canada has the building blocks for an innovation-driven economy, but further work is needed to commercialize research. Canadian businesses do not invest in research and development at the same level as their global peers. This means there is a reduced ability to turn new ideas and intellectual property into competitive products and this often leads to opportunities moving elsewhere. This reduces our economic productivity. This new

fund could support commercialization activities and could develop entrepreneurial opportunities like helping researchers make the transition from ideas to proof-of-concept to market-ready invention, connecting technologies and spinoff companies with funding for investment opportunities, and navigating the necessary legal agreements and regulatory requirements. Canada's research ecosystem is structured to attract investment from industry and funding for private-sector partnerships will support the Canada Innovation Corporation's ambition to help Canadian businesses across all sectors and regions become more innovative and productive.