Authorized by: the UCGSA Elected Council

GRADUATE STUDENTS' ASSOCIATION
UNIVERSITY OF CALGARY

A MERITORIOUS ALBERTA ADVANTAGE

UCGSA's Plan to Enhance the Competitiveness of Alberta's Post-Secondary Education System

ABSTRACT

A proposal to fund Albertan graduate students through a three-tiered, merit-based scholarship model that rewards research excellence.

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White Paper in Brief:

- Graduate students are essential for universities to meet their two core missions: research and teaching. They are also economic actors and respond to incentives, meaning they will be attracted to jurisdictions with high stipends, especially when adjusted for cost-of-living.
- Graduate student funding in Canada broadly, and Alberta more specifically, is significantly below the levels offered by international competitors. This is due to a combination of funding cuts to university operating budgets, low scholarship values and opportunities, and limited funding from the private sector.
- Given the fiscal difficulties the province of Alberta faces, we propose an alternative funding model for graduate students that can make Albertan graduate programs more internationally competitive: three tiers of research excellence scholarships, based on the tripartite structure currently used by the federal Tri-Council granting agencies, that additionally reward students for conducting research in collaboration with, or applicable to, local businesses and not-for-profits.
- Taking conservative estimates of the amount of economic activity these scholarships should generate, as well as the savings they should create by lowering the necessity of graduate students accessing financial aid, there is a clear path to making these scholarships revenue neutral.
- Given the importance of graduate students in Canada's innovation ecosystem, and the key relationships they build between universities and the private sector, these scholarships will not just make Alberta's graduate programs more competitive—they will make Alberta's *economy* more competitive, too.

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About the Authors:

About the GSA

The University of Calgary Graduate Students' Association (UCGSA) was first established in 1967 and further incorporated by an Order in Council in 1971. As per Sections 94(1) and 95(1-5) of the *Post-Secondary Learning Act*, and 58.4(1)(c) of the *Labour Relations Code*, we provide the administration of graduate student affairs and are the registered bargaining agent for all academically employed graduate students. In this capacity, we represent the collective voices of approximately 7,700 graduate students to the university and all levels of government, in addition to fostering a collegial graduate student community, administering vital services and programs such as the graduate student health and dental plan, advise students on how to navigate university policy, represent them in academic and employment disputes, negotiate the collective agreement, and other duties as circumscribed by legislation.

This report was prepared by the Government and External Relations Manager, as authorized by the Elected Councils of 2024-25 and 2025-26.

About the 2024-25 Elected Council

This paper was originated, authorized by, and written under the consultation of, the 2024-25 Elected Council, which consisted of the following members:

- Saaka Sulemana Saaka, President (PhD candidate in Political Science)
- Hunter Yaworski, Vice-President External (MA student in Geography)
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- Nadia Ghazanfari Moghaddam, Vice-President Student Life (PhD candidate in Translational Studies)

About the 2025-26 Elected Council

This paper was continued, and written under the consultation of, the 2025-26 Elected Council, which consisted of the following members:

- Irtaza Sohail, President (MSc student in Electrical Engineering)
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About the Government and External Relations Manager

The Government and External Relations Manager reports directly to the Executive Director, and is responsible for researching and writing, government and stakeholder relations, media relations, and other duties as assigned. The current Government and External Relations Manager is Andrew Kemle (M.A. in Political Science).

The author would like to thank, in no particular order, the following individuals for their insights and assistance in drafting this paper: James Steele (UCGSA President [2023-2024]), AC Cameron (UCGSA VP External [2022-2024]), Jessica Revington (UCGSA Third Advocacy Director [2023-2024]), Cara Clifford (Advocacy Coordinator, University of Calgary Students' Union), Nathan Ross (Manager, Communications and Government Relations, University of Calgary Students' Union), Hannah Hunter (Research & Policy Analyst, Canadian Alliance of Student Associations), Matthew Gerrits (Government and Stakeholder Relations Officer, Canadian Alliance of Student Associations), Trevor Potts (Director of Policy and Research, Evidence for Democracy), Josh Pentland (Calgary Chamber of Commerce), Dan Kohse (Calgary Chamber of Commerce), Nora Bieberstein (Director of Strategic Initiatives, Royal Bank of Canada), Taylor Neldner (Royal Bank of Canada), and Jackie Pitchette (Director, Skills Policy, Royal Bank of Canada).

All errors are the authors alone.

Land Acknowledgement

We acknowledge the traditional territories of the people of the Treaty 7 region in Southern Alberta, which includes the Blackfoot Confederacy (comprising the Siksika, Piikani, and Kainai First Nations), the Tsuut'ina First Nation, and the Stoney Nakoda (including the Chiniki, Bearspaw, and Wesley First Nations). The City of Calgary is also home to the Métis Nation of Alberta, Region III. The GSA is situated on land adjacent to where the Bow River meets the Elbow River; the traditional Blackfoot name of this place is "Moh'kins'tsis", which we now call the City of Calgary.

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Summary of Recommendations:

1. Create a three-tiered, merit-based, scholarship program that rewards domestic and international thesis-based graduate students for research excellence:
    a. A first tier, that rewards the top 25% of master's and doctoral students with a scholarship valued at $7,000 and $9,500, respectively;
    b. A second tier, that rewards the top 5% of master's and doctoral students with a scholarship valued at $13,000 and $18,000, respectively;
    c. A third tier, that rewards the top 1% of master's and doctoral students with a scholarship valued at $17,500 and $24,000, respectively.
2. Structure the administration of these scholarships in a similar manner to that of the federal Tri-Council granting agencies:
    a. One stream, administered by neutral experts, for the social sciences and humanities;
    b. One stream, administered by neutral experts, for the natural sciences and engineering;
    c. One stream, administered by neutral experts, for the medical sciences.
3. In the creation of merit criteria, ensure that, among other criteria recommended by subject-matter experts:
    a. Students are rewarded for research projects that align with research demand from the private sector;
    b. Students are rewarded for research projects that help not-for-profits fulfill their mandates;
    c. The above does not mean the merit of research projects are tied to labour market outcomes or undermine the entrepreneurial potential of universities.
4. In order to save administrative costs and create best practices for commercializing research, draw from Mitacs as either consultants to the scholarship program or by connecting the scholarship program to the Mitacs network;
5. In the creation of merit criteria, ensure that students are rewarded for interdisciplinary research.
6. In the creation of merit criteria, ensure that equity-seeking groups are adequately consulted, to maximize accessibility and the diversity of voices within the innovation ecosystem.
7. Collaborate with course-based students to effectively integrate their programs into the research scholarship program, or to reform the evaluation of coursework to reward excellence in non-thesis based programs;
8. Ensure that graduate students sit on the ultimate decision-making bodies of each granting stream, in order to preserve the graduate student perspective on any governance questions, and:

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   a. That rules are in place to mitigate any conflicts of interest that may arise from graduate students sitting on these bodies, so that graduate students do not have to make a choice between serving their profession and having access to external funding.

9. Ensure these scholarships result in an increase in research commercialization by:
   a. Incentivizing private businesses to invest in the model on the condition that they receive priority access to graduate student research talent and human capital;
   b. Provide a "locally made" bonus to graduate students whose work with local businesses as part of the industry engagement section of the scholarship merit-criteria.

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Introduction

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In our 2024 provincial budget submission,[1] and in our joint 2025 provincial budget submission with the University of Calgary Students' Union (UCSU) and the Students' Association of Mount Royal University (SAMRU),[2] we proposed an alternative graduate student funding model in order to make Albertan graduate programs more nationally—and *internationally*—competitive. Graduate student funding in Alberta has hit critically low levels: stipends do not cover the costs of living, graduate workers are not adequately compensated for their work, and the incentive for graduate students in all fields is to complete their studies in another jurisdiction—to *that* jurisdiction's benefit. And yet, despite the urgency of the challenges and pressures facing graduate students, the fiscal environment in Alberta does not seem to allow for the extensive injection of funding needed to make our post-secondary system functional—to make it the envy of other jurisdictions across the globe would require even greater amounts of funding. An alternative model was needed.

Our proposal called for a **graduate student funding stream based on multiple tiers of research-excellence scholarships, administrated in a similar manner to the Canadian Graduate Scholarships distributed at the federal level—i.e., by independent experts, divided into separate funding organizations (one for the natural sciences and engineering, one for the social sciences and humanities, and one for medical research).** This white paper, then, seeks to expand on this request, showcasing why investing in graduate students through merit-based scholarships would improve the competitiveness of Alberta's graduate program. Consequently, by improving the competitiveness of this province's graduate programs, our proposal will also improve the competitiveness of Alberta's economy more broadly, increasing the economic security of everyone who calls Wild Rose Country home.

But what exactly *are* graduate students? They are, in brief, a vital component of the day-to-day operations of universities and key contributors to the innovation ecosystem. The financial and reputational strength of universities depends on graduate student labour; and, in turn, graduate students depend on university finances and reputation to complete their studies, build human capital, and navigate the workforce.

The majority of research and teaching—the two core functions of a university—are now performed by graduate students. Student research projects, academic employment as research assistants, and/or participation in laboratories all help drive breakthroughs in foundational and practical knowledge, while their work as sessionals, teacher's assistants, and mentors ensure that new generations of scholars are equipped with the skills and tools needed to thrive in a complex world. Graduate students are also integral in forging close connections between universities and industry, with

[1] https://gsa.ucalgary.ca/wp-content/uploads/2016/07/UCGSA-Alberta-Budget-Submission-6.pdf
[2] https://gsa.ucalgary.ca/wp-content/uploads/2024/03/2025-Pre-Budget-Submissions-of-Students-Union-AND-Graduate-Students-Association-University-of-Calgary-and-Students-Association-of-Mount-Royal-University-v2.pdf

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multiple studies showcasing how graduate students support technology transfers, the development of intellectual property, and the commercialization of novel research. This is all while graduate students are starting families, caring for dependents, and building a nest-egg. We face all the costs of your typical Albertan, plus the addition of tuition, textbooks, laboratory equipment, and mandatory non-instructional fees (MNIFs).

Those costs matter. Graduate students are economic actors, just like everyone else, and we respond to incentives—again, just like everyone else. If presented with two options—one with a high likelihood of poverty and the other with a promise of financial security—graduate students will, all things being equal, overwhelmingly choose a stable paycheck. Even graduate students with high-risk tolerances will be weary to risk poverty or social seclusion if it is clear that other, more financially lucrative options are available. This is where Alberta's post-secondary system runs into trouble: our low pay, plus the unique combination of costs that we face, mean that the most financially secure move is to study elsewhere. Indeed, when looking at international comparisons, graduate students would have a more difficult time searching for countries with *worse* pay potential than Canada and Alberta.

Jurisdiction	Bachelor's	Masters	PhDs
Newfoundland	13.4%	5.2%	0.7%
PEI	18.5%	6.0%	0.8%
Nova Scotia	19.7%	6.6%	0.9%
New Brunswick	16.3%	4.5%	0.6%
Quebec	18.1%	6.8%	1.1%
Ontario	23.7%	8.7%	1.2%
Manitoba	20.4%	4.8%	0.7%
Saskatchewan	18.3%	4.7%	0.8%
Alberta	***21.7%***	***6.1%***	***0.9%***
British Columbia	22.7%	7.9%	1.1%
Canadian Average	*21.3%*	*7.4%*	*1.1%*
OECD Average	*18.9%*	*13.9%*	*1.3%*

As **Parts 3 and 4 of this white paper show, Albertan universities have been devastated by budget cuts—at a time when other jurisdictions, such as the European Union, are calling for significant funding increases—and Canada as a whole lags almost every developed country in the world in average graduate student stipends, whether in nominal terms or adjusted for cost-of-living.** These developments occurred before President Trump's tariffs rocked global markets and his post-secondary policies started driving prominent scholars out of the country; now, increasing funds to attract and retaining top talent has become a strategic priority, but seemingly not for Canada or Alberta. **These developments also contribute to the internationally low levels of graduate students,**

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on a per capita basis, in Canada. While Canada outperforms its peers in terms of ensuring a steady supply of students for polytechnics and colleges, there is a **clear deficit of graduate students relative to the United States and the rest of the OECD.** Alberta appears to suffer from a particularly acute leaky pipeline, as we trail other large provinces like Quebec, Ontario, and British Columbia in the number of graduate students per capita.

Decreasing operating grant funding and internationally low average stipend levels are connected. Because graduate students play such a key role in research and teaching, operating grants are *the* most important mechanism for funding graduate student labour. Currently available sources of external funding—such as scholarships from the federal government or funding from the private sector—run into a number of problems. In terms of federal research grants, while *Budget 2024* increased the value of Canadian Graduate Scholarships (CGS), these provide funding for only a small contingent of active students. In terms of the private sector, the lack of funding for graduate students is due to a much more fundamental issue. Endogenous growth theory, a family of leading economic theories on the causes of economic growth, predict that investing in general human capital and fundamental research is too risky of an endeavour for profit-maximizing firms. The benefits of knowledge cannot be fully internalized by a firm, since knowledge is not a pure private good; and general human capital is intended to help workers succeed in multiple contexts, which means any investment a firm makes could end up benefitting a competitor, should one of their employees change jobs. The end result is that businesses will gladly commercialize existing research, but are unlikely to invest in the core of the innovation ecosystem absent government assistance, leaving research-intensive universities heavily reliant on provincial operating grants. Cuts to operating grants will mean cuts to the capital pool used to compensate graduate students, which means cuts to graduate stipends. **Thus can we see why Canada is falling so far behind.**

The lack of funding available for graduate students does not just impact the so-called Ivory Tower. Endogenous growth theory also identifies human capital and innovative technologies as one of, if not *the*, most important drivers of productivity improvements—and, consequently, of generating economic growth. As we show throughout our white paper, economists, businesses leaders, and policy analysts of various stripes all identify graduate students as essential components of the innovation ecosystem. This means that the global competition for graduate students is also a competition for building an economy that can weather international shocks (like trade wars or financial market instability), resist hostile overtures from much larger states, and provide its people an increasing, and *secure*, standard of living. **If graduate student stipends fall far below international standards—if there is an overwhelming incentive to study *elsewhere*—then Canada's economic vulnerability will only get worse.** This may sound like a grandiose claim, but our white paper goes to great lengths to show that it is nonetheless true. Graduate students are not a niche resource—their fingerprints touch almost every

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part of the economy—and if one needs any further proof, note that increases to graduate student funding and professional development formed part of the *CHIPS and Science Act*, a national security-focused bipartisan bill that aimed to shore up America's strategic advantages against China.[3,4]

Provincial governments must play a central role, thanks to their constitutional jurisdiction over education. However given the uncertainty currently shrouding the globe, we recognize that limited government must be shared among many worthy projects, such as revamping infrastructure, improving healthcare, and protecting our public K-12 educational system. We also recognize that funds are particularly limited in Alberta: our fiscal framework and limitations on deficit spending tightly constrain how much additional tax revenue the government can collect and how deep into the red the government may go. Consequently, the University of Calgary Graduate Students' Association has worked to develop a funding model that fulfills the following criteria:

1. Increases the number of graduate students covered by external funding;
2. Meaningfully increases the stipends of Albertan graduate students, *including* international graduate students;
3. Incentivizes high-quality and transformative research amongst graduate students;
4. Leverages and further rewards graduate students who, in the course of their studies, partner with industry and the not-for-profit sector; and
5. Provides this funding in a revenue-neutral way.

We believe the following model does exactly that.

UCGSA proposes the creation of a merit-based, research excellence scholarship system that puts external funding directly into the hands of students. It consists of **three tiers,** with the top tier rewarding the best and most innovative research proposals from thesis-based master's or doctoral students. We purposefully included international students so as to make Alberta stand out from other jurisdictions, including research grants at the federal level, as most governments restrict access to prestigious scholarships to domestic students only. The value of the awards at each tier would amount to a significant increase in graduate student stipends, with the value of the top tier **rivalling the prestigious CGS scholarships awarded by the Tri-Council granting agencies**. Importantly, the total number of awards would cover **31% of all thesis-based students (international and domestic) and 20% of all eligible students**, a substantial number given how tightly constrained the current availability of scholarships is. This covers the first three criteria.

[3] https://cgsnet.org/press-releases/cgs-celebrates-chips-and-science-act-signed-into-law/
[4] https://www.economist.com/special-report/2023/03/06/taiwans-dominance-of-the-chip-industry-makes-it-more-important

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Tier	Value	Number Awarded	Percentage of Successful Applicants
Master's			
1	$7,000	2,102	Top 25%
2	$13,000	420	Top 5%
3	$17,500	84	Top 1%
Doctoral			
1	$9,500	1,532	Top 25%
2	$18,000	306	Top 5%
3	$24,000	61	Top 1%

The exact details of how these scholarships ought to be administered will undoubtably be an ongoing process, but there are a few points we highlight in this white paper. **The first is that neutral, expert panels are a must**. These experts do not necessarily have to come exclusively from academia—business leaders and practitioners in the not-for-profit sector can and should provide input—but the creation, and administration of, merit-based scholarships must be done at arms-length from partisan offices. We also recommend that, should this proposal be adopted, the provincial government copies the tripartite format of the Tri-Council granting agencies. That is to say, **create three separate granting streams keyed to the three overarching categories that almost all research falls into:** one of the social sciences and humanities, one for the natural sciences and engineering, and one for medical research. Additionally, we provide specific recommendations on how to enhance the number of university-industry (and university-not for profit) interactions through these scholarships. Those recommendations, as shown below, are informed by academic studies that investigate how graduate students are already driving these interactions.

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Study	Mechanism	Recommendation
Ponomariov (2008); Boardman and Ponomariov (2009); Thune (2009); Thune (2010)	Graduate students connect professors/university to private industry through work experience.	Increased funding support should naturally increase university-industry interactions, especially if it fosters positive student/supervisor or student/institution relations
Boardman and Ponomariov (2009)	Graduate students perform research that is easily commericalizable by business.	Increased funding support should naturally increase university-industry interactions, especially if it allows graduates students to concentrate more on research.
Ponomariov (2008); Boardman and Ponomariov (2009)	Graduate students enhance research capacity because they are better able to trouble shoot research projects than professors or private industry	*Include criteria that rewards students for collaborating with professors to either aid their own commericalization efforts or their partnerships with not-for-profits.*
Slaughter et. al. (2002); Santos et. al. (2020)	Graduate students drive knowledge transfer between universities and industry.	*Include criteria that rewards students for explaining their projects in a way that's accessible to a non-expert audience.*

Second, we emphasize—in line with our submission to the Standing Committee on Science and Research (SRSR) study on the proposed capstone research organization[5]—that graduate students should be included in the decision-making bodies attached to these funding streams. Graduate students have a unique perspective on the challenges any funding stream might face, and they certainly have a greater understanding of what graduate students need than individuals who have not been a student for years. Finally, ensuring that equity-deserving groups are consulted in the creation of these

[5] https://gsa.ucalgary.ca/wp-content/uploads/2024/03/UCGSA-Brief-to-the-Standing-Committee-on-Science-and-Research-Capstone-Project-1.pdf

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scholarships is important for maximizing accessibility, itself a key component in ensuring that the innovation ecosystem draws from as many voices as possible.

In order to further incentivize transformative research, as well as leverage already existing graduate student relationships with the private and not-for-profit sector, we also propose a number of suggestions for how the expert panel might score "merit." The first is to incentivize interdisciplinary research. While the tripartite funding model is an efficient means of evaluating research proposals, it should not come at the expense of crosspollination amongst different fields. Ensuring that merit criteria *rewards*, and not *inhibits*, interdisciplinary research will help ensure that the most impactful research is supported—and, from there, made available to everyone. The second suggestion, in line with Criteria #4, is to suggest that students are rewarded for research proposals with commercialization plans or which contribute to the mission-statements of not-for-profits. As we show in this paper, not only will this help directly connect graduate students with businesses and not-for-profits, but will likely help **crowd in private funding**, easing the fiscal burden faced by the province. We caveat this suggestion, though, by emphasizing that commercialization potential or fidelity to a not-for-profit's mission statement **does not imply that research funding should be tied to labour market outcomes**. We want to preserve the entrepreneurial potential of both universities and graduate students, and that requires allowing student researchers to help reorganize the production process in novel ways (ala Schumpeter) or discover new production opportunities, as in Israel Kirzner's conceptualization of an entrepreneur.

Our model is costed for a five-year period, using assumptions on current enrollment numbers and projected enrollment growth. In order to make the proposal revenue neutral, and thus fulfill Criteria #5, we further made conservative assumptions about the return on investment of graduate education (using an impact assessment conducted for the University of Alberta) and assumed any economic activity generated by these grants would be taxed at 10% (the minimum tax bracket at the time of writing). Since these scholarships would noticeably raise the average stipends of graduate students in Alberta, additional savings could be pulled from decreased demand for welfare services, allowing the government to prioritize aid for more low-income Albertans rather than having them compete with graduate students for limited funds. There could, in fact, be savings from student financial aid as well, though as UCGSA.03[6]—a policy statement in our policy library about student loans and financial aid—makes clear, cuts to non-repayable grants have led to severe underfunding for students in need.

More positively, if these scholarships crowd in additional private funding—as studies suggest they can, and which should be incentivized if the merit-criteria includes rewards for commercialization

[6] https://gsa.ucalgary.ca/wp-content/uploads/2024/03/UCGSA.03-Financial-Aid-and-Student-Loans-Policy-Final-Draft-2025-26-Update.pdf

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plans—then the final cost of the scholarships can be partially supported through private funding. All told, **this means there is a clear path to revenue neutrality**, even under conservative assumptions. And if we relax these assumptions—particularly the level of savings the government receives thanks to higher scholarship amounts—then regardless of how large the graduate student cohort gets in Alberta, these scholarships should help *expand* the provincial government's revenue base, without requiring tax increases to stimulate this revenue growth.

The table below shows exactly this revenue-neutral path. In the "conservative estimate," we show the deficit between the total cost of the scholarship—which includes the direct cost (i.e., the money spent on scholarships) of the program with indirect, administrative cost—and the economic revenue generated from *just the direct cost*, with the assumption that the added activity will be taxed at 10%. In the fully-costed savings estimate, we take the savings generated from the *direct cost only*—based on estimates from the Federal Reserve of Boston, adjusted for the fact that Alberta lacks a sales tax—and subtract them from the *total* cost. In this fully-costed scenario, the savings and additional economic activity generated by the scholarships add substantial revenue to the government over a five year period.

Year	Total Cost (Direct + Indirect)	Conservative Revenue Generated	Fully-Costed Savings Rate	Fully-Costed Savings	Difference (Conservative Estimate)	Difference (Fully-Costed Estimate)
2025/26	$53,669	$10,304	$1.50/$1.00	$64,403	-$43,365	***+$10,734***
2026/27	$59,036	$22,699	$3.00/$1.00	$141,867	-$36,337	***+$82,831***
2027/28	$64,939	$24,937	$3.00/$1.00	$155,853	-$40,002	***+$90,914***
2028/29	$71,433	$27,430	$3.00/$1.00	$171,438	-$44,003	***+$100,005***
2029/30	$78,576	$30,173	$3.00/$1.00	$188,583	-$48,403	***+$110,007***

In turbulent times, any proposal from an advocacy group that asks the government for money should demonstrate how their proposal positively, and directly, impacts the lives of everyday citizens. In addition to benefits the Albertan economy accrues from graduate student human capital and research activities, we also consider how this proposal can solve Canada's "Patent Productivity Paradox." Put simply, Canada should be generating substantially more intellectual property (IP) than it currently does based on the amount of research conducted at universities. The main bottleneck that explains this paradox is that the commercialization process—where university research becomes a consumer good—does not lead to Canadian firms generating intellectual property (IP). On the contrary, Canadian university research very frequently gets turned into IP for foreign-owned firms. While this is a net

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benefit to the world at large, for a country that is trying to kickstart its laggard productivity levels, this is a serious problem.

Some of the potential solutions identified by commentators, such as requiring Canadian universities to partner with Canadian firms or raising the costs for universities to sell their IP to foreign-owned firms, are overly protectionist and would very likely introduce inefficiencies into capital markets. By contrast, increasing the number of graduate students who partner with Canadian firms can be done with minimal disruptions, especially if these scholarships are used to create incentives for graduate student/local firm interactions. Given that graduate students are already a key linkage between firms and universities, the more graduate students that work with local firms, the more likely universities *as a whole* will partner with local firms. And since these scholarships will hopefully increase the amount of research and technology transfer that occurs thanks to graduate students, we should hopefully see both the *percentage and total amount* of IP held by Canadian firms increase.

The table below lays out our proposed methods for using these scholarships to increase graduate student/local firm interactions. We recommend a combination of the **second and third** methods, as we believe these will be the least disruptive to the labour market.

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Method	Pros	Cons
Require graduate students work with local firms	• Simplest approach; • Regulatory in nature—no additional funding needed from provincial government.	• Will create labour market distortions, which could impact human capital generation and market adaptability; • Restricts freedom of choice for graduate students; • May lead to funding problems for universities if lucrative contracts between staff (graduate students) and foreign firms are restricted.
Incentivize private firms to donate to scholarships by giving them immediate access to graduate student talent	• Increased private share of funding for scholarship model; • Increased competition for graduate student talent amongst Canadian firms; • Increased R&D funding for Canadian firms; • Labour market distortions likely milder than previous method (attempts to stimulate competition rather than restrict it)	• Increased private involvement could incentivize less risky research, if used as substitute for public funding.
Institute a "locally made" bonus to scholarship value	• Greater funding for graduate students; • "Carrot" approach likely less disruptive to labour markets; • Easy hook for any marketing campaigns	• Greater expense to government.

Our proposal should help increase the competitiveness of Alberta's graduate programs, post-secondary system, and economy as a whole with no additional charge to taxpayers. But we also recognize that this proposal cannot solve all of the system's woes. Course-based students, for instance, are as integral to universities as thesis-based students are, but crafting research scholarships around the particulars of a course-based program is difficult. We propose a number of possible ways of including course-based students in this scholarship model, but emphasize that a broader conversation around classwork and degree expectations is necessary. Additionally, we do not claim that these

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scholarships will completely eliminate student precarity. Only a systemic increase to funding and the development of infrastructure to support high levels of minimum funding, regardless of school or program, will ensure that no graduate student is at risk of falling into poverty, homelessness, or hunger. That being said, we believe this proposal goes a long way to providing an alternative and robust strategy for increasing graduate stipends, and from there, making Alberta a more attractive place for graduate students to study.

As such, our proposals in this paper are:

1. Create a three-tiered, merit-based, scholarship program that rewards domestic and international thesis-based graduate students for research excellence:
    a. A first tier, that rewards the top 25% of master's and doctoral students with a scholarship valued at $7,000 and $9,500, respectively;
    b. A second tier, that rewards the top 5% of master's and doctoral students with a scholarship valued at $13,000 and $18,000, respectively;
    c. A third tier, that rewards the top 1% of master's and doctoral students with a scholarship valued at $17,500 and $24,000, respectively.
2. Structure the administration of these scholarships in a similar manner to that of the federal Tri-Council granting agencies:
    a. One stream, administered by neutral experts, for the social sciences and humanities;
    b. One stream, administered by neutral experts, for the natural sciences and engineering;
    c. One stream, administered by neutral experts, for the medical sciences.
3. In the creation of merit criteria, ensure that, among other criteria recommended by subject-matter experts:
    a. Students are rewarded for research projects that align with research demand from the private sector;
    b. Students are rewarded for research projects that help not-for-profits fulfill their mandates;
    c. The above does not mean the merit of research projects are tied to labour market outcomes or undermine the entrepreneurial potential of universities.
4. In order to save administrative costs and create best practices for commercializing research, draw from Mitacs as either consultants to the scholarship program or by connecting the scholarship program to the Mitacs network;
5. In the creation of merit criteria, ensure that students are rewarded for interdisciplinary research.

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6. In the creation of merit criteria, ensure that equity-seeking groups are adequately consulted, to maximize accessibility and the diversity of voices within the innovation ecosystem.
7. Collaborate with course-based students to effectively integrate their programs into the research scholarship program, or to reform the evaluation of coursework to reward excellence in non-thesis based programs;
8. Ensure that graduate students sit on the ultimate decision-making bodies of each granting stream, in order to preserve the graduate student perspective on any governance questions, and:
    a. That rules are in place to mitigate any conflicts of interest that may arise from graduate students sitting on these bodies, so that graduate students do not have to make a choice between serving their profession and having access to external funding.
9. Ensure these scholarships result in an increase in research commercialization by:
    a. Incentivizing private businesses to invest in the model on the condition that they receive priority access to graduate student research talent and human capital;
    b. Provide a "locally made" bonus to graduate students whose work with local businesses as part of the industry engagement section of the scholarship merit-criteria.

The rest of this paper will be divided into five parts. **Part 1** provides an in-depth overview of what graduate students do, both for universities and the economy more broadly. The intent is to highlight the underrated role that graduate students play in the operations of research-intensive universities, making it clear that the success of these institutions is dependent on their graduate student population. It also makes it clear that graduate students respond to economic incentives. Taken together, it sets the tone for the rest of the paper: graduate students are important for Alberta—and Canada's—prosperity, but because we respond to incentives, governments have to actively craft policies to keep retain them or attract more.

Part 2 looks at the state of post-secondary funding in Alberta, specifically by analyzing the budgetary situation faced by the University of Calgary. It highlights how massive the Ministry of Advanced Education's cuts to operating grant funding have been, especially when adjusted for inflation. But the budgetary problems facing the institution do not stop there: funding from other government departments, such as Alberta Health, and private funding—particularly in the form of donations and grants—have also seen steady declines since 2018/19. Currently, the two forms of funding that have consistently increased are student tuition and fees, which raises the costs of attending graduate school, and federal funding, which is distributed to only a small number of students. Meanwhile, non-

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repayable student financial aid has *also* decreased since 2020, meaning that funding prospects for Albertan graduate students have shrunk substantially over the past half decade.

Part 3 looks at graduate funding from a comparative lens. First, we look at Canada versus comparably developed economies. The data we can find on graduate stipends paints a stark picture: European stipends are as much as five times higher than that of Canada, and even the United States pays double what we do. The trends in funding between Canada and the rest of the comparative nations also point to future challenges for attracting top graduate talent: the European Union's Draghi Report has called for substantial funding increases to European post-secondaries and sees investments in human capital as necessary for the continent's strategic competitiveness. In the United States, funding was increasing at both the state and federal levels before the Trump Presidency, meaning that there is still a large financial incentive for talent to study in America, even if the environment is less than friendly towards academia. We then compare Alberta to the rest of Canada, and what data we can find—both in terms of per-FTE funding and minimum stipend levels—suggests that Alberta is rapidly losing ground to other provinces. In particular, minimum funding for Alberta's flagship university, the University of Alberta, is only middle of the pack for U15 institutions, despite it having one of the best reputations of any institution in the country. Alberta has seemingly moved closer to a comparable funding situation to that of Ontario, which has seen mass insolvency (even in prestigious institutions like Queens) and near-system wide abuses to the immigration system in order to compensate for a lack of provincial support. We finally suggest that a direct causal line can be drawn between this data and the evidence we have compiled of a "leaky pipeline" in Alberta's post-secondary system. We have an above average number of undergraduate students per capita, both compared to Canada and the OECD, but significantly fewer graduate students: 6.1% of Alberta's working-age population has a master's degree, compared to an average of 7.1% in Canada and 13.9% in the OECD, while 0.9% have PhDs, compared to 1.1% in Canada and 1.3% in the OECD.

Part 4 lays out the specifics of the model. We provide our assumptions on current enrollment numbers, the split between course-based and thesis-based students, projected enrollment growth over 5 years (assuming that this model successfully entices more individuals to enter graduate school in Alberta), the administrative costs of these scholarships, and the return-on-investment for graduate education. It outlines our suggestions on the structure of the model, then provides a detailed breakdown of the tiers. We estimate the total cost of the program and weigh that against the tax revenue collected from our estimates of the total economic activity generated by the scholarships. It is from here that we outline a pathway to revenue neutrality. We additionally outline our suggestions on how to define "merit" for these scholarships and, finally, outline how course-based students could either be folded into the program, while recognizing that a better option may be for the government and individual institutions to reform course-work to better reward student success in course-based

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programs. Finally, we outline why endogenous growth theory requires that the government act as the primary funder for these scholarships.

Part 5 examines the future challenges Alberta and Canada face, particularly as President Trump's tariffs interact with laggard productivity growth, internationally non-competitive levels of business investment, and concerns that Canada lacks the appropriate foreign and national security policies to address major changes to the geopolitical order. We outline how graduate students are already assisting in each case, and emphasize how these scholarships can enable yet larger positive impacts. While we do not pretend that graduate students are a silver bullet to all of Canada's problems, they are nonetheless a vital—and underutilized—resource for the stubborn, uncertain, and wicked problems our province and country face.

Finally, **Part 6** concludes with some limitations of the model.

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Part 1: What Is a Graduate Student, Anyways?

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1.1. Introduction

Before we dive into the data on graduate student funding in Alberta, and the details of our funding proposal, we first want to highlight what, exactly, a graduate student is. This is important, as we recognize that many people do not fully understand what graduate students do. As we will endeavour to show, graduate students are not simply children with an intense caffeine addiction: they perform essential work within universities and in the broader community. Graduate students also tend to be older and are more likely to have dependants to care for; this adds a unique set of costs to attending graduate school and makes our members particularly vulnerable to negative income shocks (i.e., sudden drops in disposable income). Consequently, if universities are concerned about both retaining existing talent and attracting *new* talent, they will need to pay particular attention to how graduate students weigh our stipend levels with the various costs of attending graduate school. And universities *should* be concerned about retaining and attracting talent, because universities simply would not be able t function without the various forms of labour that graduate students perform.

This section of the paper, then, will first outline the work that graduate students do within universities, highlighting how closely integrated we are to the core operating functions of post-secondary institutions. It will then examine the unique costs associated with being a graduate student. Finally, it will highlight how graduate students are responsive to economic incentives—particularly, how graduate students respond to tuition shocks. Our hope is that this section will serve as a touchstone for the rest of the paper, meaning readers will always keep graduate student labour and costs in the back of their minds as we dig deep into university budgets and funding agreements.

1.2. Graduate Students Are Workers

Graduate students are students, obviously enough. This means that we attend classes to further our knowledge on a subject and, in the process, pay tuition and fees in order to attend. The major differences between ourselves and our undergraduate counterparts, in this respect, is the intensity of the studies and the expectation that we produce an original, scholarly piece of work at the end. In the former instance, our classes are typically seminar based—meaning classes are small and participation in an ongoing discussion with the instructor is expected—while, in the later instance, an original scholarly piece of work takes the form of a book-length (in the case of thesis-based master's students or doctoral students) publication that advances our chosen field.

The difference in the intensity of our studies bleeds over into the next major distinction between graduates and undergraduates: graduate students are expected, as part of our enrollment, to assist the university in fulfilling two of its core priorities. The first priority is, of course, research. We assist the university in this function through three primary channels. The first is, as already outlined,

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through our academic studies: our theses, final projects, and dissertations are scholarly works that form part of the growing pool of knowledge that other academics or researchers (including those in the private sector) draw from. Additionally, students engage in research activities that are tangentially related to their final research project, such as writing peer-reviewed articles either on their own or in collaboration with faculty members. Finally, graduate students serve as research assistants (RAs), employees of the university who are tasked with helping faculty on their research initiatives and projects. This includes assisting in maintaining a laboratory, conducting experiments, compiling and interpreting data, writing final monographs, and supervising undergraduate researchers.

Studies have found that PhD students perform the majority of research at many institutions,[7] particularly those that are classified as "entrepreneurial universities" (i.e., universities who have high knowledge spillovers, meaning they interact with, and transfer knowledge to, their local communities at a high rate).[8] In Quebec, for instance, a bibliographic study of all peer-reviewed papers found that PhD students were responsible for a third of all publications between 2000 and 2007.[9] Graduate students have a noticeable impact not just on the raw output of research universities, but also on the quality of publications: a study of 78 countries from 2014 to 2019 found a strong, statistically significant correlation between the number of PhD students and research paper quality.[10] Some of the proposed mechanisms explaining this relationship include PhD students being at the cutting edge of their research fields, frequently working in large scientific teams, and being able to bring in government funding to the broader university community.[11]

Most PhD students are also involved in research collaboration with partners outside their universities, including industry,[12] meaning that graduate students play a significant role in promoting the research practices of universities to the broader public. Indeed, this is reflected in three studies—from the United States, United Kingdom and Portugal—that argue graduate students are essential for university-industry technology transfers, which refers to the process of practical knowledge being created by universities and then turned into consumer goods or productivity-enhancing process

[7] Enders, J. 2002. "Serving Many Masters: The PhD on the Labour Market, the Everlasting Need of Inequality, and the Premature Death of Humbolt," *Higher Education* 44(1): 493-517.
[8] Bienkowska, D. and Klofsten, M. 2011. "Creating Entrepreneurial Networks: Academic Entrepreneurship, Mobility, and Collaboration during PhD Education," *Higher Education* 64(1): 207-222.
[9] Larivière, V. 2011. "On the Shoulders of Students? The Contribution of PhD Students to the Advancement of Knowledge," *Scientometrics* 90(1): 463-481.
[10] Rodríguez-Montoya, C., Zerpa-García, C., and Mirnalin, C. 2023. "Aspiring PhDs: The (Un)surprising Relation Between Doctoral Students and Research Productivity," *SN Social Sciences* 3(32): https://doi.org/10.1007/s43545-023-00616-8
[11] *Ibid*.
[12] Bienkowsak and Klofsten. 2011. "Creating Entrepreneurial Networks."

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innovations by the private sector. Boardman and Ponomariov, in analyzing the characteristics of entrepreneurial universities, find that university scientists who support increasing numbers of graduate students through grant-based funding have higher university-industry interactions, such as technology transfer, paid consultation, the creation of patents, or co-authorship of academic papers with members of industry.[13] They also found that an increase in students supported by grants increased the likelihood that university researchers would become owners, partners, or employees of private firms.[14] One of the main mechanisms they identified to explain this relationship is the fact that graduate student research is essential for the research capacities of a university and may be of particular interest to firms.[15] A 2020 study from Portugal highlighted the important role that doctoral students play in fostering close university-industry collaborations.[16] 2022 study of UK universities found that as more graduate students are supported via grants (of any type, be they government or private sector), the greater the incidence of start-ups and technology licencing emerging from that university, showcasing the important role that graduate students play as "knowledge providers."[17] Additional studies confirm that graduate students are essential for transferring knowledge between universities and private industry[18,19] and government;[20,21] some suggest that graduate students are *the* key driver in these knowledge transfers.[22,23] Graduate students also act as bridges between the private sector and

[13] Boardman, P.C. and Ponomariov, B.L. 2009. "University researchers working with private companies," *Technovation* 29(1): 142-153.
[14] *Ibid*.
[15] *Ibid*.
[16] Santos, P., Veloso, L., and Urze, P. 2020. "Students matter: the role of doctoral students in university-industry collaborations," *Higher Education Research & Development* 40(7): 1530-1545.
[17] Radko, N., Belitski, M., and Kalyuzhnova, Y. 2022. "Conceptualizing the entrepreneurial university: the stakeholder approach," *The Journal of Technology Transfer* 48(1): 955-1044.
[18] Slaughter, S., Campbell, T., Hollerman, M., and Morgan, M., 2002. "The 'Traffic' in Graduate Studies: Graduate Students as Tokens of Exchange Between Academe and Industry," *Science, Technology & Human Values* 27(2): 282-312.
[19] Mangematin, V. and Robin, S. 2003. "The Two Faces of PhD Students: Management of Early Careers of French PhDs in Life Sciences," *Science and Public Policy* 30(6): 737-749.
[20] Mangematin, V. 2000. "PhD Job Market: Professional Trajectories and Incentives During the PhD," *Research Policy* 29(6): 741-756.
[21] Mougerou, P. 2001. *Knowledge diffusion, bridging institutions and the scientific labour market in the French innovation system*. Paper presented at DRUID's Nelson and Winter Conference, 12–5 June 2001, Aarlborg, Denmark.
[22] Salimi, N., Bekkers, R., and Frenken, K. 2016. "Success Factors in University-PhD Projects," *Science and Public Policy* 27(3): 1-19.
[23] Ponomariov, B.L. 2008. "Student Centrality in University-Industry Interactions," *Industry and Higher Education* 23(1): 50-62.

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universities, which helps increase an institution's commercialization potential.[24,25] Finally, it has been found that businesses hiring graduate students as employees is a highly efficient way of transferring technology and other forms of practical knowledge to businesses,[26] a massive boon for any countries looking to kickstart research-intensive industries. Each of these studies paints a very clear picture: graduate student research is essential for commercialization, and that means graduate students are essential for turning the research output of universities into something that benefits the economy as a whole.

It should be noted that undergraduates have a key role to play in helping universities contribute to innovation and productivity. A 2017 report by the House of Commons' Standing Committee on Industry, Science, and Technology (now known as the Standing Committee on Industry and Technology [INDU]) found that students and recent graduates represent an underappreciated source of new businesses and technology transfer, being "twice as likely to as their professors to create spin-off companies," according to.[27] A witness from the private sector added that "[t]he largest intellectual property and technology transfers from academia to Canadian companies occur when one of these innovative companies hires technically well-trained graduating students," which requires integrating students "into the broader innovation ecosystem in order to do design work, proof of concept and prototyping."[28] But as the previously mentioned studies show, graduate students are already a key component of the innovation ecosystem even *before* graduation; the research graduate students generate after receiving their degrees, either in other academic institutions, in industry, or as independent scholars, is a continuation of work they have already performed *as students*. A final point to make for now is that universities perform a larger share of research and development activities in Canada than other countries,[29] and that according to the Conference Board of Canada, this is a trend which has accelerated since 1989.[30] Consequently, the outsized impact that graduate students have on

[24] Thune, T. 2009. "Doctoral Students on the University-Industry Interface: A Review of the Literature," *Higher Education* 58(5): 637-651.
[25] Thune, T. 2010. "The Training of 'Triple Helix Workers'? Doctoral Students in University-Industry-Government Collaborations," *Minerva* 48(4): 463-483.
[26] Siegel, D., Waldman, D., Atwater, L., and Link, A. 2003. "Commercial Knowledge Transfers from Universities to Firms: Improving the Effectiveness of University-Industry Collaborations," *Journal of High Technology Management Research* 14(1): 111-133.
[27] Canada. Parliament. House of Commons. Standing Committee on Industry, Science, and Technology. Intellectual Property and Technology Transfer: Promoting Best Practices. 1st Session, 42nd Parliament, 2017. Report 8. https://www.ourcommons.ca/Content/Committee/421/INDU/Reports/RP9261888/indurp08/indurp08-e.pdf, pg. 29.
[28] *Ibid,* pg. 30.
[29] https://higheredstrategy.com/wp-content/uploads/2023/11/2023-11-03-SPEC-2023_final-2_smaller.pdf, pg. 69.
[30] https://www.conferenceboard.ca/hcp/publicrandd-aspx/

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the research output, quality, and commericalization of universities also means that these students have an outsized impact on Canada's innovation ecosystem more broadly.

The other core function of a university is teaching. Graduate students primarily aid the university in its teaching function by acting as teacher's assistants (TAs), who mark papers, run tutorials, guest lecture, and answer undergraduate questions. The demands for this role can be quite intense, as TAs are typically assigned to first or second-year classes with large numbers of undergraduate students. These undergrads, furthermore, tend to have little experience with post-secondary education and may turn to TAs for advice on other courses, degree planning, and other administrative tasks like applying for scholarships and awards. Graduate students also serve as sessionals, who fully teach classes and are signed to short-term academic contracts. As a sessional, graduate students act essentially the same as full professors, meaning they construct lesson plans, create midterms, final exams, and research papers, and mark assignments from students (occasionally from other graduate students serving as TAs). The major difference is that sessional lecturers do not have tenure and lack many of the protections that full professors receive—this includes, incidentally, job and pay security.[31] Despite the precarious nature of sessional employment, sessional lecturers are becoming increasingly important for instructing future students,[32] and graduate students (typically doctoral students) are the primary group from which sessional positions are filled.[33] This means that graduate students are taking on larger and larger teaching roles within institutions.

Finally, graduate students also, on occasion, work as support staff in various university departments. This can include programming (i.e., the creation, modification, or management of academic programs), serving as student advisors, or working in IT. This option is particularly viable for students in large departments who may not have guaranteed access to TA or RA opportunities. Support staff work may also be desirable for graduate students who wish to have hands-on training working within a complex organization, given that the administration of a university—whether it is physically located on one campus or is spread over multiple locations—is closer to running a small city than it is a business or government department.

Consequently, the role graduate students play in supporting research and teaching—and any other support function they might serve—highlights that graduate students are also *active workers*, labourers whose work is essential in not just growing a university, but also keeping its lights on. As Berdahl, Malloy, and Young note, graduate students "are thus deeply embedded in making universities

[31] https://universityaffairs.ca/opinion/the-precarious-worklife-of-sessional-instructors-2/
[32] https://www.utm.utoronto.ca/careers/media/1529/download?inline
[33] Berdahl, L., Malloy, J., and Young, L. 2024. *For the Public Good: Reimagining Arts Graduate Programs in Canadian Universities*. Edmonton: University of Alberta Press, pg. 92.

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work on a daily basis, typically with no ceiling to their possible capacity and utility," and this explains why so many institutions prioritize growing the graduate student population at all costs.[34] We will highlight the essential work that graduate students do for universities again later on in the paper, as we discuss trends in operating funding at Albertan institutions.

1.3. We Face Unique Costs

Graduate students are both older than undergraduates (on average) and have a higher percentage of students that are over the age of 30.[35] This should not be surprising given that it typically takes at least four years of undergraduate education to be eligible for graduate school. Additionally, some students may delay entrance into graduate school in order to gain work or life experience, though we were unable to find any data that would indicate the number of students who choose this path. Regardless, the higher average age of our members means that graduate students are more likely to have dependents, particularly children, that must be cared for financially; indeed, among UCalgary graduate students, 22% have spouses, 12% have children, and 22% have parents whom they are responsible for.[36] Graduate students thus face the same costs as a typical Albertan: rent, mortgages, school fees, groceries, and transportation costs all factor into a graduate student's annual budget. As pointed out in our policy paper, *Soften the Blow*, graduate student's familial needs constrain the housing choices our members can make: for many, seeking housing on-campus is simply impossible, because the supply of family housing units is insufficient to meet demand.[37] This means graduate students are more likely to enter the rental market, which makes them more vulnerable than other types of students to massive cost-of-living spikes driven by rent or housing costs.

Of course, in addition to the typical costs most Albertan are familiar with, graduate students must also pay tuition and fees as part of their program. Tuition dollars are an (increasingly large) component of a university's general operating revenue, which helps fund professor's salaries, general research initiatives, and scholarships. Fees—typically known as "Mandatory Non-Instructional Fees" (MNIFs)—fund services on campus such as the Wellness Centre, athletics, and various ancillary services like parking, residence, and on-campus food plans. We will discuss tuition and fees at greater length in the next section of this paper, noting for now that tuition and fees have increased quite rapidly in Alberta over the past six or so years. Regardless of any increases, however, tuition and fees are a cost

[34] Berdahl, L., Malloy, J., and Young, L. 2024. *For the Public Good: Reimagining Arts Graduate Programs in Canadian Universities*. Edmonton: University of Alberta Press, pg. 92.
[35] https://www150.statcan.gc.ca/n1/en/pub/81-004-x/2010005/article/11386-eng.pdf?st=zCtsLtGH, pg 6.
[36] Thao Nguyen, "GSA Annual Survey 2022 Results - Graduate Students' Association," *Graduate Students' Association of the University of Calgary* (blog), September 9, 2022, https://gsa.ucalgary.ca/gsa-annual-survey-2022-results/#_ftnref2.
[37] https://gsa.ucalgary.ca/wp-content/uploads/2016/07/UCGSA-White-Paper-01-Quebecs-Soft-Rent-Cap.pdf

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that only students have to pay. This is the result of graduate students choosing to invest in new skills and knowledge, yes, but it also means that our members have an additional cost-of-living worry that most Albertans do not have to concern themselves with.

This is what we mean when we say that graduate students face unique costs. On the one hand, our status as older learners means we face many of the same costs that typical, working-age Albertans face. At the same time, though, graduate students pay tuition and fees as a condition of their employment, which is not something that other Albertans have to worry about. Thus, if there is an ongoing cost-of-living crisis, students—and especially graduate students—are vulnerable to multiple negative income shocks. For example, if inflation causes grocery payments to increase, then students—like all Albertans—will face higher grocery bills. At the same time, though, the University *itself* will face higher grocery costs, necessitating it increasing all fees that go to paying for on-campus food services. If inflation acts as a tax on incomes, then graduate students in this situation will face double taxation, simply by virtue of the fact that students are expected to shoulder an increasing large portion of a university's budget.

Finally, graduate students face a cost that does not show up on our income statements at the end of the year, but nonetheless takes up a significant amount of time and energy: administrative costs. More specifically, this is the opportunity cost of spending time applying for ethics approval for research projects, filling out award applications, checking with university lawyers on the intellectual property rights surrounding the commericalization of your research, and even remaining up to date on all immigration documentation—something that is multiplied if the university is unable to provide dedicated staff support to help guide students through these tasks. By "opportunity cost" we mean the utility you give up to engage in administrative tasks rather than, say, continuing your research or TAing a class. The more that graduate students are expected to navigate these administrative tasks on their own, the higher the opportunity cost of applying for a scholarship or commericalizing your research. Consequently, administrative support for graduate students is incredibly important, and cuts to support staff have an outsized impact on graduate degrees and labour.

1.4. We Respond to Incentives

Graduate students are like any other actor: we respond to incentives. Particularly, we respond to *financial* incentives. Student preferences for schools are formed from multiple considerations, such as offered programs, faculty reputation, local attractions, and whether the values of the institution align with that of the student. But, in the final analysis, having the ability to eat, pay your bills, save for the future, and be adequately compensated for the work you do will play an outsized role in *most* decisions about where to study. In general, this means that graduate students will, all else being equal, find

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schools which offer higher stipends and earning opportunities more attractive. Conversely, schools that charge higher tuition and fees will, all else being equal, be *less* attractive for graduate student talent.

It is fairly self-explanatory that higher compensation would be more attractive for graduate students. There are studies that argue an increase in tuition should not reduce enrollment numbers, however, largely because the middle-to-upper class is overrepresented in higher education.[38] In this case, the incentives for finding higher compensation in a graduate program would outweigh the *dis*incentive to study at high-tuition universities. It is true, as a matter of fact, that multiple studies have found that access to post-secondary education for those of low socioeconomic status (SES) is far more complicated than simply keeping tuition rates low.[39,40,41] For instance, a 2009 study from the Netherlands showed that while eligibility for post-secondary education increased, students from low-SES households nonetheless tended to avoid pursuing post-secondary education for reasons that cannot be fully explained by lack of ability to pay.[42] This study is one of many that suggests wealthier students have an advantage over students from lower SES-households that persists regardless of how high, or low, tuition rates are.[43,44,45,46] So perhaps what universities should be most concerned about is the level of compensation for graduate student labour, not necessarily whether tuition and fees are too high.

However, the studies noted above that find a null effect on increasing tuition and enrollment rates, including the 2009 Dutch study:

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[38] Denny, K. 2014. "The effect of abolishing university tuition costs: Evidence from Ireland," *Labour Economics* 26(1): 26-33.
[39] Kirby, D. 2009. "Widening Access: Making the Transition from Mass to Universal Post-Secondary Education in Canada," *Journal of Applied Research on Learning* 2(3): 1-17.
[40] Boliver, V. 2017. "Misplaced optimism: how higher education reproduces rather than reduces social inequality," *British Journal of Sociology of Education* 38(3): 423-432.
[41] Kromydas, T. 2017. "Rethinking higher education and its relationship with social inequalities: past knowledge, present state and future potential," *Palgrave Communications* 3(1).
[42] Tieben, N. and Wolbers, M.H.J. 2010. "Transitions to post-secondary and tertiary education in the Netherlands: a trend analysis of unconditional and conditional socio-economic background effects," *Higher Education* 65(1): 85-100.
[43] Dupriez, V., Monseur, C., van Campenhoudt, M., and LaFontaine, D. 2012. "Social Inequalities of Post-secondary Educational Aspirations: influence of social background, school composition and institutional context," *European Educational Research Journal* 11(4): 504-519.
[44] Schindler, S. and Lörz, M. 2012. "Mechanisms of Social Inequality Development: Primary and Secondary Effects in the Transition to Tertiary Education Between 1976 and 2005," *European Sociological Review* 28(5): 647-660.
[45] Triventi, M. 2013. "Stratification in Higher Education and Its Relationship with Social Inequality: A Comparative Study of 11 European Countries," *European Sociological Review* 29(3): 489-502.
[46] Triventi, M. 2013. "The role of higher education stratification in the reproduction of social inequality in the labor market," *Research in Social Stratification and Mobility* 32(1): 45-63.

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1. Suggest that this is true only when government financial aid is sufficient to offset the increased cost for students;[47,48,49,50]
2. Largely covers a period (the 1990s) where tuition, despite multiple increases, was a substantially lower portion of a university's operating budget (less than 20%) than it is today;[51]
3. Did not closely examine the level to which students from low SES households might be sensitive to tuition changes;[52] studies that *do* have found that tuition increases tend to have negative impacts on post-secondary accessibility, as individuals from low SES households face increased barriers to entry;[53,54,55,56]
4. Did not measure how tuition increases might impact specific identity groups, such as new migrants; studies that *do* have found that tuition increases discourage new migrants from attending post-secondary;[57]
5. And are sensitive to different measurement methods. For instance, tuition increases have a negative impact on enrollment when provincial trends in university demand (i.e., whether

[47] Looker, E.D. and Lowe, G.S. 2001. "Post-Secondary Access and Student Financial Aid in Canada: Current Knowledge and Research Gaps," *Canadian Policy Research Networks*.
[48] Johnstone, D.B. 2003. "Cost Sharing in Higher Education: Tuition, Financial Assistance, and Accessibility in a Comparative Perspective," *Czech Sociological Review* 39(3): 351-374.
[49] Rivard, M. and Raymond, M. 2004. "The Effect of Tuition Fees on Post-Secondary Education in Canada in the late 1990s," *Department of Finance Working Paper*.
[50] Finnie, R. 2012. "Access to post-secondary education: The importance of culture," *Children and Youth Services Review* 34(6): 1161-1170
[51] For the 20% figure see Levin, B. 1990. "Tuition Fees and University Accessibility," *Canadian Public Policy* 16(1): 51-59. For other figures on more current tuition figures, see Harden, J. "The Case for Renewal in Post-Secondary Education," *Alternative Budget 2017 Technical Paper: Canadian Centre for Policy Alternatives*.
[52] de Broucker, P. 2005. "Getting There and Staying There: Low-income Students and Post-Secondary Education," *Canadian Policy Research Networks Research Report*.
[53] Looker, E.D. and Lowe, G.S. 2001. "Post-Secondary Access and Student Financial Aid in Canada: Current Knowledge and Research Gaps," *Canadian Policy Research Networks*.
[54] Johnstone, D.B. 2003. "Cost Sharing in Higher Education: Tuition, Financial Assistance, and Accessibility in a Comparative Perspective," *Czech Sociological Review* 39(3): 351-374.
[55] Coelli, M.B. 2009. "Tuition Fees and Equality of University Enrollment," *The Canadian Journal of Economics* 42(3): 1072-1099.
[56] Mueller, R.E. 2007. "Access and Persistence of Students from Low-Income Backgrounds in Canadian Post-Secondary Education: A Review of the Literature," in Finne, R., Mueller, R.E., Sweetman, A., and Usher, A. (eds). *Who Goes? Who Stays? What Matters? Accessing and Persisting in Post-Secondary Education in Canada*. Montreal: McGill-Queen's University Press, pgs. 33-62.
[57] Ferede, M.K. 2010. "Structural Factors Associated with Higher Education Access for First-Generation Refugees in Canada: An Agenda for Research," *Refuge* 27(2): 79-88.

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enrollment rates were increasing for labour market-related reasons *before* tuition increases were instituted) are controlled for.[58] Similarly, a negative relationship between tuition levels and enrollment is observed when the proxy for tuition increases is government policy, which better captures exogenous tuition changes;[59] and

6. Do not necessarily look at factors that might indirectly impact degree attainment, such as being forced to find employment during your studies in order to achieve some measure of financial security. To that end, Josipa Roksa found that students from lower socio-economic backgrounds sought more hours of employment during their degree in order to improve their financial security, and that this was associated with lower degree attainment.[60]

Those studies that find null effects also do not tend to focus on graduate students, and at graduate student retention in particular. This is a problematic omission. Studies that do not find any relationship between tuition increases and enrollment numbers point to the fact that university students disproportionately come from middle-to-upper class families, and thus are able to absorb higher levels of tuition. But since graduate students are frequently older and, thus, more likely to be living away from their parents (or, indeed, might be starting families of their own), they may not have the same level of familial support as undergraduates.

For studies that *do* look at graduate students, high levels of undergraduate debt act as a deterrent for graduate school application, [61,62] especially for students from lower-SES households.[63] Once in graduate school, high levels of student debt leads to earlier exits from graduate programs, delays in major degree milestones, and significant levels of finance-related stress.[64,65] On study in particular, by Terrell L. Strayhorn, found that graduate student persistence is also negatively related to

[58] Johnson, D.R. and Rahman, F.T. 2005. "The role of economic factors, including the level of tuition, in individual university participation decisions in Canada," *The Canadian Journal of Higher Education* 35(3): 101-127.
[59] Neill, C. 2009. "Tuition Fees and the Demand for University Places," *Economics of Higher Education Review* 28(1): 561-570.
[60] Roksa, J. 2011. "Differentiation and Work: Inequality in Degree Attainment in U.S. Higher Education," *Higher Education* 61(3): 293-308.
[61] Xu, Y.J. 2014. "Advance to and Persistence in Graduate School: Identifying the Influential Factors and Major-based Differences," *Journal of College Student Retention* 16(3): 391-417.
[62] Zhang, L. 2013. "Effects of college educational debt on graduate school attendance and early career and lifestyle choices," *Education Economics* 21(2): 154-175.
[63] Malcom, L.E. and Dowd, A.C. 2016. "The Impact of Undergraduate Debt on the Graduate School Enrollment of STEM Baccalaureates," *The Review of Higher Education* 35(2): 265-305.
[64] Doran, J.M., Kraha, A., Marks, L.R., Ameen, E.J., and El-Ghorourym N.H. 2016. "Graduate Debt in Psychology: A Quantitative Analysis," *Training and Education in Professional Psychology* 10(1): 3-13.
[65] DeClou, L. 2016. "Who Stays and for How Long: Examining Attrition in Canadian Graduate Programs," *Canadian Journal of Higher Education* 46(4): 174-198.

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high levels of student loan debt (i.e., while almost all graduate students who persist in their degrees will have student loan debt, at a level above $25,000 debt becomes associated with lower levels of degree completion) and is positively related to tuition reductions.[66] Interestingly, that same study also found that TA-ships are *negatively* related to persistence, while RA-ships are positively related to persistence.[67] This suggests, much like Roksa's study mentioned in Point 6, that attempting to pay for post-secondary through employment can actually push student's out of their programs.

International students are particularly vulnerable to tuition increases, with research in the United States indicating that doctoral and research universities recruit international students to bolster their internal revenue streams.[68] This is in addition to challenges international students face in finding affordable and adequate housing, personal finances, and culture shock.[69] International students are also vulnerable to information asymmetries (particularly with accurate information about cost-of-living) and face a great deal of uncertainty about their future job prospects and social networks in whichever country they have chosen to study.[70] As such, any increase in tuition or fees risks increasing the precarious finances of students with limited social supports compared to domestic students, particularly for international students suffering from incomplete or inaccurate information about cost-of-living in their chosen country.

That is all to say that tuition and fees matter for determining whether graduate students think it studying in a particular jurisdiction is a worthwhile investment. Graduate students will be attracted to higher stipends and better compensation, but they will also be concerned with tuition levels and the wage cuts that inevitably follow a tuition shock. This is true of undergraduate as well, and while this paper focuses on graduate student funding, it would be remiss of us to not mention that you only get graduate students by having successful undergraduate programs. But because graduate students are in the unique position of being expected to work for the university during their studies, universities will need to be particularly concerned with how much they are paying graduate students *and* how much

[66] Strayhorn, T.L. 2010. "Money Matters: The Influence of Financial Factors on Graduate Student Persistence," *Journal of Student Financial Aid* 40(3): 4-25.
[67] *Ibid,* pg. 17.
[68] Cantwell, B. 2015. "Are International Students Cash Cows? Examining the Relationship Between New Undergraduate Enrollments and Institutional Revenue at Public Colleges and Universities in the US," *Journal of International Students* 5(4): 512-525.
[69] Calder, M.J., Richter, S., Mao, Y., Kovacs Burns, K., Mogale, R.S., and Danko, M. 2016. "International Students Attending Canadian Universities: Their Experiences with Housing, Finances, and Other Issues," *Canadian Journal of Higher Education* 46(2): 92-110.
[70] Khanal, J. and Gaulee, U. 2019. "Challenges of International Students from Pre-Departure to Post-Study: A Literature Review," *Journal of International Students* 9(2): 560-581.

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they are charging these students to attend—otherwise, essential functions of the university simply will not get done.

1.5. Conclusion

This section emphasized the work that graduate students perform, the costs they face, and their responsiveness to incentives. The goal is to show not only how closely integrated graduate students are to the general operations of a university, but that post-secondary policy on tuition, fees, and stipends will have a noticeable impact on enrollment numbers, reattainment, and the quality of graduate student labour—even if the post-secondary system is a complex machine with multiple, competing priorities.

This outline of who graduate students are will serve as a touch point while we discuss the funding situation faced by Albertan graduate students. Our hope is that it will be clear, from the data and arguments we present, that a new funding stream is necessary for Alberta to remain a competitive place to attend graduate school. In fact, as the next two sections of the paper will show, Alberta is perhaps more vulnerable than anywhere else in Canada to seeing an exodus of existing graduate talent, let alone be behind the curve on attracting top talent from elsewhere.

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Part 2: The Current State of Graduate Student Funding in Alberta

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2.1. Introduction

This portion of the paper will outline the funding mechanisms available to graduate students and their current trends in Alberta. We will be focusing primarily on the University of Calgary, though all Albertan post-secondary institutions—including colleges and polytechnics—are facing similar funding situations.

Our intention is to show three key facts:

1. Graduate student compensation is inextricably entwined with the operating funding of a university, meaning graduate students care about where our funding comes from, and in what quantity, as much as university administrators do;
2. All but two sources of revenue to the university—tuition and federal research funding—have declined since 2019, oftentimes by significant amounts and without taking enrollment growth into account; and
3. Of those two sources that have increased since 2019, tuition and fee increases constitute a wage cut for graduate students, while federal funding is too narrowly distributed to make up for funding cuts elsewhere.

Therefore, if graduate students respond to affordability concerns and economic incentives just like everyone else, these funding decreases mean that current and prospective students have less of an incentive to study in Alberta. As graduate students play an outsized role in creating a dynamic and innovative economy, this will create real harm for all Albertans—especially if other jurisdictions are more competitive in attracting and retaining top talent. Thus, we hope the justification for investing in graduate students through our proposed scholarship plan becomes clearer.

This part will therefore first look at operating funding of institutions in Alberta, looking particularly at the University of Calgary. It will chart the evolution of public, private, and own source (student tuition and fees) since 2019 until 2024 (excluding Budget 2025, due to that consolidated financial statements and annual reports are not available at the time of writing). It will then look at existing scholarships and awards for Albertan graduate students, including those offered as part of non-repayable student financial aid. Finally, it will look at research funding from the federal government. In total, the picture that should begin to emerge is that Albertan graduate students face a severe lack of funding opportunities, and that no alternative sources of funding exist to make up the deficit without seriously increasing the cost of attending graduate school.

2.2. Operating Funding: The Province, Private Sector, and Tuition

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Discussing Albertan graduate student funding is inseparable from discussing the state of post-secondary operating budgets in the province. By operating budgets, we mean revenue streams that fund the two core functions of a university: teaching and research. Included in this revenue portfolio is the administrative support that students and faculty receive in order to perform their functions within the institution. As outlined in the previous section, the administrative support that students and faculty require is extensive; while it may be tempting to view these costs as "administrative bloat" that needs to be cut, in some circumstances a lack of funding towards administrative functions can cause essential university operations to seize. This is one reason why students care about operating funding in contrast to targeted enrollment funding, which often lacks supports for the administrative side of post-secondary education. For graduate students, however, the other reason we care particularly about operating funding is because that is the revenue stream by which we are compensated for our work. When operating funding declines, as it has in Alberta, the opportunity cost of attending graduate school increases as a result.

Graduate students have access to two internal, institutional funding mechanisms—academic contracts and scholarships—and both are heavily dependent on university operating funding. As outlined in the previous section, academic contracts cover everything from assisting tenured faculty in conducting research—in which case their funding would come from the research grant the faculty member has been awarded—to serving as a sessional instructor. If operating funding decreases, then so too will the pool of money available to pay graduate students; if this decline happens whilst enrolment increases, then the per capita amount of funding available for graduate students will decline further. And because graduate students are tightly embedded in the core functions of a university, if pay for their work is decreasing, that also means that the university is likely generating less research and teaching activity as well.

The operating budgets of post-secondary institutions (PSIs) in Alberta are primarily funded from public sources, though private sources—from either individuals or corporations—contribute to a portion of research and teaching activities as well. For the University of Calgary and all other PSIs, the majority of public funds are received from the provincial government,[71] with most provincial funding being received through the Ministry of Advanced Education's Campus Alberta Grant.[72] Other funding

[71] University of Calgary, "Consolidated Financial Statements for the Year Ended March 31, 2022" § (2022), pg. 6. Note: numbers used are what was budgeted for at beginning of the year, rather than final totals, to account for random fluctuations in financing and funding that are not the result of government policy. Totals and trends in data are not significantly affected by this decision.

[72] Ministry of Advanced Education, "Annual Report: Advanced Education, 2021-2022" § (2022), pg. 76. Note: numbers used are what was budgeted for at beginning of the year, rather than final totals, to account for random fluctuations in financing and funding that are not the result of government policy. Totals and trends in data are not significantly affected by this decision. See Appendix B for more information on the numbers used.

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would come from a variety of sources, but most prominent among them would be the Ministry of Technology and Innovation and Alberta Health. Technology and Innovation provides provincial funding for research projects conducted by both PSIs and private businesses, through research grants such as the Major Innovation Fund.[73,74] These research grants would contribute to graduate student funding, likely more-so than funding from any other ministry besides Advanced Education. Alberta Health, meanwhile, would fund research and teaching activities almost exclusively at the Cummings School of Medicine, making funding from this source highly restricted (albeit still part of operating revenue, to some extent). Finally, the only alternative source of public funding is the federal government, which does not fund operations directly; instead, various programs, overseen by the Innovation, Science, and Economic Development Canada (ISED),[75] fund research activities by students and faculty. We will return to the federal government in a subsequent section and focus primarily on the provincial government as a public source of operating funding until then.

Private sources of funding include student tuition and fees, donations and other grants, dividends from investments, and the sale of services and products.[76] Of these private sources of funding, student tuition and fees again represent the largest sources of revenue for PSIs like the University of Calgary.[77] However, while student tuition and fees represent the largest source of private funding for universities, increasing revenue from these sources ultimately results in a funding cut for students. Tuition and fee increases could have a similar impact on graduate student finances as a general decline in operating funding.

Provincial public funding for the Albertan post-secondary system has, as mentioned above, dropped precipitously over the past five years, and tuition has rapidly increased as a result. Since 2019, in real terms (indexing for inflation, in 2024 dollars), operating funding from the Ministry of Advanced Education has declined from $599.2 million to $428.6 million, or by **$170.6 million**, a **28.5%** cut **(Fig.1.)**.[78,79] Funding from other Government of Alberta agencies and departments has also declined during this time, from an inflation-adjusted total of $66.5 million in 2019 to $60.2 million in 2024, or by

[73] https://www.alberta.ca/major-innovation-fund
[74] https://ucalgary.ca/news/3-ucalgary-projects-receive-203m-provincial-innovation-grants#:~:text=UCalgary's%20innovation%20ecosystem%20just%20received,Major%20Innovation%20Fund%20(MIF).
[75] https://ised-isde.canada.ca/site/ised/en
[76] University of Calgary, "Consolidated Financial Statements for the Year Ended March 31, 2022" § (2022), pg. 6.
[77] *ibid.*
[78] Ministry of Advanced Education, "Annual Report: Advanced Education, 2019-2020" § (2020), pg. 75. https://www.bankofcanada.ca/rates/related/inflation-calculator/, using July 2019 to July 2024 CPI. Average annual inflation rate during this period is 3.42%.
[79] Ministry of Advanced Education, "Annual Report: Advanced Education, 2023-2024" § (2024), pg. 119.

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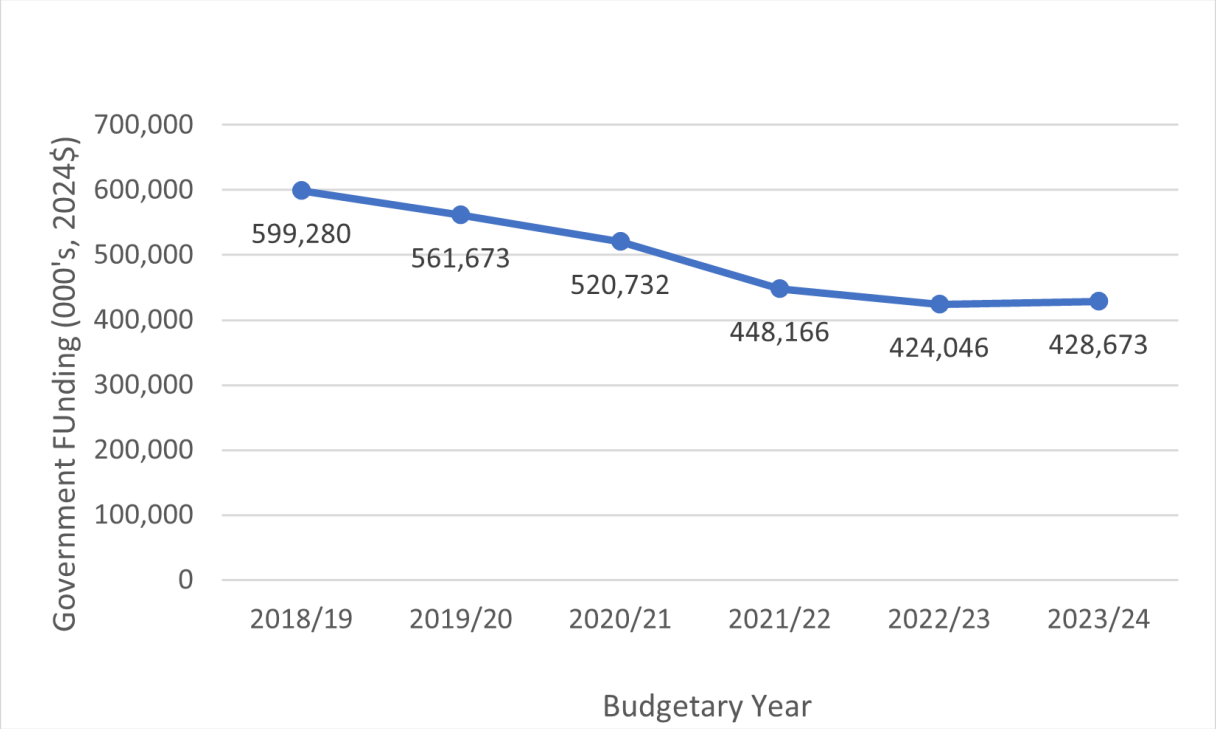
$6.3 million, a **9.4%** cut **(Fig.2.)**.[80,81] While we cannot disaggregate Technology and Innovation funding from other ministries—and, thus, this number will overestimate the total funding available for graduate students through this revenue stream—the downward trend nonetheless emphasizes yet another dwindling public funding source for graduate students to rely on. Finally, funding from Alberta Health has declined as well, from an inflation-adjusted peak of $94.7 million to $80.2 million, or **$14.5 million**, a **15.4%** cut **(Fig.3.)**.[82,83] Alberta Health's funding is unique, however, in that this peak occurred in 2021, where-as all other revenue streams from the Government of Alberta were higher in 2019 than at any time in the past five years.

Fig.1. Real Advanced Education Operating Grant Funding to UCalgary, 2018/19 to 2023/24[84]



[80] University of Calgary, "Consolidated Financial Statements for the Year Ended March 31, 2019" § (2019), pg. 27. https://www.bankofcanada.ca/rates/related/inflation-calculator/, using October 2019 to October 2024 CPI. Average annual inflation rate during this period is 3.44%.
[81] University of Calgary, "Consolidated Financial Statements for the Year Ended March 31, 2024" § (2024), pg. 32.
[82] University of Calgary, "Consolidated Financial Statements for the Year Ended March 31, 2019" § (2019), pg. 27. https://www.bankofcanada.ca/rates/related/inflation-calculator/, using October 2019 to October 2024 CPI.
[83] University of Calgary, "Consolidated Financial Statements for the Year Ended March 31, 2024" § (2024), pg. 32.
[84] See Appendix C.

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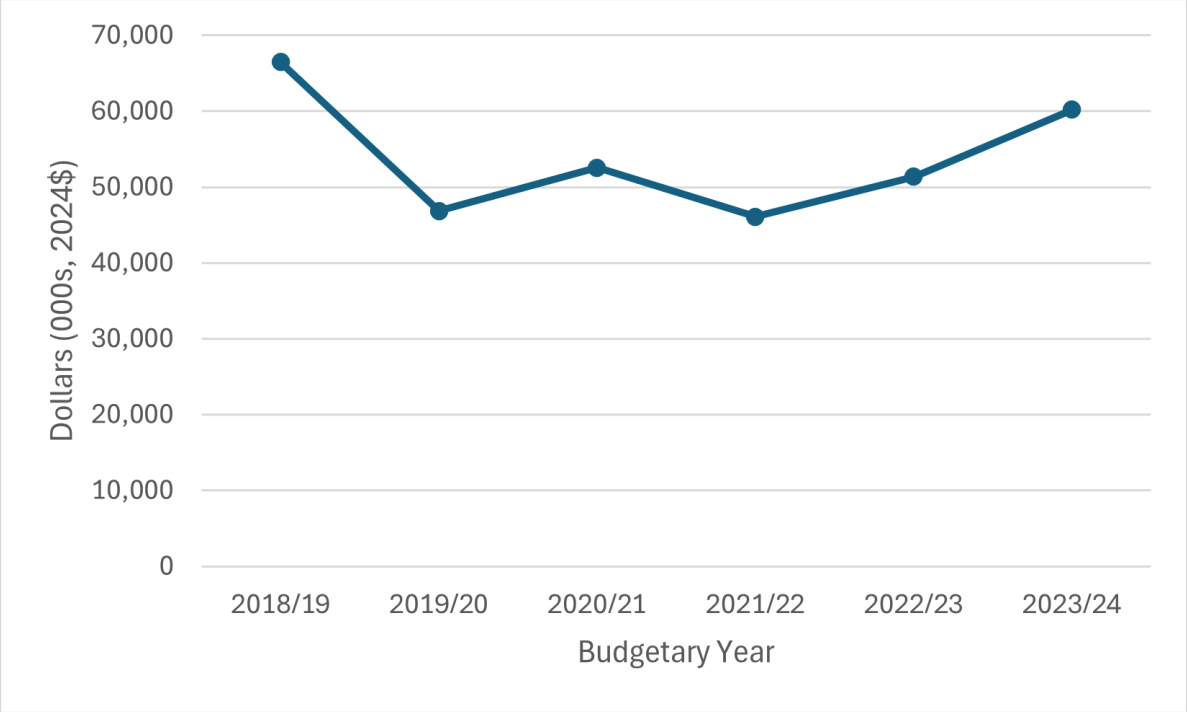
Funding from external private sources has also declined since 2019. Private, non-tuition funding sources at the University of Calgary are "sales of services and products," "donations and other grants," and "investment income" from non-governmental business enterprises. Of the various sources of private funding, donations and other grants are the most similar to Government-funded operating grants, with the exception that most donations will have restrictions on which programs, faculties, or projects the money can be spent on, and will frequently go to fund capital costs in addition to research or teaching activities.

Fig.2. Real Other Government of Alberta Funding to UCalgary, 2018/19 to 2023/24[85]



[85] See Appendix C.

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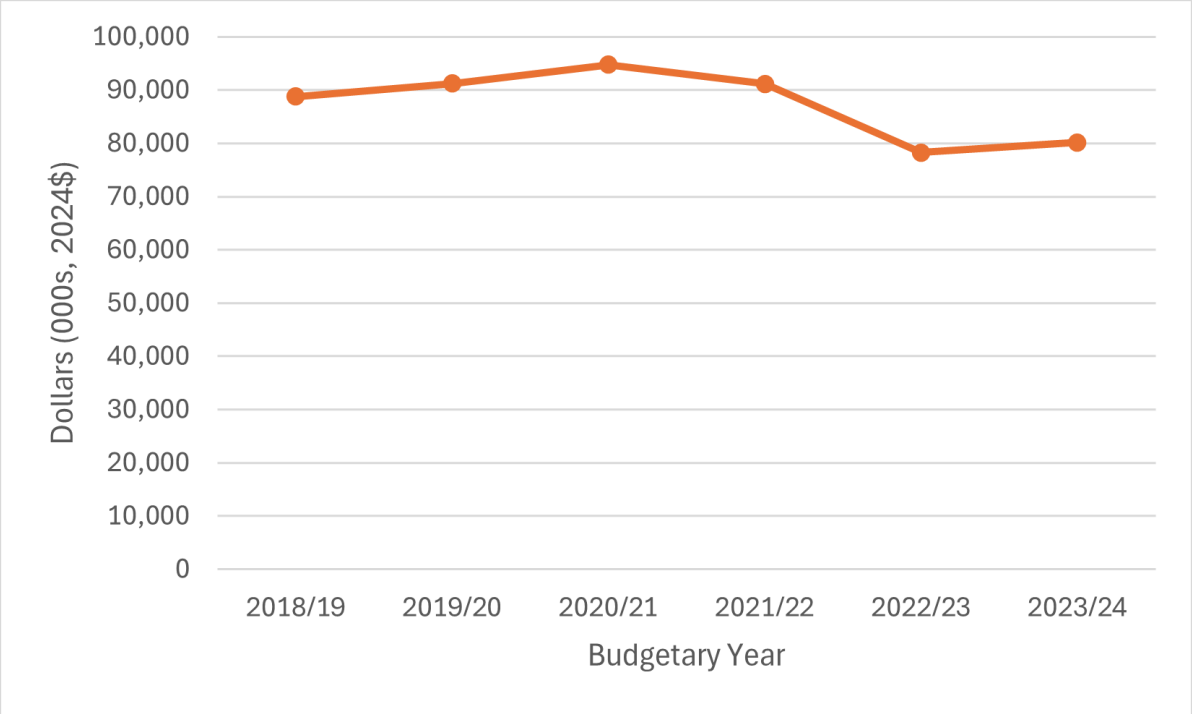
Fig.3. Real Alberta Health Funding to UCalgary, 2018/19 to 2023/24[86]



Since 2019 **(Fig.4.)**, the budgeted allotment from private sector grants has decreased (in nominal terms) from $203.7 million[87] to $190 million in 2024.[88] If we adjust for inflation, the budget allotment from private sector grants has decreased by **$51 million**,[89] a drop of **21.1%**. Total non-tuition private funding has declined steadily since 2019: notably, this includes the area of sales of products and services, indicating a reduced capacity for the university to innovate and produce. Indeed, were it not for the university's investment income—which reflects the University's holdings rather than the production of goods and services and ability to attract investment from non-governmental sources—private funding would have declined by **$81 million** since 2019. An important note: while it may be tempting to blame the University's external communications and marketing for this drop, the economic literature on "endogenous growth theory" would more likely connect this decline to the drop in public funds for university, a point we will elaborate upon in more detail in a later section of the paper.

[86] See Appendix C.
[87] University of Calgary, "Consolidated Financial Statements for the Year Ended March 31, 2020" § (2020), pg. 6.
[88] University of Calgary, "Consolidated Financial Statements for the Year Ended March 31, 2024" § (2024), pg. 6.
[89] https://www.bankofcanada.ca/rates/related/inflation-calculator/, annual interest rate of 4.41%.

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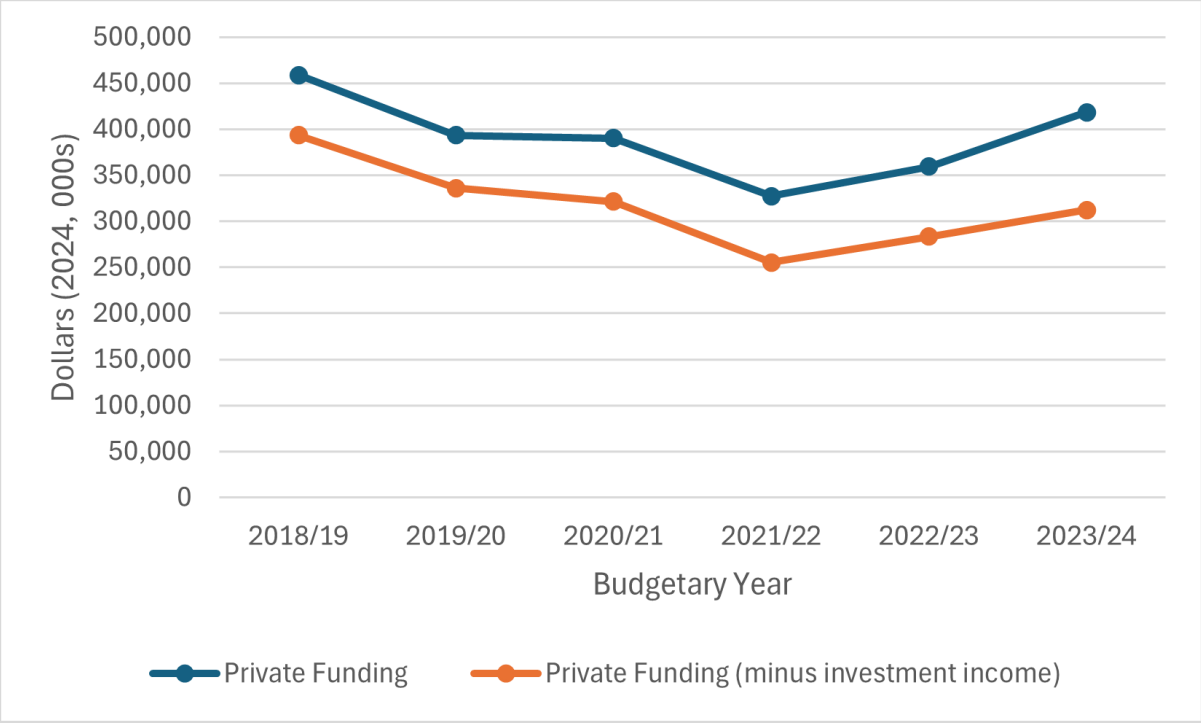
Fig.4. Real UCalgary Private External Funding, 2018/19 to 2023/24[90]



During this same period, the amount of money the university has collected through student tuition and fees has increased. In nominal terms, the total amount of revenue collected by the university through tuition and fees was $231.8 million in 2019; [91] in 2024 it was $372.6 million,[92] which is an increase of **$140.8 million**, or **41.9%.** In *real* terms (indexed for inflation, 2024 dollars), the total amount of revenue collected via student tuition and fees increased from $274.3 million in 2019 to $372.6 million in 2024, [93] or by **$98.3 million**—a **35.9**% increase.[94] The nominal amount shows how much the cost of tuition has risen for students, while the inflation-adjusted amount shows the purchasing power of each dollar of tuition that universities can spending on teaching and researching. The University of Calgary is therefore collecting **$72 million dollars *less*** in tuition than would be

[90] Numbers taken from University of Calgary Yearly Financial Statements for the years ending in 2019 to 2024, and adjusted for inflation using the Bank of Canada's *Inflation Calculator* (July 2019 to July 2024 CPI). See Appendix C for yearly numbers.
[91] University of Calgary, "Consolidated Financial Statements for the Year Ended March 31, 2019" § (2019), pg. 6.
[92] University of Calgary, "Consolidated Financial Statements for the Year Ended March 31, 2024" § (2024), pg. 6.
[93] https://www.bankofcanada.ca/rates/related/inflation-calculator/, using July 2019 to July 2024 CPI. Average annual inflation rate during this period is 3.42%.
[94] See Appendix C.

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required to cover the Government of Alberta operating grant cuts, *despite* students paying more to attend the university than ever before.

Consequently, Albertan university operating budgets have tightened substantially in recent years. **Figure 5** shows the total operating funding available from the province, private sector, and own-source revenue streams (i.e., tuition and fees) since 2019, adjusted for inflation. While there has been an uptick in total funding since 2022, the university is still receiving approximately **$128 million** less from these sources than five years ago. Notably, none of these numbers adjust for actual or planned enrollment growth. According to the University of Calgary Office of Institutional Analysis (OIA), total enrollment grew from 35,043 students in 2020 to 38,175 in 2024, a total enrollment growth of **8.9%**.[95] Per student operating funding, then, has declined **9.2%** since 2020: this decrease would be even more precipitous if OIA had enrollment data for the year 2019, and will only accelerate as the university aims to double to the number of graduate students by 2030.[96]

As a result of declining revenue, the university has seen widespread layoffs and a reduction of services,[97,98,99,100] including a reduction in the number of Graduate Program Administrators (GPA), an essential staff member and administrative resource for graduate students. But declining revenue also means that less and less funding is available for graduate students, whether that is to compensate their teaching and research support, fund their own research projects, or ensure that bursaries prevent students from falling into poverty and homelessness. And already declining revenue, plus concerns about affordability and adequate compensation, underscores why further increases to tuition and fees cannot be a viable strategy for balancing the budget: **every dollar spent on tuition is a wage cut for graduate students**. Or, alternatively, **tuition and fees are an income tax that only students have to pay.**

If graduate students respond to economic incentives, and graduate students play an indispensable role in the teaching and research operations of a university (both arguments having been laid out earlier in this paper), then because tuition and fees act as a tax on graduate students, the more a university increases tuition, the more unattractive it will become to prospective talent. Importantly, if tuition increases amount to a wage cut for graduate students, it makes little sense for a university to

[95] https://public.tableau.com/app/profile/university.of.calgary.office.of.institutional.analysis/viz/Factbook-SummaryALL/TableofContents
[96] https://www.ucalgary.ca/sites/default/files/teams/10/UCalgary-Strategic-Plan-Ahead-of-Tomorrow.pdf, pg. 3.
[97] Hudes, Sammy. "Layoffs Begin at U of C, Mount Royal Following Provincial Budget Cuts." *Calgary Herald*, November 28, 2019.
[98] University of Calgary, "Annual Report for the year ended March 31, 2019" § (2019), pg. 9.
[99] Slack, Jeff. "UofC anticipates 125 to 150 positions will be terminated over the next few months." *CityNews*, Calgary, April 21, 2020.
[100] Cook, Dustin. "U of A plans to cut 650 jobs by 2022 to overcome $127-million funding gap." *Edmonton Journal,* October 4, 2022.

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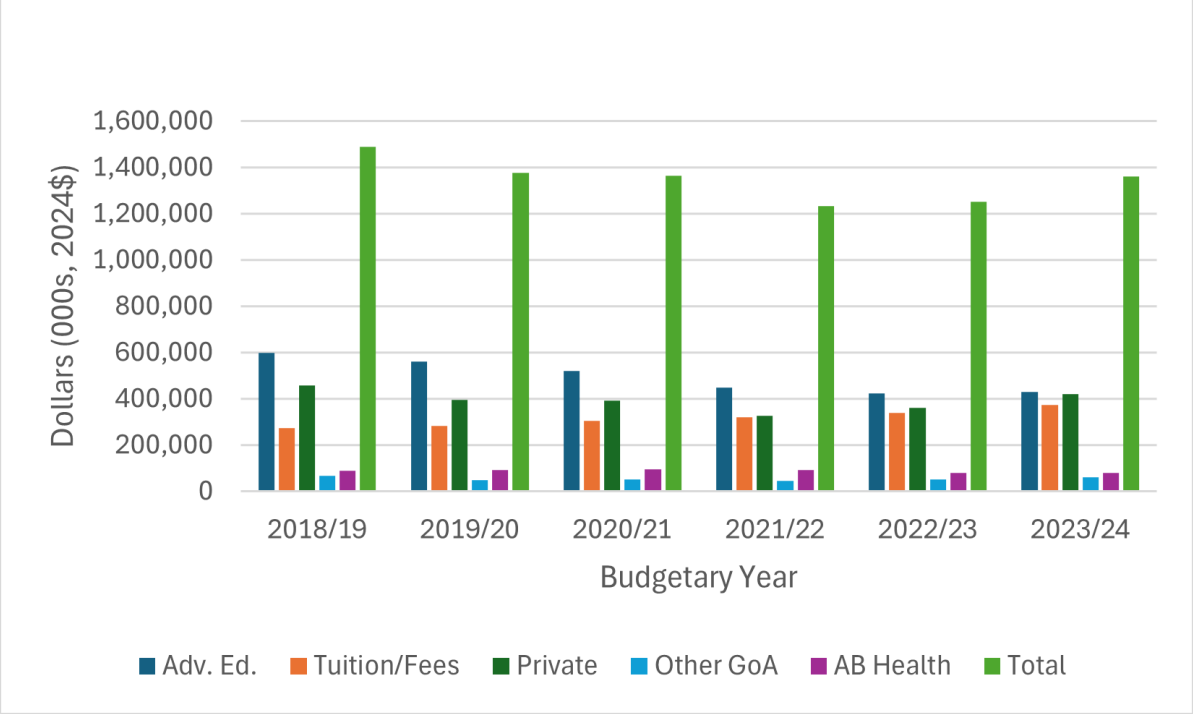
increase tuition in order to increase graduate student's funding packages—hence the importance of external sources of funding.

Fig.5. Real Public, Private, and Tuition-Based Funding for UCalgary, 2018/19 to 2023/2024[101]



2.3. Albertan Graduate Student Scholarships and Awards

If internal operating revenue is declining, then graduate students must turn to external funding sources in order to pay their living expenses and support their research initiatives. External merit-based scholarships fill this role. Students compete to showcase research excellence, well-rounded academic and professional abilities, or some combination of the two, in the hopes of winning prestigious awards with (generally) high monetary values. Scholarships thus serve two important functions: they compensate students for their work *and* signal to institutions, granting agencies, businesses, and others that these students have high research potential. Scholarships, as a consequence, can keep students out of poverty and significantly dictate the course of their future careers, whether those careers are in academic, business, or government. But this is only possible if scholarships have a sufficient enough financial value, and are distributed to a sufficiently large percentage of the graduate student

[101] See Appendix C.

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population, to have an impact on the average affordability and career progression of graduate students. As we will see, in Alberta, this is not the current reality.

Scholarships can come from both government and private sources. Some of the highest valued scholarships, in fact, come from the private sector. For example, the Loran Scholars Foundation, a national charitable organization, offers a four-year, $100,000 scholarship;[102] the Schulich Leader Scholarships are available for 100 STEM students, valued at $120,000 each.[103] Both these scholarships, however, are limited to high school students just entering university. Indeed, a great deal of the highest valued and most prestigious privately funded scholarships are focused on high school entrants to university of existing undergraduate students. For graduate students, high-paying and well-regarded scholarships almost always come from the government.

The Albertan government currently offers a variety of merit-based scholarships for graduate students, ranging from a value of $10,000 to $31,000 (See Appendix A.). However, many of these existing scholarships are restricted to specific degrees or subject matter. For instance, to be legible for the *Alberta Innovates Graduate Student Scholarship*, you must be studying either Information Communications Technology (ICT) or nanotechnology.[104] Three separate scholarships, totaling two awards each, are dedicated to students studying law;[105,106,107] as they are open to juris doctor (J.D.) students, these awards are technically *undergraduate* scholarships, given the Canadian convention of treating J.D. degrees as undergraduate professional programs.[108] Ultimately, only *one* scholarship is open to graduate students of all degree streams and subjects of study: the *Alberta Graduate Excellence Scholarship* (AGES), which in institutions like the University of Calgary are awarded as part of the yearly Tri-Council application process.[109] Public information on the total number of AGES awards that are distributed yearly is limited, but the University of Alberta lists 480 awards in 2024:[110] it is not unreasonable to assume that the total number of AGES distributed is less than 1,000.

Note that merit-based scholarships are not the same thing as financial aid scholarships. Financial aid scholarships—which are also known as "non-repayable" sources of financial aid, due to the fact that students are not expected to pay a portion of this aid back—are distributed on the basis of

[102] https://loranscholar.ca/the-program/how-it-works/
[103] https://schulichleaders.com/
[104] https://studentaid.alberta.ca/scholarships/alberta-innovates-graduate-student-scholarship/
[105] https://studentaid.alberta.ca/scholarships/chief-justice-fraser-scholarship/
[106] https://studentaid.alberta.ca/scholarships/david-johnston-law-scholarship/
[107] https://studentaid.alberta.ca/scholarships/excellence-in-public-law-scholarship/
[108] https://www.law.utoronto.ca/admissions/jd-admissions
[109] https://iac01.ucalgary.ca/FGSA/Public/SpecificAward.aspx?AwardID=6940
[110] https://www.ualberta.ca/en/graduate-studies/media-library/awards-and-funding/awards-documents/ages-dept-allocation.pdf

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financial need.[111] While these are not the same as merit-based scholarships, they do nonetheless represent another potential funding source for graduate students—albeit only for those who are already experiencing financial hardship. Unfortunately, even if we want to include financial aid in the conversation, non-repayable student financial aid faces a severe funding shortfall when we dig into the numbers.

Alberta has three categories of non-repayable financial aid:[112]

- Grants;
- Scholarships and awards; and
- The Alberta Heritage Scholarship.

Additionally, there are **three** factors that determine whether funding for non-repayable student financial aid keeps Alberta's post-secondary system accessible to all:

1. Enrollment numbers;
2. Tuition expenses; and
3. Cost of living

According to the Government of Alberta's data, the number of students enrolled in a master's or doctoral degree has increased **14.8%** from 2019 to 2024, the latest date with data.[113] StatCan data shows that the average graduate student tuition in the province has increased **11.1%** since 2019 as well, in nominal terms (adjusted for inflation, it has dropped 12.3%).[114] Finally, Alberta's cost of living has increased year over year as well, with Calgary and Alberta more broadly having the highest inflation rate in the country at certain points in 2024.[115] With all three numbers increasing (when using nominal tuition dollars; it is two out of three increasing when average tuition is adjusted for inflation),

[111] Student loans thus fall under the category of "repayable financial aid." Because these are not unconditional grants—i.e., because students must pay back portions of the loan, plus interest—we are excluding them from our discussion of graduate student funding. See *UCGSA.03*, in the UCGSA Policy Library, for more information on student financial aid in Alberta.
[112] Ministry of Advanced Education, "Annual Report: Advanced Education, 2021-2022" § (2022), pg. 55.
[113] See "System headcount enrolment within the Alberta post-secondary system" for data.
[114] https://www150.statcan.gc.ca/t1/tbl1/en/tv.action?pid=3710000401&pickMembers%5B0%5D=1.10&cubeTimeFrame.startYear=2018+%2F+2019&cubeTimeFrame.endYear=2024+%2F+2025&referencePeriods=20180101%2C20240101
[115] https://calgaryherald.com/news/calgary-alberta-inflation-highest-canada-october-2024

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then funding for non-repayable student financial aid would have to have increased substantially from 2019 as well, in order to ensure that students in financial need can access graduate school.

Unfortunately, we would argue that the funding available for grants, scholarships, and other non-repayable sources has not kept pace with increasing headcount or costs, particularly the cost of living. In nominal terms, a total of $149 million was available for non-repayable student financial aid in the 2018/19 academic year, while in 2025 that number sums to $164 million. This is an increase of just under $15 million over seven years, or a **10% increase**, far below the increased headcount, nominal tuition, and cost of living. When we adjust for inflation, a total of $180 million was available for non-repayable student financial aid in the 2018/19 academic year, compared with $164 million today. That amounts to a **$16 million *cut*, or a decline of 8.8%** (see **Fig. 6.** for more). While graduate students have also seen a 12.3% reduction in tuition, in real terms, increasing enrollment and increasing cost of living still means that far fewer dollars are available on a per-student basis for non-repayable financial aid.

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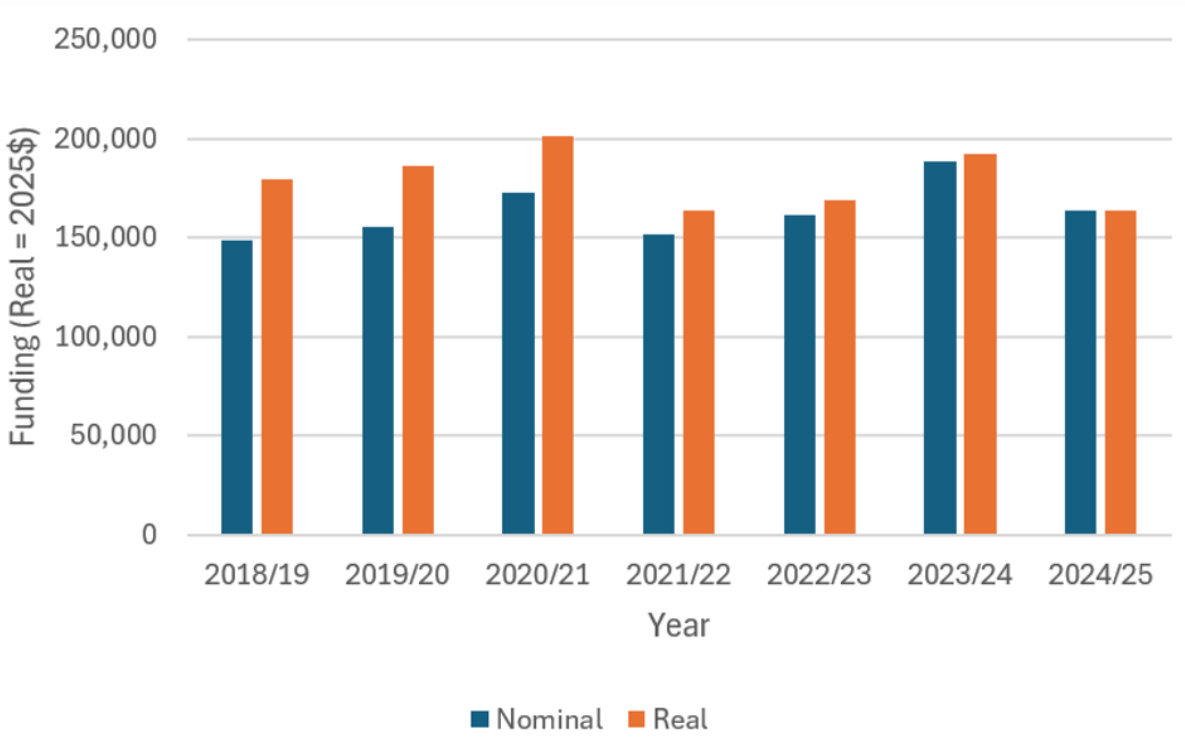
Fig.6. Nominal and Real Funding for Non-Repayable Student Financial Aid, 2018/19 – 2024/25[116,117,118,119,120,121,122,]



The peak of available funding was in the 2020/21 academic year, where $173 million (nominal; $201 million in 2025 dollars) was available for grants and scholarships. Funding was sharply reduced the year after and has ebbed and flowed since then.[123,124] The rationale provided in the Ministry of Advanced Education's Annual Report was that funding for grants was cut by 35.7% to prevent the

[116] Ministry of Advanced Education, "Annual Report: Advanced Education, 2019-2020" § (2020), pg. 47.
[117] Ministry of Advanced Education, "Annual Report: Advanced Education, 2020-2021" § (2021), pg. 63.
[118] Ministry of Advanced Education, "Annual Report: Advanced Education, 2021-2022" § (2022), pg. 55.
[119] Ministry of Advanced Education, "Annual Report: Advanced Education, 2022-2023" § (2023), pg. 48.
[120] Ministry of Advanced Education, "Annual Report: Advanced Education, 2023-2024" § (2024), pg. 93.
[121] Ministry of Advanced Education, "Annual Report: Advanced Education, 2024-2025" § (2025), pg. 43.
[122] Inflation calculated using https://www.bankofcanada.ca/rates/related/inflation-calculator/., June 2025 CPI
[123] Ministry of Advanced Education, "Annual Report: Advanced Education, 2020-2021" § (2021), pg. 63.
[124] https://www.bankofcanada.ca/rates/related/inflation-calculator/. June 2021 CPI to June 2025 CPI. Annual inflation rate change: 3.84%

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Alberta Study Grant, a needs-based grant targeting "one-year certificates, graduate studies, and apprenticeships," from going over budget; said grant had gone over budget the previous year because of an "unexpected increase in demand".[125,126] While we recognize that the COVID-19 pandemic was an unusual time for the government and the post-secondary system, we also would like to note 2021 is arguably the beginning of the cost-of-living crisis that Canada has yet to fully recover from. As such, non-repayable financial aid is perhaps even more important in a post-COVID world, and massive cuts to its funding are unlikely to help maintain an open and accessible post-secondary system.

Adjusted for inflation, then, the provincial government has cut non-repayable student financial aid since 2021. They have made these cuts despite the large increases in tuition and mandatory non-instructional fees during that very same period. They have also made these cuts in the midst of a cost-of-living crisis—one that students, and graduate students in particular, are not immune from. Graduate students are, on average, older than undergraduate students: they frequently have already started, or are beginning to start, families of their own, or have responsibilities to grandparents and parents. Unlike other individuals in a similar position, graduate students also have unavoidable costs in the form of tuition and mandatory non-instructional fees. Financial aid not only helps graduate students, but their dependents as well. Conversely, the negative impacts of a financial aid system that creates high levels of debt will not be limited only to graduate students.

Albertan graduate students thus face a three-pronged challenge. On the one hand, operating revenue has declined precipitously when both inflation and enrollment growth are taken into account, which leaves less funding available to compensate graduate student labour or fund internal, institutional scholarships. External scholarships for graduate students are overwhelmingly provided by government sources, but the Albertan government has limited merit-based scholarships that fund only a select few programs. Finally, even student financial aid is an unreliable funder, despite being limited to the most vulnerable students, because of cuts to non-repayable student financial aid.

2.4. Research Grants and Scholarships: The Federal Government

The final source of external funding for graduate students is the federal government. While the opening and operation of post-secondary institutions are ultimately provincial jurisdiction,[127] the federal government nonetheless plays a substantial role in funding post-secondary research activities. Indeed, as ***Figure 7*** below shows, federal research funding to the University of Calgary the research allocation received from Alberta's Ministry of Advanced Education. In fact, even if we assume that all

[125] *Ibid*.
[126] Ministry of Advanced Education, "Annual Report: Advanced Education, 2018-2019" § (2019), pg. 83.
[127] Part IV: Legislative Powers, Section 93. *Constitution Act, 1867*.

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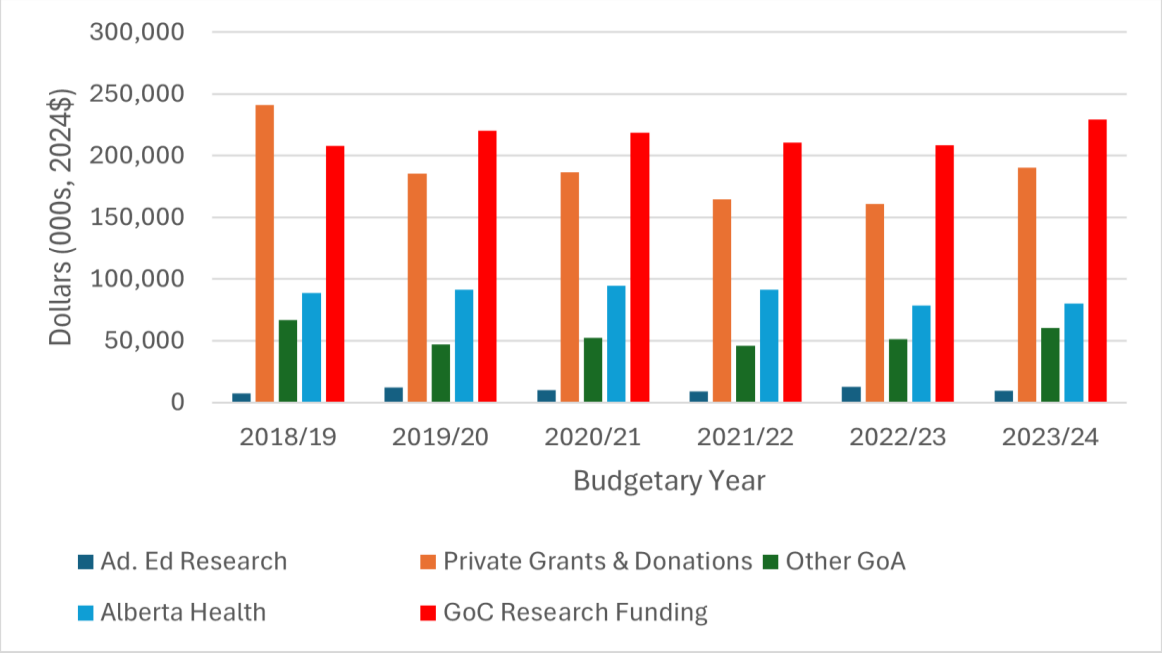
funding from other Government of Alberta Ministries and Alberta Health are oriented to research, federal funding exceeds that from the province by almost a factor of two. To further underscore the importance of federal funding for the University's budget, since 2019 total funding from the Government of Canada has also exceeded private grants and donations. Despite this, as we will see, there are significant gaps in the federal research funding structure that leave Canadian graduate students worse off than they were twenty years ago.

Fig.7. Real Government of Canada Funding, Advanced Ed Research Funding, Private Grants and Donations, Other GoA Funding, and Alberta Health 2018/19 to 2023/24[128]



Federal funding flows to graduate students through three avenues: by working on research projects with faculty members who have won a federal grant, through a series of merit-based awards and scholarships distributed directly to students, and through the Mitacs program, which connects students with private and public sector career opportunities while still in school.[129,130] Research grants

[128] See Appendix C.
[129] https://www.mitacs.ca/discover-students/
[130] The federal government also provides student loans and financial aid grants to eligible students. *However*, much like with Alberta student loans, we are excluding repayable financial aid from the discussion on graduate student funding. Equally important is the fact that graduate students *are ineligible for non-repayable financial aid from the government*. Currently, only undergraduate students may apply for the Canada Student Grants program. See https://www.canada.ca/en/services/benefits/education/student-aid/grants-loans/full-time.html for more.

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where graduate students serve as research assistants, or in some other capacity, are an important means of funding graduate school for students. And as we will discuss in a later section of this paper, evidence from multiple countries shows that these grants—along with other forms of private and public sector grants to students—help facilitate technology transfers between academia and the private sector. However, while working on faculty-led projects provides an important opportunity for graduate students to hone their skills, assist in the operations of major, multi million-dollar research projects, and connect academia with the private sector, they nonetheless do not necessarily reward graduate students for their own original research work. Additionally, graduate students in certain programs—such as physics, psychology, or some branches of engineering—will have more opportunities to participate in faculty-led research, as these degree streams conduct work in large laboratories that can run several experiments simultaneously. For example, University of British Columbia's Behavioural Neurogenetics Lab, which is one of 55 laboratories run by the UBC Psychology Department, has 4 PhD students working on its many projects.[131] TRIUMF, Canada's national particle accelerator centre, has over 150 students working within it, according to its website.[132] Faculty-led projects in fields like economics or sociology cannot support the same number of students. Thus, federally funded awards and scholarships are unique in that they directly reward graduate student ingenuity and are (at least theoretically) equally available to students from all degree types.

Mitacs is somewhat different in that there is significant scope for rewarding graduate students for research projects they originate and control, such as the example of computer science graduates from McGill utilizing Mitacs funding to turn their research into a tech start-up geared at improving medical outcomes for women.[133] However, this is indirect funding: Mitacs typically works by providing students with internship opportunities and source private or public sources of funding, rather than directly funding their research projects in the same way as the Tri-Council granting agencies.[134] While Mitacs is an important model for connecting students to the private and public sectors—and something that will be mentioned again later in this paper—its impact on graduate student stipends is more limited than other forms of federal funding.

In Canada, the main merit-based scholarships for graduate students are the Canadian Graduate Scholarships, available to thesis-based master's students (CGS-M)[135] and doctoral students (CGS-D).[136] Doctoral students had, before *Budget 2024,* access to a number of fellowships and postgraduate

[131] https://rankinlab.psych.ubc.ca/labmembers/graduate-students/
[132] https://www.triumf.ca/home/for-public/careers-triumf/student-programs
[133] https://www.mitacs.ca/our-innovation-insights/startup-develops-device-to-support-womens-pelvic-floors/
[134] https://www.mitacs.ca/about/what-we-do/
[135] https://www.nserc-crsng.gc.ca/students-etudiants/pg-cs/cgsm-bescm_eng.asp
[136] https://www.nserc-crsng.gc.ca/students-etudiants/pg-cs/cgsd-bescd_eng.asp

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awards as well, though a restructuring of the scholarships have resulted in these funding opportunities being folded into CGS-D (as will be detailed below). The Canadian Graduate Scholarships are awarded by the three Tri-Council granting agencies, each one responsible for a broad envelope of research competencies. These agencies are:

- The Social Science and Humanities Research Council (SSHRC), responsible for funding social science, humanities, and business research;[137]
- The Natural Science and Engineering Research Council (NSERC), responsible for funding natural science and engineering research;[138] and
- The Canadian Institutes for Health Research (CIHR), responsible for funding health and medical research.[139]

The policies, criteria, and eligibility of all grants awarded by the Tri-Council agencies are determined by their respective Councils, which operate at arms-length from the government: as NSERC's enabling legislation details, the federal cabinet can appoint the President and members of the Council, but cannot dictate which policies the Council must pursue.[140] This includes the research criteria for CGS-M and CGS-D's. A further layer of separation exists at the level of individual PSI's: each eligible institution is given a quota of awards they can offer to students, as determined by the past three years of federal funding, with institutions with greater success in funding competitions receiving higher allocations.[141] An internal review committee for that institution then collects applications for the CGS awards and sends those of their top students to the Tri-Council agencies.[142] The eligibility criteria for CGS awards, then, is determined as much as possible by academics and subject-matter experts, independent of any direct control by governments. What the federal cabinet *can* control, however, is the funding available to each of the agencies CGS competitions, thus changing the value of the awards and the total number available for distribution.

Figure 8 below shows the value of CGS scholarships, taken from the 2024 federal budget. The column detailing the "current programs annual award" shows what the value of these scholarships was from 2004 to 2024. The lack of any funding increase or top-up resulted in inflation eroding the real value of these awards: for example, a $35,000 CGS-D award in 2004 would be worth **$53,831** in 2024, a

[137] https://www.sshrc-crsh.gc.ca/home-accueil-eng.aspx
[138] https://www.nserc-crsng.gc.ca/index_eng.asp
[139] https://cihr-irsc.gc.ca/e/193.html
[140] https://laws.justice.gc.ca/eng/acts/N-21/page-1.html
[141] https://www.nserc-crsng.gc.ca/students-etudiants/cgsallocations-quotasbesc_eng.asp
[142] https://grad.ucalgary.ca/awards/award-opportunities/canada-graduate-scholarships

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loss of **54%** of its value.[143] The increase in value to $40,000 is thus an improvement, but still nearly **$14,000** less than the inflation-adjusted value of the award in 2004. Doctoral students additionally suffer from the loss of the Vanier Scholarship as part of the streamlining process for doctoral scholarships, which at $50,000 was originally the highest valued graduate student scholarship in Canada. The situation is more ideal for master's students, as the inflation-adjusted value for CGS-M in 2004 is **$26,915**, meaning the new value announced in *Budget 2024* is in line with inflation. Without a commitment from the federal government to index CGS-M to CPI, though, the financial value of the award will rapidly begin to dissipate, as it had from 2004 onward.

Fig.8. Budget 2024's Changes to CGS Awards[144]

	Current Programs Annual Award		New Talent Program Annual Award
Canada Graduate Scholarships – Master's	$17,500	**Master's →**	$27,000
SSHRC Doctoral Fellowships	$20,000	**Doctoral →**	$40,000
NSERC Postgraduate Scholarships	$21,000		
CIHR Doctoral Foreign Study Award	$35,000		
Canada Graduate Scholarships – Doctoral	$35,000		
Vanier Canada Graduate Scholarships	$50,000		
SSHRC Post-doctoral Fellowships	$45,000	**Post-doctoral →**	$70,000
NSERC Post-doctoral Fellowships	$45,000		
CIHR Fellowship	$40,000-$60,000		
Banting Post-doctoral Fellowships	$70,000		

[143] Number arrived at by taking 2004-2023 value of CGS-D and plugging it into the Bank of Canada's inflation calculator (October 2024 CPI, annual inflation rate of 2.18% during period).
https://www.bankofcanada.ca/rates/related/inflation-calculator/
[144] *Budget 2024*, Chapter 4: Economic Growth for Every Generation, pg. 175.

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Nevertheless, the CGS awards remain the highest valued and most prestigious publicly funded scholarships available to Canadian graduate students. Being awarded a Tri-Council scholarship is a necessary step towards earning an academic job; for graduate students who work outside academia (which constitutes the majority of graduate students[145]), a Tri-Council scholarship still signals to employers that winners possess extensive human capital, especially in the realm of non-routine analytical skills. And even if a Tri-Council winner does not go on to find an academic job, their scholarship will help fund essential teaching and research operations at their institutions and make it more likely for said institution to attract future external investment. That these awards carry this level of prestige and financial disbursement even when they are being eroded via inflation speaks to the power of merit-based awards with high financial value.

Ultimately, though, there are two major challenges facing graduate students vis-à-vis the Tri-Council agencies. The first is that these scholarships are few and far between. The second is that there is a very limited quota of awards available to international students—*up to* 15% of doctoral awards can go to international students, and none are allotted to master's students.[146]

As stated above, each eligible PSI in Canada is given a quota by the Tri-Council's. This is the total number of scholarships that an institution can offer to its students on behalf of the granting agencies. They are not the total number of scholarships that *will* be distributed, but are the theoretical *maximum* that can be offered to students. ***Figure 9*** and ***Figure 10*** show the Master's and Doctoral quotas for each granting agency, respectively, as well as the total number of domestic students in each degree stream.[147,148] If we add up the total quotas, we arrive at a maximum of **7,402** scholarships for approximately 213,210 eligible students,[149] meaning only **3.5% of students will receive a Tri-Council scholarship.** Note that, while the quote numbers are up to date as of writing, the student enrollment numbers are from 2022/23. The total eligible population is likely higher during the 2024/25 academic year than two years prior, so this percentage may actually *overestimate* the theoretical maximum.

[145] Statistics Canada estimated in 2016 that approximately 61% of men and women with PhD's worked outside of academia: https://www150.statcan.gc.ca/n1/pub/36-28-0001/2022012/article/00002-eng.htm
[146] https://www.nserc-crsng.gc.ca/NewsDetail-DetailNouvelles_eng.asp?ID=1518
[147] See Appendix D for how the distribution of students was calculated.
[148] We would like to thank Hannah Hunter, Research & Policy Analyst at the Canadian Alliance of Student Associations (CASA), and Trevor Potts, Director of Policy & Research at Evidence for Democracy, for assistance in compiling these numbers.
[149] This number includes students who were classified as "other" or "unclassified." They are included in the total as not fitting into Statistics Canada's categories does not preclude you from being eligible for a Tri-Council award. They are *not* included in ***Figures 9*** or ***10*** as we do not have enough information to classify them according to eligible granting agency. As such, the total students for both figures is lower than the total listed in the body paragraph.

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Regardless, fewer awards are distributed per year than quotas, so the *actual* number of domestic graduate students who receive a Tri-Council scholarship is likely significantly lower than 3.5%.

Fig.9. Master's Student Tri-Council Quotas in 2024/25 and Total Domestic Enrollment, 2022/23[150,151]

Granting Agency	Master's Quotas	Total Students	% of Maximum Successful Applicants
SSHRC	1,365	86,889	1.6
NSERC	840[152]	29,741	2.8
CIHR	795	54,936	1.4
Total	***3,000***	***171,566***	***1.7***

Fig.10. PhD Students Tri-Council Quotas in 2024/25 and Total Domestic Enrollment, 2022/23[153,154,155,156]

Granting Agency	PhD Quotas	Total Students	% of Maximum Successful Applicants
SSHRC	1,817	18,567	9.8
NSERC	1,655	14,571	11.4
CIHR	930	4,353	21.4
Total	***4,402***	***37,491***	***11.7***

International students being ineligible for all non-Vanier Tri-Council awards, despite conducting the same research and teaching the same classes as domestic students, pulls the total number down even further. In 2022/23, Canada's total Master's enrollment—domestic and international—stood at

150 https://www.nserc-crsng.gc.ca/students-etudiants/cgsallocations-quotasbesc_eng.asp

151 https://www150.statcan.gc.ca/t1/tbl1/en/tv.action?pid=3710001801&pickMembers%5B0%5D=2.2&pickMembers%5B1%5D=5.14&pickMembers%5B2%5D=7.2&pickMembers%5B3%5D=4.6&pickMembers%5B4%5D=6.1&cubeTimeFrame.startYear=2022+%2F+2023&cubeTimeFrame.endYear=2022+%2F+2023&referencePeriods=20220101%2C20220101

152 Includes 20 earmarked for meritorious Indigenous scholars.

153 https://www.sshrc-crsh.gc.ca/about-au_sujet/facts-faits/index-eng.aspx

154 https://www.nserc-crsng.gc.ca/Students-Etudiants/PG-CS/quota-quota_eng.asp

155 https://www.cihr-irsc.gc.ca/e/51528.html

156 https://www150.statcan.gc.ca/t1/tbl1/en/tv.action?pid=3710001801&pickMembers%5B0%5D=2.2&pickMembers%5B1%5D=5.14&pickMembers%5B2%5D=7.2&pickMembers%5B3%5D=4.6&pickMembers%5B4%5D=6.1&cubeTimeFrame.startYear=2022+%2F+2023&cubeTimeFrame.endYear=2022+%2F+2023&referencePeriods=20220101%2C20220101

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231,687; for Doctoral students, it was 63,027.[157] Only 7,402 scholarships would have been available to a total of 294,714, a mere **2.5%** of the graduate student population. Again, note that these numbers are from 2022/23 while the quota numbers are for the 2024/25 intake year. Reputational damage from Immigration, Refugees, and Citizenship Canada (IRCC) applying a cap on international students may have led to a decrease in enrollment (among other things) for 2024/25,[158] but international students in the 2022/23 intake year would also have had access to the Vanier Scholarship. Consequently, we believe the 2.5% accurately reflects how the theoretical *maximum* number of students that could be supported via a CGS award, with the actual number being significantly lower.

What should be clear from this data is that the Tri-Council scholarships, while relatively lucrative, are hardly a consistent source of funding for students. While these scholarships have an outsized impact on a scholar's academic career, and the funding graduate students bring to Albertan universities constitutes an increasingly large share of their revenue, most students will not receive a Tri-Council funded award. Funding and operating grant cuts in other parts of the post-secondary system thus are not compensated for by the federal government, leaving aside questions of whether that is possible *or* desirable in the first place.

2.5. Conclusion

The above funding data should showcase how tightly intertwined graduate students are with the financial health of post-secondary institutions. The relationship is bi-directional: graduate students can bring in more funding for universities by winning scholarships and awards, but when base operating grants are cut, graduate students face concurrent wage and financial support reductions.

The data should also show that only two sources of funding for universities—tuition/fees and federal research funding—have consistently been increasing since 2019, adjusted for inflation. This is problematic for graduate students, as tuition increases represent a wage cut and federal scholarships only reach a small contingent of students. All other sources—operating grants, private funding, and student financial aid—have seen steep declines during that period. Therefore, the overall funding situation for graduate students is quite dire: universities not only lack the funds to pay graduate

157 https://www150.statcan.gc.ca/t1/tbl1/en/tv.action?pid=3710001801&pickMembers%5B0%5D=2.2&pickMembers%5B1%5D=5.1&pickMembers%5B2%5D=7.1&pickMembers%5B3%5D=4.7&pickMembers%5B4%5D=6.1&cubeTimeFrame.startYear=2022+%2F+2023&cubeTimeFrame.endYear=2022+%2F+2023&referencePeriods=20220101%2C20220101

158 https://higheredstrategy.com/carnage/

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students for their labour but have had to balance their books by increasingly charging students more to attend.

If graduate students respond to affordability concerns and economic incentives just like everyone else, then Alberta's post-secondary system is becoming less competitive in attracting top talent. If other jurisdictions pay their graduate students better than Alberta does, then the province is also becoming less competitive in *retaining* top talent. Given the close connection between graduate student labour and the innovation ecosystem, any exodus of graduate students will harm Alberta's broader economy.

As the next portion of the paper demonstrates, we may already be seeing the harmful effect of an uncompetitive post-secondary system on at least on key macroeconomic metric: productivity growth.

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Part 3: Graduate Student Funding in a Comparative Perspective

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3.1. Introduction

This section of the paper compares Canada's graduate student funding with other jurisdictions. It also looks at how Alberta in particular ranks amongst Canadian provinces in terms of graduate stipends and funding support. The reason "why" is very simple: an exodus of human capital can have serious, problematic consequences for any economy, especially if it is dominated by white collar services jobs and technology. This is why the negative effects of human capital flight are often called "brain drain:" if top talent has an incentive to go elsewhere, it can mean their home country loses out on harnessing the benefits of their accumulated skills, knowledge, and social connections.

To be sure, the free movement of people and capital is generally a net benefit to all involved, which is why not all economists see human capital flight as being exclusively bad for countries with high levels of net-migration,[159] or argue that its negative effects are contingent on the domestic policies of a migrants home country.[160] From a post-secondary standpoint, however, a "brain drain" reflects a failure of governments and institutions to provide sufficient incentives for students to study in their region. This will inevitably have negative consequences for the system itself, as less students means less funding (both internal, through tuition, and external, through scholarships and awards), less prestige, and less connections with private businesses. Economically, the benefits of post-secondary institutions—something we will highlight in more detail later in the paper—will fail to materialize if students feel a greater pull to study elsewhere.

This section thus aims to show the economic incentive students face to study in some jurisdiction other than Canada—aka, the "brain drain" pressure our PSE system faces. It will do so by first comparing Canada's graduate stipend levels with other countries, particularly those in the Organization for Economic Cooperation and Development (OECD). It will then compare Alberta's stipend levels with other provinces in Canada. Finally, we provide evidence that Alberta has been suffering from a structural "leaky pipeline," meaning that our PSE system is less adept at getting undergraduates to become graduate students.

With those established, we will be able to outline our vision for a new funding model for Albertan graduate students, which we believe will allow us to better compete to retain—and eventually attract—top graduate talent.

[159] Tomohara, A. 2020. "Do migration networks worsen trade deficit? Evidence from the United States and Germany," *The World Economy* 44(6): 1720-1739.
[160] Gibson, J. and McKenzie, D. 2010. "The Economic Consequences of 'The Brain Drain' of the Best and Brightest: Microeconomic Evidence from Five Countries," *IZA Discussion Paper*. Retrieved from: https://docs.iza.org/dp5124.pdf

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3.2. Canada versus the World

Finding data on graduate student funding is difficult, as not all programs or institutions advertise their graduate stipends. Raw funding data also does not necessarily tell the full story: a high cost-of-living can easily erode an otherwise lucrative stipend. The latter point is especially important given rising housing costs and the still-lingering effects of the COVID-era inflation spike. Looking at Canada specifically, in 2024 nearly half of Canadians (45%) reported that inflation was making it difficult to meet day-to-day expenses, an increase of 12% over the previous year.[161] Rent also increased by 21.6% in Canada between 2021 and 2024;[162] some cities, such as Calgary, saw rent increase by 14.3% in 2023 alone.[163] If you adjust for average incomes, Canada has the second most unaffordable housing of all OECD countries, just a hair behind Portugal.[164] A graduate stipend in Canada, then, very likely will not provide as much financial security in Canada as it would in more affordable countries.

Unfortunately, data limitations prevent us from exploring this comparison with much rigour. *Academic Insider*, an educational website that provides advice and resources to prospective graduate students, listed the 2022 average PhD stipends for 14 highly developed countries and compared them with the average costs of living, excluding rent. The data was collected from Glassdoor.com and Numeo; as such, we lack stipend data for the year 2024 or adjust the 2022 cost-of-living to include rent. Nonetheless, the data we *can* access shows that Canada's average stipend is third lowest among all surveyed countries (***Fig.11***) *and* has the third lowest stipend/cost ratio (***Fig.12.***), meaning that our stipends do little to support graduate students living expenses when compared with other highly developed economies.

A study from Thomas Bailey, Andy Fraass, Kayona Karunakumar, and Andrea Wishart provides further supporting data that Canada's graduate stipends trail competitor nations, though we should note that this study has yet to undergo peer review.[165] The authors surveyed multiple schools from each province and gathered data on minimum funding guarantees for each institution's biology and physics programs. They then compared these totals with minimum stipends from the United States and United Kingdom. What they found was that only *two* of the 140 programs they surveyed in Canada had

[161] https://www150.statcan.gc.ca/n1/daily-quotidien/240815/dq240815b-eng.htm
[162] https://www.kelownarealestate.com/blog-posts/the-impact-of-canadas-21-6-three-year-rent-growth-on-real-estate-portfolio-valuations#:~:text=Understanding%20the%20Market%20Trends%20(2021,growth%2C%20particularly%20in%20urban%20centers.
[163] https://www.cbc.ca/news/canada/calgary/calgary-cmhc-report-rental-housing-market-data-1.7100712
[164] https://www.oecd.org/en/data/indicators/housing-prices.html?oecdcontrol-a81da07b0e-var6=HPI_YDH
[165] https://www.biorxiv.org/content/10.1101/2024.11.06.622240v3

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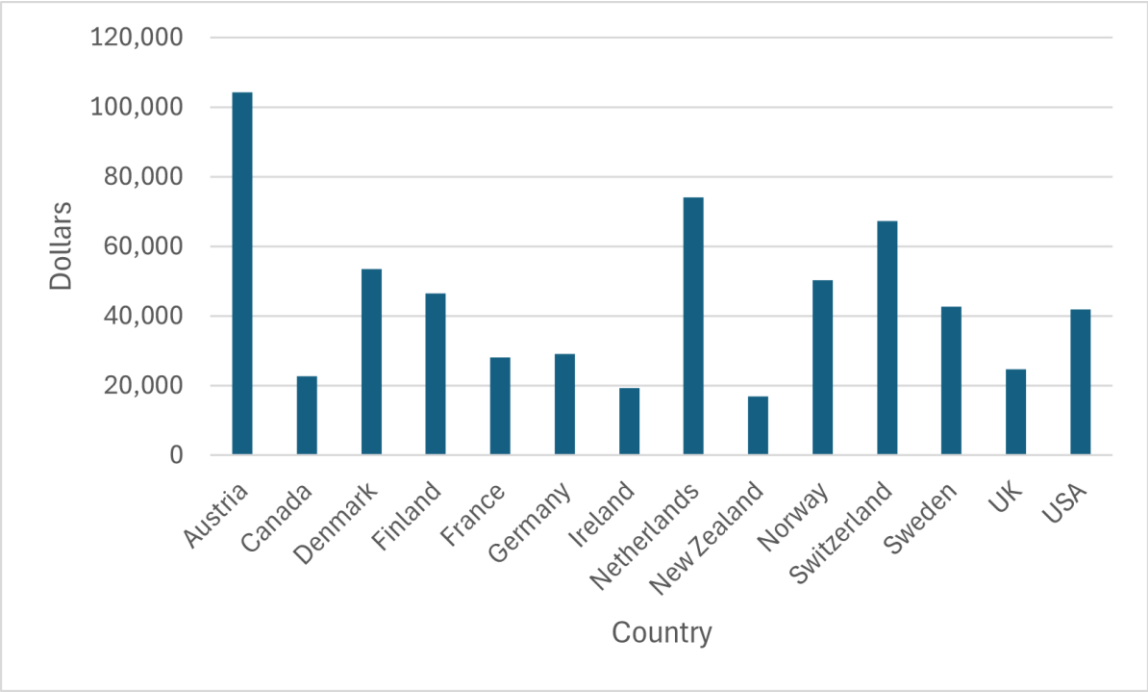
minimum stipend values above the poverty line, when accounting for tuition and mandatory fees.[166] Furthermore, they found that the highest minimum stipend from a Canadian university was either equal to, or in many cases lower, than the lowest minimum stipend for a biology graduate student in the United States.[167] The average minimum stipends were also significantly lower than that of the United Kingdom.[168] It should be noted, too, that not all Canadian institutions *have* minimum funding guarantees: for instance, the University of Manitoba does not have a gross stipend value in the author's datasets.

Fig.11. Average Stipends for 14 Countries, 2022 (USD)[169]



Finally, given how this paper has attempted to show how closely intertwined university operational funding and graduate stipends are, we can look at funding trends in other countries and gather whether graduate students are being increasingly or *decreasingly* supported through their studies. One example is the European Union: in 2021, the European Commission compiled a report that said EU members spent, on average, 0.8% of GDP on PSE; they argued that this constituted "significant underfunding" that threatened European universities ability to fund research, expand, support their

[166] *Ibid*.
[167] *Ibid*.
[168] *Ibid*.
[169] https://academiainsider.com/phd-student-salary-how-much-cash-will-you-get/

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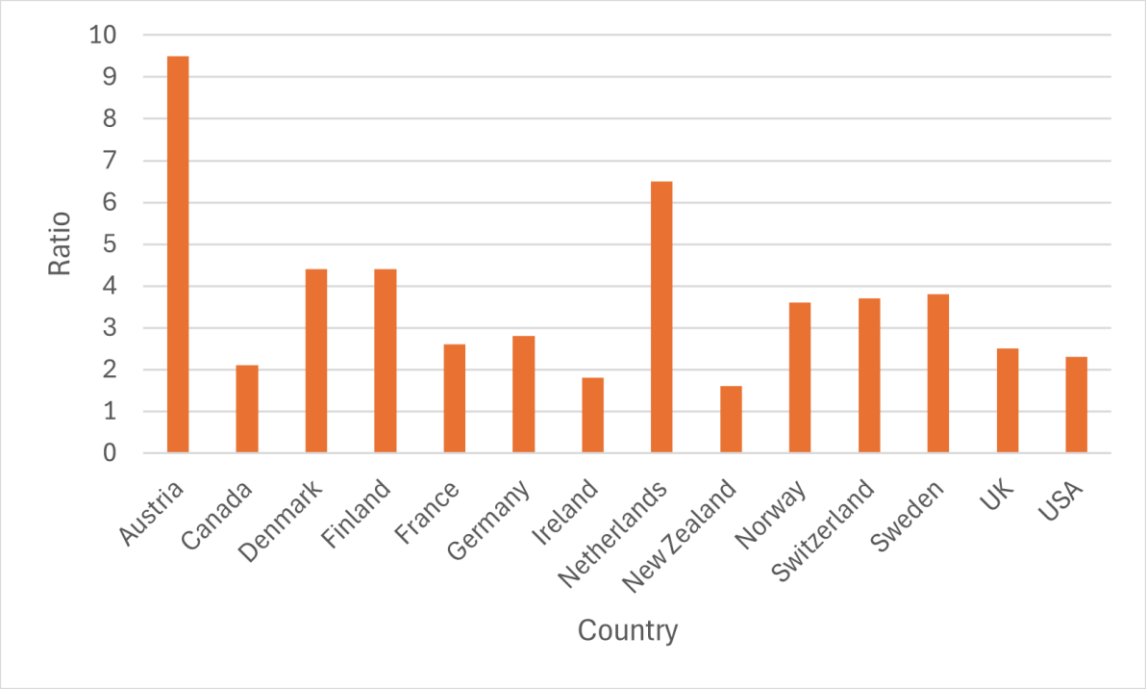
students, and fulfill their role as guardians of democratic and pluralistic values.[170] Consequently, the Commission has made expanding financial support for European universities a top priority, as evidenced by the €1.2 billion (approximately $1.8 billion CDN) injection into their Erasmus+ program, through to 2027.[171]

Fig.12. Stipend/Cost of Living Ratio of 14 Countries, 2022 (USD)[172]



While a $1.8 billion injection from the EU to help member states top of their PSE spending shows a willingness by European leaders to fund post-secondary, there is a different way of viewing Europe's numbers. According to data compiled by the Canadian Association of University Teachers (CAUT), in 2019/20, very few provinces managed to substantially exceed the 0.8% of GDP that the European Commission argued was "significant underfunding," with some—such as Alberta, British Columbia, and Ontario—scoring *below* 0.8%.[173] Note that this was before the largest spending cuts had

[170] European Commission. 2022. *Communication on a European Strategy for Universities*, pg. 11. Accessed online: https://education.ec.europa.eu/sites/default/files/2022-01/communication-european-strategy-for-universities-graphic-version.pdf.
[171] https://education.ec.europa.eu/education-levels/higher-education/european-universities-initiative/funding
[172] https://education.ec.europa.eu/education-levels/higher-education/european-universities-initiative/funding
[173] Data available here: https://www.caut.ca/resources/almanac/2-canada-provinces.

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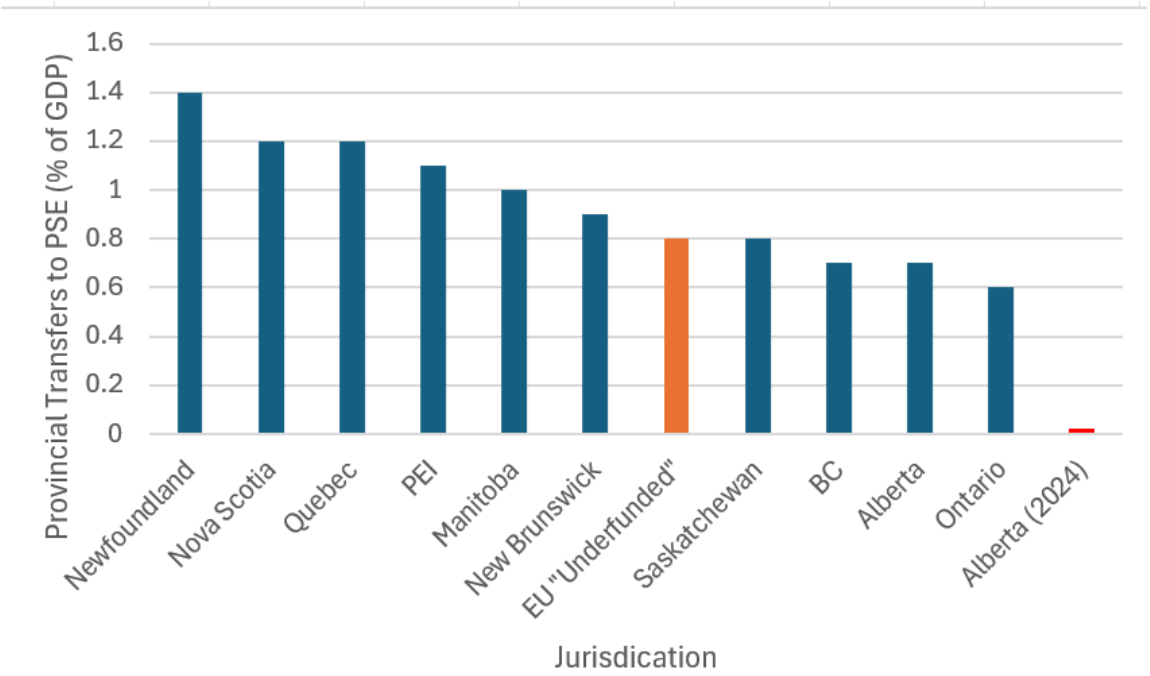
been instituted by the Alberta government: using 2024 data, Alberta spent just over $6.3 billion[174] on post-secondary education against a net GDP of $351.4 billion.[175] This means that, in 2024, Alberta spent only **0.02% of GDP on PSE (*Fig.13*).**

Fig.13. Provincial Transfers to PSE as a % of GDP[176]



The EU has taken an even stronger stance towards funding post-secondary, and graduate students more specifically, this year. Mario Draghi, a former president of the European Central Bank, authored a report titled *The Future of European Competitiveness* that proposed a wide number of regulatory, fiscal, monetary, procurement, and governance reforms.[177] This included instituting EU-wide scholarships for master's and PhD students in order to attract top talent from outside Europe,[178]

[174] See the Government of Alberta's Expense Tables on their "Budget Documents" website.
[175] https://www.ibisworld.com/canada/economic-profiles/alberta/#:~:text=Alberta's%20gross%20domestic%20product%20(GDP,the%205%20years%20to%202024.
[176] See Appendix C for more details.
[177] https://commission.europa.eu/document/download/ec1409c1-d4b4-4882-8bdd-3519f86bbb92_en?filename=The%20future%20of%20European%20competitiveness_%20In-depth%20analysis%20and%20recommendations_0.pdf
[178] *Ibid*, pg. 271.

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prioritizing giving graduate students access to top-level teachers,[179] ensuring graduate students have contracts to participate in research at Europe's best institutes and research centres,[180] instituting an EU-level visa program to streamline both the application process for students and to offer meaningful work opportunities after graduation,[181] and developing programs to identify and retain early talent that is socioeconomically at risk of leaving school.[182] The list of reforms is extensive, and covers everything from the EU more rapidly adopting artificial intelligence to harmonizing regulations and administrative law between member states; but despite its scope, students nonetheless are repeatedly mentioned as a key contributor to the future of a globally competitive European Union. Additionally, in light of President Donald Trump's conflicts with American universities and researchers, the President of the European Commission, Ursula von der Leyen, announced a €500 million increase to scientists and research agencies in order to entice American researchers to Europe.[183] Europe is thus in prime position to capitalize on any brain drains out of the United States, and reassert itself as one of the dominate contributes to science and human knowledge on the planet.

A more local comparison is, however, with the United States, where competition for talent has already been fierce. The United States earmarked $13 billion in funding for STEM education, "including scholarships, fellowships, and traineeships for graduate students,"[184] via the *CHIPS and Science Act* (CHIPs), as part of its plan to decouple the production of semiconductors and the development of artificial intelligence (A.I.) from China.[185] And funding increases to PSE were not just limited to the federal level: as Alex Usher has pointed out, US states have increased their funding to universities by **8.6%** and **10.2%** in 2022, 2023, and 2024, respectively, even if you exclude stimulus funding from the COVID-19 pandemic.[186] Indeed, there has been a substantial divergence between US states and Canadian provinces since 2013/14, as **Figure 14** shows: the former has seen funding outpace inflation every year, while the latter went from falling behind to declining outright starting in 2018/19.

[179] *Ibid*, pg. 251.
[180] *Ibid*, pg. 271.
[181] *Ibid*, pg. 275.
[182] *Ibid*, pg. 275.
[183] https://www.dw.com/en/eu-pledges-500-million-for-science-amid-us-funding-cuts/a-72438165
[184] Karnes, K. (Sept 9, 2022). "CGS Celebrates CHIPS and Science Act Signed Into Law," *Council of Graduate Schools*. Accessed online: https://cgsnet.org/press-releases/cgs-celebrates-chips-and-science-act-signed-into-law/.
[185] Taiwan's dominance of the chip industry makes it more important," *The Economist* (March 6, 2023). Accessed online: https://www.economist.com/special-report/2023/03/06/taiwans-dominance-of-the-chip-industry-makes-it-more-important.
[186] https://higheredstrategy.com/lagging/

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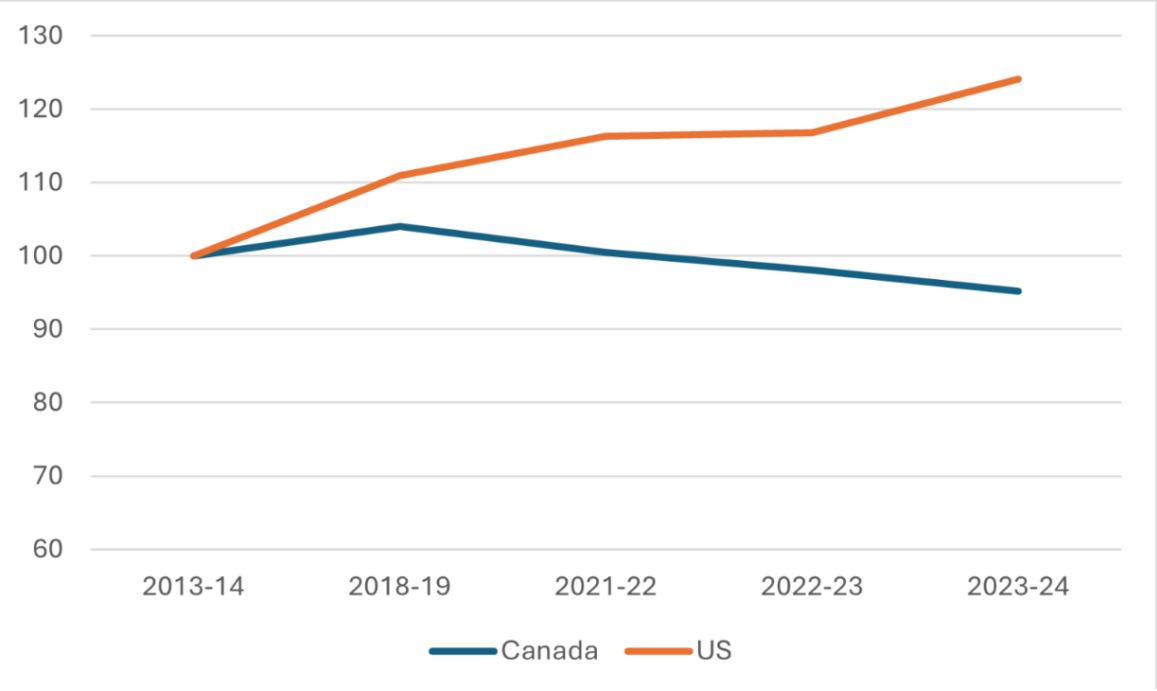
While the future of CHIPs is uncertain,[187,188,189] and the political climate of the United States is significantly more hostile to post-secondary education than it had been a year ago, the training and scholarships both CHIPs and increased state support have funded will nonetheless continue to impact American graduate stipends going forward. Given that stipends are already nearly twice as high on average compared to Canada, and can support students even in high-cost cities better than Canadian stipends, any additional funding advantage will further make America a more attractive place to study—and at Canada's expense.

Fig.14. Change in Real State/Provincial Expenditures on PSE, Canada vs US, 2013/14 to 2023/24 (taken from HESA)[190]



If we assume, too (and not unreasonably) that political instability will drive researchers out of the United States, this section should show that their likely destination is not Canada. Top quality graduate talent will not see a country with bottom-three cost-of-living support and declining funding as

[187] https://apnews.com/article/mike-johnson-chips-act-d5504f76d3aa0d5b401216f3592c9a09
[188] https://www.politico.com/live-updates/2025/03/04/trump-joint-address-to-congress/trump-tells-congress-to-end-chips-act-00212871
[189] https://www.nytimes.com/2025/03/10/technology/trump-chips-act.html?unlocked_article_code=1.204.M3QT.UGTrsSXi9m6B
[190] https://higheredstrategy.com/lagging/

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an attractive place to live, study, and further invest in their skills. If there is to be an exodus of students away from the United States, it will be to Europe—and this wave will likely pick up many Canadian students in its wake.

3.3. Alberta Versus Canada

If top global talent is likely to go to Europe, and top *Canadian* talent is likely to follow, which province stands to suffer the greatest brain drain? Or, put differently: how far below the Canadian average does Alberta fall when it comes to funding supports? If the province leads the way in stipends, scholarships, and grants, then it may mitigate the pull most students will feel towards Europe. Indeed, Alberta might even be in a position to take advantage of other province's lax funding and emerge as the sole attractive Canadian destination for graduate students—a vibrant reef in an otherwise stagnant sea.

As **Figure 13 above** shows, however, this is hardly the case. Alberta was near the bottom in funding as a percentage of GDP back before the heaviest cuts were enacted; the aftermath of these cuts dropped us even further down the list. As per the latest data (2022/23), this is true if we look at government expenditures per full-time equivalent (FTE) as well (**Fig.15**). Alberta ranks second last, and as Alex Usher and the Higher Education Strategy Associates (HESA) team note, the only reason we appear above the Canadian average is because Ontario singlehandedly drags that number down.[191]

[191] https://higheredstrategy.com/wp-content/uploads/2024/09/2024-09-04_SPEC-2024_v1_Publications.pdf, page 43

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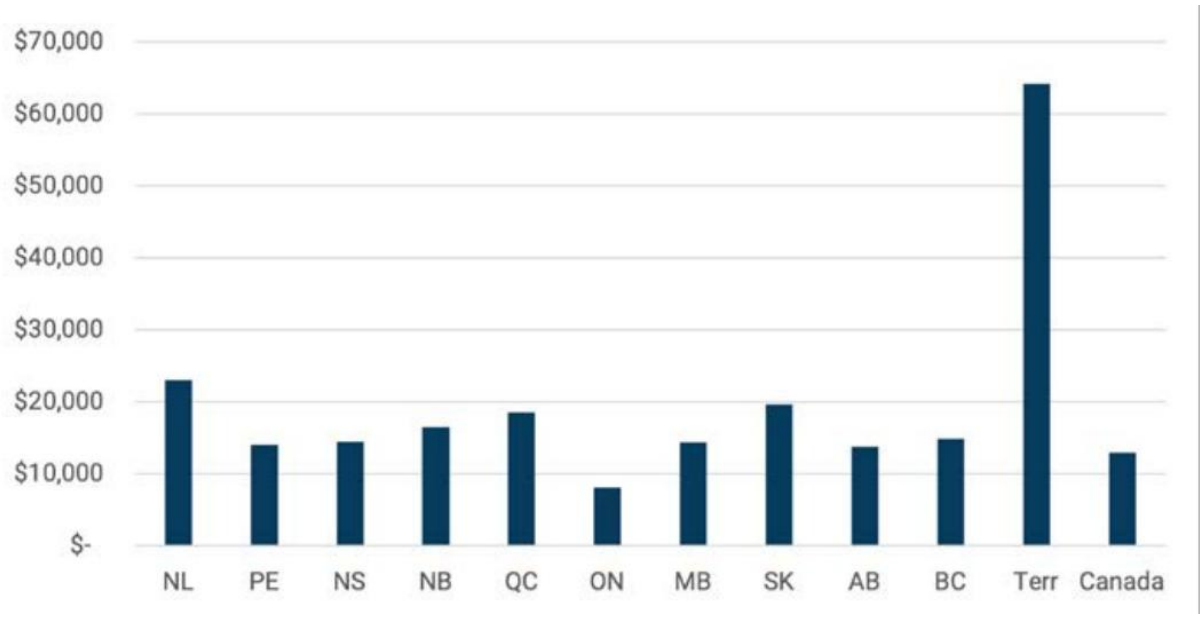
Fig.15. Provincial Expenditures per FTE, 2022/23 (HESA "State of Postsecondary Education: 2024," page 43)[192]



Another way of comparing provinces would be to look at their funding packages. This would indicate—in line with the facts we tried to establish previously in the paper—the extent to which a university's operating funding is directed to compensated graduate student labour. Unfortunately, the same data problems that prevent a robust international comparison prevent any *interprovincial* comparisons of sufficient rigour. Instead, we can return to Bailey et. al's pre-print from earlier and their dataset on *minimum net stipends* amongst major Canadian institutions. Their dataset—which is available at Github[193]—does only cover biology and physics students, but it can nonetheless be used to establish a baseline funding comparison, if we assume that most other graduate degrees do not command substantially higher minimum funding packages than these. Given the lifetime earnings of physics students in the United States and its status as a prestigious natural science,[194] this is not an unreasonable assumption. While UCalgary's lack of a minimum funding guarantee prevents us from using that institution in the comparison, the University of Alberta *does* have a minimum funding guarantee in these programs, and thus can stand as (likely the higher end) of stipends in the province.

[192] https://higheredstrategy.com/wp-content/uploads/2024/09/2024-09-04_SPEC-2024_v1_Publications.pdf
[193] https://github.com/UVicMicropaleo/Canadian-Minimum-Graduate-Stipends/blob/main/SOS_%20Minimum%20Stipend%20Data%20Collection%20-%20Finalized%20Information%20-%20Machine.csv
[194] https://bigeconomics.org/major5007/

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Finally, in order to control for the size of the graduate student body, we will focus on comparing UAlberta's stipend only with other major research institutions—i.e., the U15.

Figure 16 shows the differences in minimum net stipend guarantees. As you can see, UAlberta ranks towards the front of the pack, scoring comparably to McMasters and Waterloo but below U of T, UBC, and McGill (to an extent). Its rankings somewhat depend on the program: physics and astronomy students are well compensated by Canadian standards, but biology students are not. Note, though, that these are *net* stipends, meaning that they are adjusted for estimated cost-of-living expenses. The *gross* stipend received by biology or physics students at UAlberta is significantly less than the gross received by U of T students, as an illustrative example.[195]

[195] One way we could theoretically coarse-grain this data further would be to chart the average funding across disciplines and programs (Msc and PhD) and compare the total student population of each institution. The more students that are enrolled at an institution, the more funding will be available for stipends even if we hold tuition values and government expenditures constant. Charting out the average funding relative to enrollment size would therefore let us see if universities were underfunding or overfunding graduate stipends relative to the size of their student body. However, a lack of consistent, publicly available, or up-to-date data on enrollment numbers prevents this exercise from occurring with any rigour. Otherwise, we would be comparing UAlberta's 2022 enrollment numbers with U of T's 2016 numbers.

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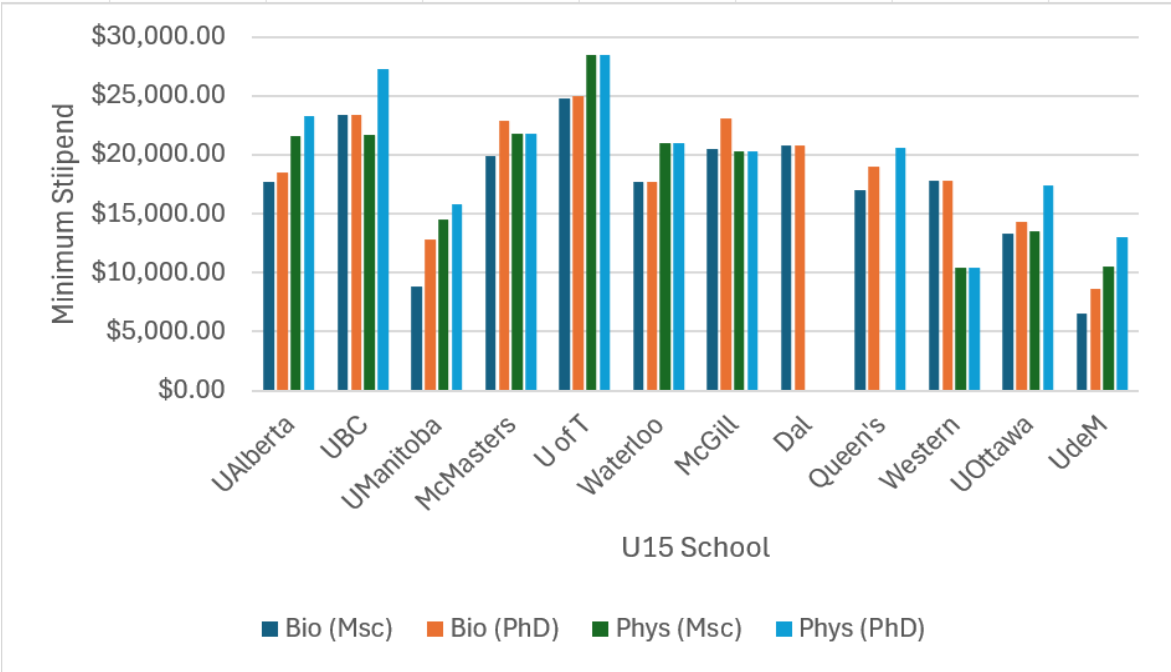
Fig.16. Bailey et. al.'s Minimum Net Stipends for Bio and Physics Msc and Phd Students, U15[196]



Given that UAlberta is the flagship university in Alberta, the fact that its net minimum stipends are comparable to that of McMasters or Waterloo should not be interpreted positively. UAlberta represents the tip of the spear for academic research and teaching in the province, but it does not compete with the elite universities in British Columbia or Ontario. Note that both BC and Ontario have, alongside Alberta, seen low government support for university operating funding, either as a percentage of GDP or per FTE student. Despite this fact, graduate students still manage to receive higher funding in their flagship institutions (or, in the case of Ontario, equivalent funding in *non*-flagship institutions). This may reflect the steeper decline in funding that Alberta has faced, or it may indicate that cuts in Alberta have been more damaging to revenue streams graduate students rely upon for financial compensation. Alternatively, it is highly possible that BC and Ontario students have greater access to externally funded grants and scholarships, which as this paper has previously established, are few and far between for Albertan students.

Indeed, the broader trend that has emerged in this section—that Alberta's funding cuts are making us comparable to Ontario—is not something to rejoice in, even if the MacKinnon Report

[196] https://github.com/UVicMicropaleo/Canadian-Minimum-Graduate-Stipends/blob/main/SOS_%20Minimum%20Stipend%20Data%20Collection%20-%20Finalized%20Information%20-%20Machine.csv

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signalled that Ontario was a worthwhile model for Alberta's PSE system to emulate.[197] The stability of Ontario's PSE system is currently in serious doubt: Laurentian University filed for creditor protection in 2021[198] and, on January 9th 2024, the Provost of Queen's University declared that his university would similarly be insolvent by the end of the 2025-26 academic year.[199] A blue-ribbon panel was convened by the provincial government to provide recommendations on how to increase the financial stability of Ontario's post-secondary system; while the panel's terms of reference limited any considered solutions to being compatible with fiscal conservatism,[200] the panel nonetheless found that a major reversal of the government's hack-and-slash approach to university budgets was required to prevent other Ontario institutions from falling into financial ruin.[201] That the only other province with comparably low government expenditures per FTE or support as a percentage of GDP is Alberta does not bode well for the future stability of our system.

Regardless, this section should make clear that if Canada as a whole is behind international funding trends for post-secondaries, then Alberta does not sufficiently stand ahead of its peer provinces enough to mitigate the incentive for top talent to flow elsewhere. Indeed, Alberta's funding situation is rather stark by Canadian standards, and our closest comparator is looking positively dilapidated after sustained cuts and underfunding. If graduate students respond to incentives like any other economic actor, then a rather stark funding situation—even relative to Canada as a whole—might leave Alberta more vulnerable to a brain drain than other regions.

3.4. Alberta's Leaky Pipeline

A piece of suggestive evidence that Alberta is more vulnerable to a brain drain of graduate talent than most other Canadian jurisdictions is that Alberta has an above average number of students enrolled in undergraduate degrees, on a per capita basis, but a below average number of *graduate* students. This would suggest that there is something of a "leaky pipeline" preventing Albertan students from entering graduate school at the same rate as their peers in other provinces, particularly those

[197] https://open.alberta.ca/publications/report-and-recommendations-blue-ribbon-panel-on-alberta-s-finances
[198] "Laurentian University Files for Creditor Protection," *CBC*, February 2, 2021, https://www.cbc.ca/news/canada/sudbury/laurentian-university-creditor-protection-1.5896522.
[199] Sophia Coppolino, "'Queen's Could Cease to Exist If We Don't Deal with This Issue:' Faculty and Staff Remain Skeptical - The Queen's Journal," The Queen's Journal, January 12, 2024, https://www.queensjournal.ca/queens-university-faces-imminent-closure-if-cuts-not-made-faculty-and-staff-remain-.
[200] Alex Usher, "What's in Ontario's Blue Ribbon Panel Report?," *Higher Education Strategies Associates* (blog), November 20, 2023, https://higheredstrategy.com/whats-in-ontarios-blue-ribbon-panel-report/.
[201] Alan Harrison, "Ensuring Financial Sustainability for Ontario's Postsecondary Sector," *Blue-Ribbon Panel on Postsecondary Education Financial Sustainability* (November 15, 2023). https://files.ontario.ca/mcu-ensuring-financial-sustainability-for-ontarios-postsecondary-sector-en-2023-11-14.pdf

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larger provinces—like BC, Ontario, or Quebec—that have a similar level of impact on Canada's economy. **Figure 17** below shows the data for other comparable provinces as well as the OECD for the year 2021.

What this means is that Canada as a whole—and especially Ontario, Quebec, and British Columbia, and perhaps with the exception of Manitoba and Saskatchewan—are better than Alberta at retaining students within their PSE systems and ensuring that their undergraduate population goes on to graduate studies. Note that this data is from 2021, so it does not factor in the full brunt of Alberta's cuts to PSE, suggesting that this has been a long-term structural problem. Alberta has had a reputation for seeing significantly more net outgoing migration of students,[202] though the fact that we have slightly above average per capita bachelor's degrees suggests that the problem lies with the transition into graduate school, not necessarily student migration numbers as a whole. It may be that, in Alberta, a strong economy means students do not require a postgraduate degree to achieve financial security, thus fewer students feel the need to go to graduate school. However, given that real GDP per capita has declined in Alberta more than any other province since 2014,[203] you would expect that more Albertans would start to see a postgraduate degree as a safe investment in their future incomes—unless, of course, the cost of a graduate degree was seen as too prohibitive for Albertan students.

Regardless, Alberta has less wiggle room than other provinces (again, save for perhaps Manitoba) to lose graduate talent to other jurisdictions. Due to our existing leaky pipeline to graduate studies, any further increase in the brain drain would see Alberta's PSE system undergo an incredible amount of stress. This would inevitably impact undergraduate degrees in a negative way, too, as less graduate students means less sessionals, instructors, and teacher's assistants. Unless universities have the capacity to hire more full-time professors, the amount of undergraduates that can be educated in Alberta will decline, to say nothing of the quality.

Finally, this data should nuance the claim that Canada is the "most educated country in the world." As **Figure 17** shows, we outperform the OECD in providing undergraduate education. Where we lag significantly, however, is graduate education, with not a single province above the OECD average in master's degrees or PhDs. This paper will later provide an overview of evidence that suggests this gap explains part of our productivity woes relative to other countries. Beyond that problem, however, a massive gap in graduate degrees shows that Canada as a whole—and Alberta in particular—are facing serious, ongoing challenges in retaining top graduate talent. If we are concerned about an accelerating brain drain, then this gap will have to reverse—and quickly, at that.

[202] https://higheredstrategy.com/the-alberta-exodus/
[203] https://novascotia.ca/finance/statistics/archive_news.asp?id=19878

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Fig.17. Percentage of Bachelor's and Graduate Degrees amongst working age population (25-64) in Alberta and Comparative Provinces, 2021.[204]

Jurisdiction	Bachelor's	Masters	PhDs
Newfoundland	13.4%	5.2%	0.7%
PEI	18.5%	6.0%	0.8%
Nova Scotia	19.7%	6.6%	0.9%
New Brunswick	16.3%	4.5%	0.6%
Quebec	18.1%	6.8%	1.1%
Ontario	23.7%	8.7%	1.2%
Manitoba	20.4%	4.8%	0.7%
Saskatchewan	18.3%	4.7%	0.8%
Alberta	***21.7%***	***6.1%***	***0.9%***
British Columbia	22.7%	7.9%	1.1%
Canadian Average	*21.3%*	*7.4%*	*1.1%*
OECD Average	*18.9%*	*13.9%*	*1.3%*

3.5. Conclusion

This section intended to quantify the incentives graduate students face to study somewhere other than Alberta and, as a consequence, outline the brain drain risks this province faces. We looked at average stipends across the OECD, which saw Canada's average stipends not only fall well below the norm for most advanced economies, but also showcased that graduate student funding does little to mitigate the cost-of-living pressures that Canadian students face—especially when compared to European graduate programs.

We also looked at the minimum stipends of major (U15) Canadian institutions, seeing that Alberta's flagship university—the University of Alberta—failed to outperform non-flagship institutions in other provinces. Given that other institutions in Alberta—such as the University of Calgary—do not currently have minimum funding guarantees, the actual funding packages of most Albertan institutions may fall even further behind comparable universities in other provinces, though data limitations prevent us from confirming that possibility.

Finally, we looked at Alberta's "leaky pipeline," which is our relative difficulty in ensuring undergraduate students go on to attend graduate school in Alberta. Of particular note is that Alberta's pipeline is among the "leakiest" in Canada (second perhaps only to Manitoba), despite Canada *itself*

[204] https://www150.statcan.gc.ca/t1/tbl1/en/tv.action?pid=9810042901.

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possessing an incredibly leaky pipeline relative to the OECD. This means that Alberta is already vulnerable to the effects of a brain drain, and if we wish to close the gap between undergraduate and graduate students—either within Canada or relative to the OECD—we will need to increase the incentives that graduate students have for studying in this province.

The next section of this paper will outline our proposal for doing so.

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Part 4: The Model

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4.1. Introduction

The previous sections of this paper have outlined what graduate students are, the essential role that graduate students play in the operations of Albertan universities, the lack of funding options for Albertan graduate students, and how existing funding compares with other Canadian jurisdictions and international peers. Taken together, they show that:

1. Graduate students respond to incentives, like any other economic agents;
2. Graduate students perform the majority of teaching and research in universities and are key drivers in industry-university interactions;
3. The funding situation in Alberta is quite poor, even relative to other Canadian jurisdictions;
4. International peers are supporting their graduate students to a significantly higher degree; therefore
5. Prospective graduate student talent will be incentivized to move to other jurisdictions, accelerating and worsening the brain drain from our province.

In order for Alberta's post-secondary system to be maximally competitive, and in order for the system to not just retain homegrown talent but attract talent from *elsewhere*, we need to increase graduate student funding in a fiscally sustainable way.

The following model, then, is our attempt at providing a fiscally sustainable funding stream that does not fully replace university operating grant funding, but can nonetheless lessen the impact of funding cuts. Importantly, the funding model is designed to further incentivize high-quality graduate student research. By improving the financial conditions of graduate students and creating more incentives to engage in impactful research, this funding stream should help improve the ability for every research-intensive university in Alberta to meet their core societal functions.

Our funding model creates three tiers of merit-based scholarships, open to both domestic and international thesis-based master's and doctoral students. The value of each tier will be competitive with existing institutional and federal scholarships. All together, the three tiers will ensure that **31% of eligible students**—and **20% of *total* students**—receive a merit-based scholarship. The total number of students receiving an award is important, as studies have shown that research productivity depends in large part on having a large pool of quality collaborators.[205] We want to distribute merit-based funds as broadly as we can whilst still being cognizant of budgetary constraints on the provincial government. For this reason, we recommend that international students **be fully eligible** for these awards, as this will not only distribute research award funds as widely as possible, but also distinguish Alberta from

[205] Larivière, V. 2013. "PhD Students' Excellence Scholarships and their Relationship with Research Productivity, Scientific Impact, and Degree Completion," *Canadian Journal of Higher Education* 43(2): 27-41.

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other jurisdictions. Making Alberta's funding policies more inclusive of international students should both attract top talent to study here as well as incentivize these students to stay in Alberta after graduation.

Again, this model will not fully replace what has been cut from university operating budgets, and many graduate students will still face financial hardship. And as we will show in this section of the paper, research-focused scholarships are difficult to adapt to the structure of course-based master's students, who remain an important part of the university environment *and* are just as much at risk of poverty as thesis-based students. We nonetheless believe that this funding model will help improve the competitiveness of Alberta's post-secondary system and is worth being part of the province's advanced education portfolio.

This section will therefore outline our underlying assumptions behind the model, detail an approximate structure for the scholarship funding process to take, and then outline the tiers, value, and cost of the model. It will also show a **potential path to making this model revenue neutral**, through a combination of increased (and taxable) economic activity and lateral spending moves. It will provide some suggestions on what we think the "merit" component should focus on, in order to ensure that these scholarships create the largest possible value for the Albertan economy. We also discuss some ideas around how to provide merit-based scholarships to course-based master's students, though admittedly this is only a rough sketch that we provide. Finally, we address a potential counterargument—namely, "Why must the *government* fund these scholarships?"—and, in the process, reiterate the importance of public funding for research-intensive universities. This section of the paper concludes with a list of our full recommendations to the government.

4.2. Assumptions

Our scholarship model makes the following assumptions:

- The 2022-23 post-secondary headcount data is still accurate for graduate students.[206]
    - *Justification*: enrollment decreases as a result of new federal regulations around international students[207] likely put the total graduate student population close to 2023 enrollment numbers.
- There is a 50/50 split between course-based and thesis-based master's students.

[206] This data can be found at the Government of Alberta's *Open Data* website, under "System enrollment within the Alberta post-secondary education system."
[207] https://www.cbc.ca/news/canada/calgary/university-calgary-revenue-international-student-1.7393803#:~:text=A%20drop%20in%20the%20University,of%20nearly%20nine%20per%20cent.

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- *Justification*: universities have been rapidly increasing the number of course-based master's degrees, since these programs are less costly to administer than thesis-based programs.

- Assume 10% enrollment growth year-over-year until 2030.
  - *Justification*: the University of Calgary's strategic plan aimed to double the number of graduate students over the course of seven years,[208] which would require an average yearly enrollment growth rate of 14.3% (100/7 = 14.3). According to the Office of Institutional Analysis (OIA), graduate student enrollment growth only increased by a *total* of 14% between Fall 2020 and Fall 2024, or an average of 3.5% per year. If our scholarship model is successful in helping attract more graduate talent to Alberta, we should expect to see enrollment growth increase year-over-year. However, the drop in enrollment growth from the new federal international student regulations shows how vulnerable enrollment growth numbers are to external shocks. As such, we took the average between the yearly enrollment growth number from the University of Calgary's strategic plan to the *actual* enrollment growth between 2020 and 2024 ([14.3 + 3.5]/2 = 8.9), then rounded to 10%.
- Assumed that the administrative costs of the program are equal to 25% of the direct cost.
  - *Justification*: the University of Calgary's Research Overhead Procedure states that the indirect costs of research grants from either the government or the not-for-profit sector are equal to 25% of the direct costs.[209] As these scholarships are government funded research grants, we will use the same overhead costs in our calculations.
- Assume a return on investment (ROI) of $4.80 for every $1 spent on the value of these scholarships.
  - *Justification*: a 2023 Economic Impact Study, done by R.A. Malatest & Associates for the University of Alberta, found that for everyone $1 of provincial funding spent on the institution, $4.80 of economic activity was generated.[210] As we established earlier in this paper, graduate students are closely integrated into all of the major functions of a university, suggesting that an investment in graduate students *should* provide similar economic returns to the broader Albertan economy. Note, though, that these scholarships are intended to incentivize graduate student research, and part of our proposal is to use scholarships to better connect Albertan graduate students with the business community. We also want these scholarships to attract new students from

[208] https://ucalgary.ca/about/ahead-of-tomorrow
[209] https://www.ucalgary.ca/legal-services/sites/default/files/teams/1/Policies-Research-Overhead%20Procedure.pdf
[210] https://www.ualberta.ca/en/media-library/impact-report/u-of-a-economic-impact-study-report.pdf

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outside Alberta. As such, we may actually be *underestimating* the economic impact of these scholarships, since they will—ideally—be bringing in new taxpayers with a focus on productivity-enhancing research.

- For evidence that we may be *underestimating* the returns, R.A. Malatest & Associates noted that they only measured the short-term impacts of university funding; a number of long-term impacts, if included, would have increased the ROI for the University of Alberta. In a similar vein, a 2008 study from the Federal Reserve of Boston pegged the ROI for higher education at $7.46.[211,212] Specifically, this is the amount of money the government saved by investing in higher education, through channels such as reduced welfare enrollment and higher tax revenue.

4.3. Structure

As outlined in our discussion of federal research grants, all federal research funding is divided between three granting agencies: SSHRC, NSERC, and CIHR. This tripartite system allows subject-matter experts to be recruited to evaluate research proposals from both faculty and students. It also avoids any issues around comparing "apples to oranges" when it comes to research—i.e., an economist does not have to argue why a research project in their field is more meritorious than a project championed by a physicist. The three agencies still have to compete for scarce federal dollars, it is true; but the worth of social science, natural science, or medical research is judged relative to other proposals *in their field*. This avoids unnecessary infighting and, ideally, makes the evaluation process fairer for all research fields.

As such, we recommend that the Government of Alberta, if this proposal is accepted, adopt a similar tripartite structure as seen at the federal level. The specific details of how this structure should be fleshed out (i.e., whether they should be individual granting agencies, whether they should have permanent staff, etc) is something that will likely need to be worked out in an iterative process, with collaboration amongst the government, universities, and student groups. There are also considerations around interdisciplinary or transdisciplinary research to take into account, and how to best connect student research with the private and not-for-profit sectors—areas which we touch on later in this

[211] Trostel, P.A. 2008. "High Returns: Public Investment in Higher Education," *Community & Banking*. Federal Reserve of Boston.
[212] Trostel, P.A. 2007. "The Fiscal Impacts of College Attainment," *New England Public Policy Center Working Paper*: https://www.bostonfed.org/publications/new-england-public-policy-center-working-paper/2007/the-fiscal-impacts-of-college-attainment.aspx

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section of the paper. However, we believe that the three granting streams allow for efficiency gains that are not available if all scholarship funding is siloed into a single stream.

One recommendation we *would* make, as far as the governance of any provincial granting process is concerned, is to ensure that graduate student voices are included in the decision-making process. There are currently no statutory requirements for graduate student representation on any of the decision-making bodies and committees within the Tri-Council granting agencies. Multiple reviews of Canada's research system have called for increased consultation on governance procedures with graduate students, or outright recommended that graduate student representation be required on the decision-making bodies of funding agencies. This includes a 2006 review of NSERC and SSHRC's consultation processes,"[213] and two reports from this very committee: the 2023 *Government of Canada's Graduate Scholarship and Post-Doctoral Fellowship Programs Report,*[214] and the 2022 *Top Talent, Research, and Innovation Report*.[215] We echo these recommendations, because the graduate student experience—and the challenges that graduate students face within Canada's federal funding system—can only be accurately articulated by current graduate students. The social, political, and economic conditions that shapes graduate studies today are not necessarily the same conditions faced by faculty or industry leaders when they were completing graduate studies. Therefore, if the decision-making bodies wish to have the most accurate and up-to-date information about the state of graduate studies in Canada, the most effective means of ensuring this is to include graduate student voices on these bodies. This is, naturally, also true at the provincial level, if a similar scholarship system was implemented here.

One of the goals of the modernization of Canada's federally-funded research system is to create additional advisory bodies that can identify, respond to, and ultimately mitigate systemic challenges within Canada's innovation ecosystem, a recommendation that was forcefully made in the *Advisory Panel on the Federal Research Support System Report* (also known as the "Bouchard Report").[216] To that end, a proposed change to the Tri-Council governance system, as outlined in the federal government's 2024 budget,[217] includes the creation of the capstone research funding organization that this

[213] James R. Mitchell, *A Review of NSERC and SSHRC* (Report prepared for Industry Canada, December 15, 2006).
[214] House of Commons, "Government of Canada's Graduate Scholarship and Post-Doctoral Fellowship Programs", https://www.ourcommons.ca/Content/Committee/441/SRSR/Reports/RP12784325/srsrrp08/srsrrp08-e.pdf
[215] House of Commons, "Top Talent, Research, and Innovation", https://www.ourcommons.ca/Content/Committee/441/SRSR/Reports/RP12004489/srsrrp02/srsrrp02-e.pdf
[216] Advisory Panel on the Federal Research Support System, "Report of the Advisory Panel on the Federal Research Support System", https://ised-isde.canada.ca/site/panel-federal-research-support/sites/default/files/attachments/2023/Advisory-Panel-Research-2023.pdf
[217] Government of Canada, "Budget 2024: Fairness for Every Generation; Chapter 4: Economic Growth for Every Generation," https://budget.canada.ca/2024/report-rapport/chap4-en.html.

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committee is studying, which will help guide the development and coordination of research standards and practices in Canada. An additional change outlined in *Budget 2024* is the creation of a science and innovation advisory council to drive the development of Canada's research strategies and priorities. As these organizations will have significant influence on how graduate students plan, conduct, and fund their research, the same reasons for including graduate student representatives on existing Tri-Council decision-making bodies applies: only graduate students can provide an accurate, timely picture of what it is like to be a graduate student researcher in Canada.

We also wish to emphasize that the experience of master's students and doctoral students differ with respect to expectations, scope of research, and resources available to prepare for scholarship applications. Having an accurate picture of the full graduate student experience will, ideally, require timely information and feedback from both types of students. When filling the student seats on each of the decision-making bodies listed in this brief, we would further suggest that the appointments process aims to ensure that there is at least one master's student and one doctoral student, rather than having the committees be dominated by one type of student.

Finally, we recognize that having graduate students serve on the decision-making bodies could nonetheless lead to a perceived conflict of interest if they are still eligible for these awards. However, given that scholarships impact both a student's finances and their future career prospects, we do not want to put students in an awkward spot where they must forgo scholarships that advance their careers (and, indeed, help them pay their bills) if they wish to serve on these decision-making bodies. If nothing else, graduate students would have little incentive to serve on these committees if that were the case, and thus these seats would most likely remain unfilled. We hope that graduate students will not be deemed ineligible for these awards outside of the time period where they are serving on advisory or governance committees, and we would suggest awarding students who *do* serve a scholarship that recognizes their commitment to improving the governance of Alberta's research ecosystem and compensates them for it accordingly.

One last consideration is that the federal agencies earmark some scholarships for equity-seeking groups, such as Indigenous students. We fully support this practice, as an important piece of ensuring that graduate school is accessible to individuals of all backgrounds is recognizing that there are historical injustices which place barriers to entry for some students. We strongly urge the Government of Alberta, if this proposal is adopted**, to heavily consult with these affected groups** in order to finetune the best, most effective, and most authentic ways for merit-based scholarships to address historical barriers to graduate education. This too must be an iterative process that involves the voices of these groups, and any organization structure must be flexible enough to accommodate these necessary, and likely long-term, conversations.

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4.4. The Three Tiers

The following is a detailed breakdown of our recommended tier numbers, value, and distribution of awards, alongside calculations on the direct, indirect, and total cost of the program over a five-year period:

Total Master's Students:

- 16,815

Total Eligible (Thesis-based) Master's Students:

- 8,408

Total Doctoral Students:

- 6,129

Tier Structure:

- Tier 1: Top 25% of students
- Tier 2: Top 5% of students
- Tier 3: Top 1% of students

Tier 1

Eligible Master's Students	Value of Award	Direct Cost
2,102	$7,000	$14,714,000

Eligible Doctoral Students	Value of Award	Direct Cost
1,532	$9,500	$14,319,000

Tier 2

Eligible Master's Students	Value of Award	Direct Cost
420	$13,000	$5,460,000

Eligible Doctoral Students	Value of Award	Direct Cost
306	$18,000	$5,508,000

Tier 3

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Eligible Master's Students	Value of Award	Direct Cost
84	$17,500	$1,470,000

Eligible Doctoral Students	Value of Award	Direct Cost
61	$24,000	$1,464,000

Total Direct Cost:

- **$42,935,000.00**

Total Indirect Cost:

- **$10,733,750.00**

Total Cost of the Scholarship Model:

- **$53,668,750.00**

Long-Term Cost

	2025-26	*2026-27*	*2027-28*	*2028-29*	*2029-30*
Master's	$21,644,000	$23,808,400	$26,189,240	$28,808,164	$31,688,980
Doctoral	$21,291,000	$23,420,100	$25,762,110	$28,338,321	$31,172,153
Indirect Cost	$10,753,750	$11,807,125	$12,897,838	$14,286,621	$15,715,283
Total	**$53,668,750**	**$59,035,625**	**$64,939,188**	**$71,433,106**	**$78,576,416**

4.5. Return on Investment and a Path to Revenue Neutrality

4.5.1: The Conservative Estimate

As **Figure 18** below shows, even if we assume that the returns on these scholarships are significantly lower in the first year of the program (due to innovation-enhancing projects taking time to get off the ground), we nonetheless immediately see the yearly economic activity generated by this investment to outstrip the total costs. Note that we are assuming the returns apply only to the *direct* costs of the scholarships, while total costs include the indirect spending required to administer the granting program. Even with this assumption**, far more economic activity is generated than what the province spends**.

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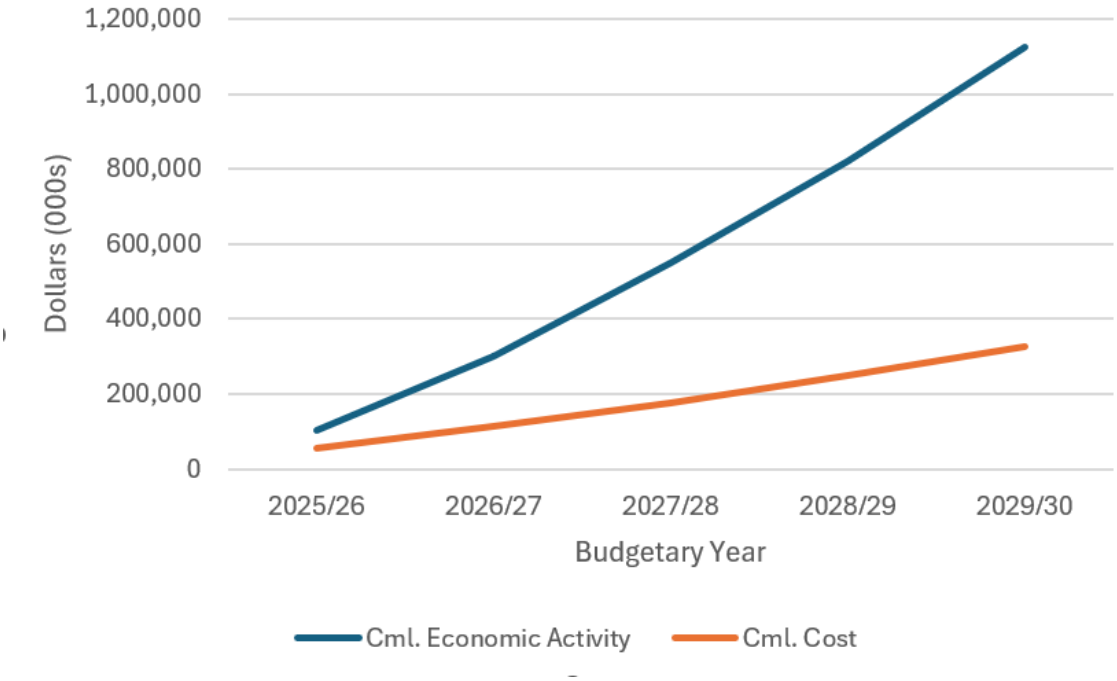
Fig.18. Cumulative Cost of Model vs. Cumulative Return on Investment[218]



We as an organization cannot offer recommendations to the government on tax policy, but this return on investment presents an opportunity for this new scholarship model to nonetheless be revenue neutral. Assume that all economic activity is taxed at 10%, currently the lowest income tax bracket in Alberta.[219] As per the numbers listed in Appendix E., this would amount to **$22.7 million in new tax revenue for 2026/27**, against a total cost of $59 million. The government would then have to find $36.3 million in savings to achieve revenue neutrality. But if the merit criteria are crafted in such a way that students from low-income or otherwise disadvantaged backgrounds do not face obstacles to obtaining these scholarships, and the scholarship value is high enough to raise graduate student stipends to internationally competitive levels, then graduate students will be less reliant on non-repayable student financial aid to meet their cost-of-living needs. As such, significant savings should be found in through reduced student financial aid payments.

Alternatively, low-income families with graduate students would be less reliant on social welfare if their stipends were increased, meaning that savings could likely be found in other income-assistance programs. Obviously, we do not recommend that the government cut funding for these projects in order to pay for graduate student scholarship. We are only indicating that $36.3 million in savings will

[218] See Appendix E for data table.
[219] https://www.alberta.ca/taxes-levies-overview

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likely be found in reduced demand for other income-assistance services *by graduate students*, if these scholarships are implemented. The money that would otherwise be spent on keeping graduate students above the poverty line could thus be redirected to these programs.

As Appendix A also shows, a significant amount of money is already spent on scholarships in Alberta. The problem is that these scholarships are not widely available, are administered in a fragmented fashion, and are often tied to specific degrees. Since we do not want to duplicate the awards, the government's current spending on merit-based scholarships can *also* be redirected to this new funding stream, creating further savings.

Importantly (and something we will discus shortly), some of these scholarships can have stipulations attached to them to encourage graduate students to interact with private industry or the not-for-profit sector. Consequently, the cost of these scholarships could also partially be offset by funding from private businesses and/or not-for-profit foundations. Recall from Part 1 that numerous studies have shown graduate students to be an essential mechanism for increasing university-industry interactions. Based on these findings, **it is reasonable to assume that publicly provided graduate student funding will *crowd in* additional private funding**, especially as the program becomes more established. Therefore, an additional path to revenue neutrality is that some of the costs of this scholarship model will be met through private contributions, with the province being only one of (albeit the most important) sources of funding.

Finally, we also should note that it is possible we overestimated the indirect costs of these scholarships and *underestimated* the total revenue savings from providing graduate students merit-based scholarships. In the former case, existing infrastructure already exists to help administer federal scholarship applications; this scholarship model may be able to piggyback on said infrastructure at a lower indirect cost than 25%. That being said, as Part 2 of this paper has made clear, existing funding cuts have led to significant cuts in support staff on Albertan campuses. That 25% figure may represent what level of funding is necessary to support an efficient internal support system for graduate students.

4.5.2: The Fully-Costed Estimate

In terms of trying to fully quantify the *savings* from merit-based scholarships—i.e., the drop in necessary spending in other government departments as a result of increased graduate student stipends—recall that Federal Reserve of Boston/New England Public Policy Center study that said governments save $7.46 for every $1 spent on higher education. That is not simply economic activity, but *total savings* as a result of reduced welfare program use, higher tax revenues due to growing wages, lower crime incidence, and, of course, also increased economic activity. The above study argues that the majority of savings accrue at the level of the federal government, mostly in the form of higher

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federal tax revenue.[220] It estimates that this results in a state-level savings rate of approximately $3.10 for every $1.00 spent.[221] This is still substantial—higher education effectively pays for itself by April of every year—but even this may underestimate the total savings in a Canadian context. All but two American states have income tax rates higher than that of Alberta,[222] though Alberta's lack of a sales tax might cancel out the effects of its higher income and corporate taxes. In order to split the difference, in order to remain somewhat conservative in our estimates, we argue that in a *fully costed* scenario, where all potential savings are included in the estimates, these scholarships could generate **$3.00 in savings for the provincial government.** These scholarships could, therefore, pay for themselves even in a very short timeframe—even if, again, we assume the savings are half in the first year due to inefficiencies or lag in implementation, and even if we assume that savings are only found on *direct*, rather than *total*, spending (i.e., assuming that administrative spending does not contribute to the savings).

Figure 19 below summarizes both the *conservative* and *fully-costed* spending scenarios. In the former, we show what savings would have to be made if all economic activity generated by the scholarships is taxed at 10%. In the later, we take the numbers from the Federal Reserve of Boston (adjusted slightly for Alberta's higher tax rate) and assume that all possible savings are priced in. This shows us the potential surplus this scholarships program could create for the provincial government, through a combination of higher wages, higher tax revenue, lower welfare spending, and other efficiencies.

[220] Trostel, P.A. 2007. "The Fiscal Impacts of College Attainment," *New England Public Policy Center Working Paper*, pg.2. https://www.bostonfed.org/publications/new-england-public-policy-center-working-paper/2007/the-fiscal-impacts-of-college-attainment.aspx.
[221] *Ibid*.
[222] https://taxnews.ey.com/news/2022-0007-2022-state-income-tax-and-supplemental-withholding-rates-preliminary-as-of-january-5-2022

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Fig.19. Conservative and Fully-Costed Savings Minus Costs of Scholarship Program (in thousands)[223]

Year	Total Cost (Direct + Indirect)	Conservative Revenue Generated	Fully-Costed Savings Rate	Fully-Costed Savings	Difference (Conservative Estimate)	Difference (Fully-Costed Estimate)
2025/26	$53,669	$10,304	$1.50/$1.00	$64,403	-$43,365	***+$10,734***
2026/27	$59,036	$22,699	$3.00/$1.00	$141,867	-$36,337	***+$82,831***
2027/28	$64,939	$24,937	$3.00/$1.00	$155,853	-$40,002	***+$90,914***
2028/29	$71,433	$27,430	$3.00/$1.00	$171,438	-$44,003	***+$100,005***
2029/30	$78,576	$30,173	$3.00/$1.00	$188,583	-$48,403	***+$110,007***

4.6. Merit Criteria: Interdisciplinary Research and Community/Industry Connections

The exact standards of merit for these scholarships should—and, in the event this proposal is adopted, likely *will*—be determined by an expert panel. As such, we do not want to suggest too many specific points in this document: the three funding streams should ensure that experts in each field are able to evaluate student research for originality, impact, theoretical and empirical rigour, and its contribution to humanity's stock of knowledge. We also believe that Alberta should again copy the Tri-Council's in evaluating both the research merit of a proposal and broader research qualities of an applicant, such as their academic history and professional, academic, and extracurricular activities.[224,225] We will, however, highlight some areas of concern that we believe any merit criteria should meet: namely, that it should incentivize (or at least not *disincentivize*) interdisciplinary research, and that it should reward student connections with industry or the not-for-profit sector.

4.6.1. Incentivizing Interdisciplinary Research

As Daniel Woolf, the principal of Queen's University, rightfully said: "interdisciplinary research … has gone from 'nice to have' to need to have.'"[226] Part of the rise in demand for interdisciplinary research is that major scientific breakthroughs rarely require input from just one field of knowledge. For instance, artificial intelligence touches on computer science, physics, mathematics, linguistics, philosophy, biology, neuroscience, and psychology—at bare minimum. Add in questions about the

[223] For Total Cost and Conservative Revenue Generated, see Appendix E. For Optimistic Savings Rate, see again Appendix E.
[224] https://www.nserc-crsng.gc.ca/students-etudiants/pg-cs/cgsm-bescm_eng.asp
[225] https://www.nserc-crsng.gc.ca/students-etudiants/pg-cs/cgsd-bescd_eng.asp
[226] https://univcan.ca/news/the-future-is-interdisciplinary/

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impact of a transformative technology on our economy and institutions, and you can add economics, political science (Herbert Simon, one of the founders of the field of artificial intelligence, was in fact a political scientist by trade), anthropology, geography, history, sociology, and even literature studies. An even more important reason, though, is the growing recognition that the problems of today—and most certainly the problems of the future—cannot be solved by isolated silos. Many of these problems are "wicked problems," which—as defined by Horst Rittel and Melvin Webber—are highly complex social problems that:

- Have hard to define goals or targets;
- Confront problems that are themselves difficult to define or understand;
- Lack a clear stopping point;
- Have uncertain or unknowable consequences;
- Change rapidly, which limits our ability to learn through trial and error;
- Lack an exhaustive set of potential solutions, meaning we can never know if we have picked the best option or plan;
- Are closely interconnected with other wicked problems; and
- Have incredibly high stakes, such that the "planner has no right to be wrong."[227]

It should be little wonder, then, that interdisciplinary research is far more likely to impact public policy, at least when it comes to a wicked problem like pandemic responses.[228]

Berdahl, Malloy, and Young note, in their book *For the Public Good*, that many graduate students (particularly in the arts) "are already playing important roles in addressing Canada's wicked problems," by acting "in leadership roles in the public service and private sector" and "as researchers whose work informs public policy."[229] They further argue that any graduate education (again, particularly in the arts) which fulfills a university's moral duty to improve the lives of the society at large must meet the "wicked problems imperative," or producing students and research that contributes to our understanding of, and strategies to beat, current and future wicked problems:

> **By explicitly connecting arts graduate education to the wicked problems imperative, we can increase both the number of individuals able to provide real-world solutions to wicked problems (through theoretical coursework learning that produces new ideas and ways of**

[227] Rittel, H.W.J. and Webber, M.M. 1973. "Dilemmas in a General Theory of Planning," *Policy Sciences* 4(2): 155-169.
[228] Hu, L., Haung, W-b., and Bu, Y. 2024. "Interdisciplinary Research Attracts Greater Attention from Policy Documents: Evidence from COVID-19," *Humanities & Social Science Communications* 383(1): https://doi.org/10.1057/s41599-024-02915-8
[229] Berdahl, L., Malloy, J., and Young, L. 2024. *For the Public Good: Reimagining Arts Graduate Programs in Canadian Universities*. Edmonton: University of Alberta Press, pg. 27.

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> **thinking) and the volume of original research knowledge on wicked problems (through graduate research) … In addition to the coursework noted above, at a minimum, students should be encouraged and enabled to find the connections between the subject of their research focus and contemporary problems.**[230]

As such, if PSIs are going to fulfill their role as sites of problem solving and experimentation—and if these proposed scholarships are going to be successful in helping graduate students contribute to the innovation ecosystem—then the merit criteria should be structured in such a way to incentivize interdisciplinary research.

Scholarships will not be an effective tool to modify graduate school curriculums to better support the interdisciplinary focus necessary for meeting the wicked problems imperative. But properly designed scholarships can nonetheless incentivize graduate students to engage with other disciplines, and share their findings with emerging scholars in other fields, by rewarding students who create research projects that transcend department or even faculty boundaries. The Tri-Council granting agencies again provide a potential blueprint: a pilot program for a Tri-Agency Interdisciplinary Review Committee has just concluded, which will allow existing grants—such as SSHRC's Insight Grants competition—to properly evaluate and reward scholars engaged in interdisciplinary research.[231] Special review committees could be set up, on an ad-hoc basis, to perform the same function with Alberta-based student scholarships.

The other side of this argument is that scholarships should not be set up in such a way that they *discourage* interdisciplinary research—for example, by designing merit criteria for each scholarship stream that is overly biased towards the methodologies or research practices of one discipline. As mentioned earlier in this section, there are efficiency benefits to having three granting streams to oversee these scholarships; but a challenge for this model will be ensuring that the three degree streams do not become silos. This can be as simple as ensuring that scholars who engage in interdisciplinary research are not penalized by scholarships judges, or that the criteria for each granting stream is designed in such a way that interdisciplinary scholars do not fall through the cracks. An Alberta-based version of the Tri-Agency Interdisciplinary Review Committee can also help in this regard by advising on each stream's merit criteria.

4.6.2. Community/Industry Connections

As noted in the first part of this paper, graduate students naturally form a linkage between universities and private industry. Greater support for graduate students should translate to greater

[230] *Ibid*, page 125-126.
[231] https://cihr-irsc.gc.ca/e/52470.html

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university-industry interactions on its own. If the government wants to increase the frequency of these interactions, or if we want to crowd in future private investment, then crafting merit considerations to reward students for engaging with the private sector is one strategy to pursue. Additionally, many organizations dedicated to solving wicked problems are not-for-profits that could benefit from close collaboration with universities and graduate programs. Merit considerations should then similarly reward students for engaging with not-for-profits. This could, potentially, lead to charitable foundations contributing towards the cost of these scholarships; even if funding from not-for-profits is limited, though, it nonetheless creates another channel whereby these scholarships can help Albertan graduate education contribute to the well-being of Alberta as a whole.

The easiest way of incentivizing external partnerships with both private business and the not-for-profit sector would be to include merit criteria that asks students how their research can either (a) be commercialized and/or (b) contribute to the mission-statements of a not-for-profit organization. This process should have a number of positive spillover effects, above and beyond the potential for external funding for these scholarships to come from private sources. For example, having this merit criteria would force faculty and students to survey the business and not-for-profit community and understand their research needs, or at least recognize the existence of research gaps that their work could fill. A greater awareness of how academic research can translate into practical solutions—whether those generate a profit or serve a social need—should help form closer relationships between universities and broader civil society. It would also incentivize both faculty and students to develop skills that help them interact with non-academics and identify areas of potential collaboration; the same should be true in the reverse direction, with private sector or not-for-profit actors developing skills that allow them to better interact with academics, including gaining a greater appreciation for basic or theoretical research that sets the foundations for practical-oriented work.

More specific recommendations can be pulled from the academic literature on graduate students and technology transfers (summarized in ***Fig.20.*** below). Boardman and Ponomariov, for instance, identify three interrelated mechanisms that tie the level of graduate students supported by scholarships to the number of university-industry interactions. They are:[232]

- Students with positive supervisor relations are more likely to connect their professors with the private sector;
- Graduate students are central to the university's research capacity and tend to produce work that is easily commercializable by businesses;

[232] Boardman, P.C. and Ponomariov, B.L. 2009. "University Researchers working with Private Companies," *Technovation* 29(2): page 145.

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- Large stocks of research funding allow for universities to more flexibly deploy their research human capital, which means graduate students can test, prototype, and trouble-shoot projects to a greater extent than professors *or* businesses can.

If we try to operationalize these mechanisms into specific merit-criteria recommendations, we can see that increased research funding in of itself should help create greater university-industry interactions, as already noted. But if graduate students are better able to test, prototype, and trouble-shoot projects, and this attracts more private businesses to cooperating with graduate programs, then the merit criteria could include past experience with assisting a professor on their own commercialization projects. This should incentivize more programs to encourage this sort of student/supervisor collaboration, while additionally increasing the total commercialization experience at the faculty level. This same criterion can also be adopted to include assisting professors with not-for-profit work, especially in programs that typically have lower rates of commercialization (for instance, in the social sciences or humanities).

Santos et. al. similarly note that graduate students play a crucial role in connecting universities with industry, and argue that it is by facilitating knowledge transfer between post-secondary and the private sector that is the key driver behind this connection.[233] This paper is more-so concerned with exploring the depth of this interaction, and how industry involvement changes graduate programs, than specifically tracking the mechanisms that cause graduate students to increase a university's commercialization activities. However, if knowledge transfer is the key driver behind this relationship, then one merit criteria recommendation could be that students demonstrate an ability to describe their research projects in clear language, making their research more accessible to outsiders. This should help streamline the knowledge transfer process and demonstrate to external partners that graduates can easily integrate themselves with teams outside their area of expertise.

A potential resource to draw from, as far as developing the merit criteria *and* administering the process of connecting graduate students and the private sector together, is Mitacs. As mentioned earlier in this paper, Mitacs is a program that connects students—undergraduates, graduates, and post-doctoral students—with internship opportunities in the private and public sector.[234] It does not directly reward graduate students, but rather helps students find funding sources and connects them with organizations that can give them hands-on experience in their research fields. Given the business community's arguments before the Standing Committee on Industry, Science, and Technology (INDU) that providing students with hands-on experience in commercialization is a necessary step in

[233] Santos, P., Veloso, L., and Urze, P. 2020. "Students Matter: The Role of Doctoral Students in University-Industry Collaborations," *Higher Education Research & Development* 40(1): page 1540.
[234] https://www.mitacs.ca/discover-students/

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accelerating Canada's IP generation,[235]Mitacs fills an important role in Canada's innovation ecosystem. Such expertise could be utilized either indirectly by the provincial government, in that they can consult with Mitacs on best practices for commericalizing student research or finding research-related employment opportunities. Mitacs could also provide *direct* assistance by connecting this scholarship program to Mitacs, allowing experts within the federal innovation ecosystem—both private and public—to help guide how the program is run. Such a connection could help limit administrative costs by taking advantage of an already existing stock of expertise.

Fig.20. Mechanism-informed Merit Criteria Recommendations[236]

Study	Mechanism	Recommendation
Ponomariov (2008); Boardman and Ponomariov (2009); Thune (2009); Thune (2010)	Graduate students connect professors/university to private industry through work experience.	Increased funding support should naturally increase university-industry interactions, especially if it fosters positive student/supervisor or student/institution relations
Boardman and Ponomariov (2009)	Graduate students perform research that is easily commericalizable by business.	Increased funding support should naturally increase university-industry interactions, especially if it allows graduates students to concentrate more on research.
Ponomariov (2008); Boardman and Ponomariov (2009)	Graduate students enhance research capacity because they are better able to trouble shoot research projects than professors or private industry	*Include criteria that rewards students for collaborating with professors to either aid their own commericalization efforts or their partnerships with not-for-profits.*
Slaughter et. al. (2002); Santos et. al. (2020)	Graduate students drive knowledge transfer between universities and industry.	*Include criteria that rewards students for explaining their projects in a way that's accessible to a non-expert audience.*

One important caveat is that community or industry connections should not be viewed—either by universities or by the provincial government—as a means of tying student scholarships to current

[235] https://www.ourcommons.ca/Content/Committee/421/INDU/Reports/RP9261888/indurp08/indurp08-e.pdf
[236] Studies are referenced in Part I of the paper.

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labour market outcomes. Put differently: the provincial government has instituted performance-based metrics that track how well universities produce graduates that meet existing labour market shortages—we are saying that these scholarships should *not be used for the same purpose*. The criteria by which students are evaluated for any connections between their research and industry or not-for-profit needs should be very general, perhaps even as simple as providing some written evidence that a for-profit business or not-for-profit organization is interested in funding, and applying, that student's research. A maximal amount of room should be preserved for students, and civil society actors, to organically—*spontaneously*, even—determine how a student's research can be applied to non-academic settings, rather than force this technology transfer to conform to the government's labour market projections.

The primary reason we add this caveat is that we want to preserve the entrepreneurial potential of student researchers and universities in general, and entrepreneurialism is largely incompatible with government plans that treat all educational institutions as supplying what the labour market needs *right now*. Entrepreneurs, in the Schumpeterian sense, are disruptive: they are supposed to organize production in new and innovative ways, creating new markets, new demands, and requiring economic actors to make new plans in order to adapt and avoid being left behind.[237,238] For theorists who view entrepreneurs as being alert to new opportunities, as Israel Kirzner does,[239,240] it nonetheless makes the most sense to allow students and industry/community actors to make these discoveries themselves, rather than restrict the process to what the government estimates to be current labour market needs. This is not to say that striving to meet current labour market needs is unimportant, only that it should not be the focus of merit-based scholarships for university researchers.

Additionally, we should be cognizant of the fact that research funding from the private sector can carry with it greater indirect costs than government funding. The University of Calgary's Research Overhead Procedure, for instance, lists the indirect costs of industry-funded research at 40% of direct costs, which is nearly double the indirect costs of government or not-for-profit funded research (25%).[241] While the document does not elaborate on why the indirect costs for industry-funded research are so much higher, part of that might be explained by the legal services required to ensure that the intellectual property of faculty members, students, the university as a whole, *and* the funding

[237] Schumpeter, J.A. 1934 [1911]. *A Theory of Economic Development: An Inquiry into Profits, Capital, Credit, Interest, and the Business Cycle*. Cambridge, MA: Harvard University Press.
[238] Schumpeter, J.A. 1942. *Capitalism, Socialism, And Democracy*. New York: Harper & Brothers.
[239] Kirzner, I.M. 1973. *Competition and Entrepreneurship*. Chicago: University of Chicago Press.
[240] Kirzner, I.M. 1999. "Creativity and/or Alertness: A Reconsideration of the Schumpeterian Entrepreneur," *Review of Austrian Economics* 11(1): 5-17.
[241] https://www.ucalgary.ca/legal-services/sites/default/files/teams/1/Policies-Research-Overhead%20Procedure.pdf

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business are all respected, or at least reflected fairly (in the sense that no party is willing to go to court over the issue) in the research contract. This is part of a broader conversation around intellectual property best practices—something that was the subject of a 2017 report from the then-named Standing Committee on Industry, Science, and Technology (now simply "Industry and Technology")[242]—and, as such, it is beyond the scope of this paper to discuss further. Regardless, though, we believe it prudent to mention that the more funding that comes from for-profit businesses, the higher the indirect costs of these scholarships may be.

4.7. Course-Based Students

As laid out in the assumptions, course-based master's students comprise a significant portion of the graduate student population. While course-based students do not necessarily engage in the same type of research as thesis-based students, nor are they expected to work within universities to the same extent, they are nonetheless important components of the post-secondary system. In addition, course-based students are already excluded from major federal-level scholarships, despite facing the same cost-of-living increases as thesis-based students. One important caveat is that course-based master's students are expected to be in their programs for no more than a year, in most cases, and as such should theoretically accumulate less tuition and fee costs than a full-time thesis-based master's student. **Nonetheless, course-based students are vulnerable to slipping into poverty due to a lack of financial support options**, and they should not be neglected when proposing alternative funding models for graduate students.

One possible way of constructing a merit-based scholarship for course-based master's students is to centre it on industry/community connections, to a greater extent than with thesis-based or doctoral scholarships. Since course-based programs tend to be more practical-oriented than thesis or doctoral degrees, emphasizing industry and/or community connections would allow universities and civil society actors to directly fund, and hopefully strengthen, the pipeline between graduate students and career opportunities. Creating scholarships that specifically recognize course-based students with skills and interests that help industry or not-for-profits fulfill their goals should also help improve these student's future earnings potential, thanks to the signals it will send to future and even current employers (i.e., that these students have skills and knowledge that is highly valuable and useful).

There are two means of creating this scholarship. The first is to focus on the major research paper, or "capstone" project (depending on the degree) at the end of a student's coursework, and evaluate it much like an awards panel would evaluate a thesis—with some key differences. Whereas a master's thesis is intended to be longer and expand our stock of knowledge (albeit to lesser degrees

[242] https://www.ourcommons.ca/Content/Committee/421/INDU/Reports/RP9261888/indurp08/indurp08-e.pdf

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than a doctoral dissertation), a major research paper or capstone project is more likely to focus on a student demonstrating their mastery of a particular literature, such as housing policy or the impacts of clean drinking water on community health. As such, a course-based project can more easily tailor itself to practical problems outside of academia. While originality and rigour are still important, those aspects can be weighted lower than the practical applications of a student's research, thus making it easier for course-based students to be rewarded for producing novel solutions to pressing, everyday problems.

An alternative means of rewarding course-based graduate students is, instead, to focus on their coursework. In essence, this would be similar to merit-based scholarships for undergraduate students, that reward high GPAs instead of research proposals. Alternatively, these scholarships could narrow in on students who engage in work-integrated or experiential learning, evaluating not so much their performance with external partners but rather their willingness to include these partnerships as part of their graduate education. The problem with this method is that far too few graduate programs are structured in such a way as to let students take advantage of cooperative learning opportunities, particularly in the arts. Berdahl, Malloy, and Young's *For the Public Good* does an excellent job at documenting the importance of (among many other things) both coursework and work-integrated learning opportunities for graduate students, particularly in the arts;[243] but they also make it clear that major changes to the structure of graduate programs are necessary to take full advantage of these opportunities.[244] Scholarships are unlikely to drive departments, faculties, universities, or even ministries to revaluate how graduate programs are created and delivered, so at this juncture, this remains an entirely speculative exercise.

Nonetheless, **we do not want to leave course-based students behind when discussing new, alternative funding models for graduate students**. While the model for thesis-based master's and doctoral students is much more fleshed out, should the government pursue this project, we also recommend looking at ways in which course-based students can similarly be compensated for their work within the university. Focuses on their potential connections to industry or the not-for-profit sector as part of their end-of-degree research projects, or perhaps even through their choice of courses, represents one possible option.

4.8. Why Must the Government Fund This?

[243] Berdahl, L., Malloy, J., and Young, L. 2024. *For the Public Good: Reimagining Arts Graduate Programs in Canadian Universities*. Edmonton: University of Alberta Press. Pages 151-152, 197-198.
[244] *Ibid*, page 107.

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When outlining the potential for this model to be revenue neutral, we have mentioned a number of ways that private funding could be "crowded in" and lessen the burden on Albertan taxpayers. This may raise a question: why must the government pay for this at all? The answer to this question lies in "endogenous growth theory," a relatively new paradigm for understanding the origins of economic growth, albeit still within the typical axioms of neoclassical economics.

Traditionally, economic models treated the primary drivers of growth as being "exogenous": that is to say, they are "outside" the model and cannot be explained by the tools of economists. For some models, like Harrod-Domar model, the primary driver of economic growth was the savings rate.[245,246] Others, like the Solow-Swan model that became dominant in macroeconomics, assumed that it was productivity increases driven by technological change.[247,248] Since these technological changes were *exogenous*, however, they were explained by the "animal spirits" of entrepreneurs, or perhaps just pure scientific luck, rather than in any systemic manner. Importantly, this left economists without the ability to provide policymakers recommendations on how to increase the rate of technological change and, therefore, improve productivity growth.

By contrast, "endogenous" growth theories assume that economic tools and analysis can explain the rates of technological change and are subject to the same assumptions as any other economic activity. Multiple economists have created endogenous growth models, including Nobel Prize winners such as Kenneth Arrow,[249] Robert Lucas,[250] and Daron Acemoglu.[251] Perhaps the most well-known proponent of endogenous growth models, however, is Paul Romer, himself a Nobel Prize winning economist affiliated with Boston College, the World Bank, and the Hoover Institute at Stanford.

[245] Harrod, R.F. 1939. "An Essay in Dynamic Theory," *The Economic Journal* 49(193): 14-33.
[246] Domar, E. 1946. "Capital Expansion, Rate of Growth, and Employment," *Econometrica* 14(2): 137-147.
[247] Solow, R.M. 1956. "A Contribution to the Theory of Economic Growth," *Quarterly Journal of Economics* 70(1) 65-94.
[248] Swan, T.W. 1956. "Economic Growth and Capital Accumulation," *Economic Record* 32(2): 334-361.
[249] Arrow, K.J. 1962 "The Economic Implications of Learning by Doing," *The Review of Economic Studies* 29(3): 155-173.
[250] Lucas, R.E. 1988. "On the mechanics of Economic Development," *Journal of Monetary Economics* 22(1): 3–42.
[251] Acemoglu, D. 2009. *Introduction to Modern Economic Growth*. Princeton: Princeton University Press.

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According to Romer's work, there are two stylized facts about innovation systems:[252,253,254,255,256]

1. Human capital—the accumulated skills, knowledge, dispositions, and experiences that are useful in the production process—is the primary driver of innovation;
2. Due to the nature of scientific knowledge and human skills, it is typically too risky for firms to invest in human capital *or* the basic research needed to drive technological change. This means that, even in a perfectly competitive market, less human capital and innovation will be generated than is socially optimal.

More expansively, these two stylized facts mean the following:

- Human capital is *not* a pure private good, meaning that it is either not excludable—meaning you cannot prevent other people from using it—or is non-rivalrous, meaning that using a good does not deplete the total stock of that good in the economy. The former is particularly important for human capital, as individual firm cannot ensure that they and they alone benefit from any investment in human capital. This is especially true for "general" human capital, which by definition includes skills or knowledge that is applicable in multiple environments.
- So long as firms are somewhat risk-adverse and seek to maximize profits, the possibility that rivals will benefit from any investment in human capital will lead them to *under*investing in employee skills, knowledge, and so on.
- Since human capital drives innovation, firms will be less innovative than is necessary to maintain constant economic growth.

And:

- Knowledge, in the form of scientific research, is *also* not a pure private good, meaning that a firm can never guarantee that a proprietary technology—be that a product or production process—will ever *stay* proprietary.

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[252] Romer, P.M. 1990. "Human Capital and Growth: Theory and Evidence," *Carnegie-Rochester Conference Series on Public Policy* 32(1): 251–86,
[253] Romer, P.M. 1990. "Endogenous Technological Change," *Journal of Political Economy* 98 (5): S71–102.
[254] Romer, P.M. 1994. "The Origins of Endogenous Growth," *Journal of Economic Perspectives* 8 (1): 3–22.
[255] Nelson, R.R. and Romer, P.M. 1996. "Science, Economic Growth, and Public Policy," *Challenge* 39 (1): 9–21.
[256] Romer, P.M. 2000. "Should the Government Subsidize Supply or Demand in the Market for Scientists and Engineers?" *NBER Working Paper*. Retrieved from: https://www.nber.org/system/files/working_papers/w7723/w7723.pdf.

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- Firms that sell goods at marginal cost (i.e., equal to equilibrium price) that rely heavily on scientific research will never fully recoup the costs of production, as other firms can free-ride on their investment.
- So long as firms are somewhat risk-adverse and seek to maximize profits, the possibility that they will never recoup the costs of engaging in scientific research mean that firms will forgo any basic R&D.
- Since R&D is an essential component of technological change, firms will be less innovative than is necessary to maintain constant economic growth.

The end result is a less dynamic, less innovative, less productive, and less *healthy* economy. It must be stressed that this is not because firms are behaving irrationally—far from it, in fact. The issue at hand is that the incentives in place for for-profit firms do not allow them, in an otherwise perfectly competitive market, to engage in the types of risky behaviour that would allow for the private provision of human capital development and basic research. Not-for-profit foundations and charities may face different incentives and, thus, may be more able to privately support human capital development and basic research. The issue facing not-for-profits and charities, however, is lack of funds; given how expensive continual education and cutting-edge scientific research can be, the not-for-profit sector may not have the budget to support the innovation ecosystem.

Because there is a market failure in the development of human capital and scientific knowledge, governments can therefore play a role in reaching a new, socially optimal equilibrium. Supporting universities both as sites of human capital development and as research institutions is obviously one means of correcting for market failure. It may also be more efficient than directly paying firms to perform research and development, as direct subsidies to firms can run into problems with picking "winners" and "losers" in the market, along with other pathologies identified by public choice theory. By contrast, universities are expected to provide a basic foundation of knowledge and skills for all other actors in society to build from, which somewhat shields them from causing the same types of market distortions than corporate subsidies may create. And if universities are good vectors for developing both human capital and innovative research, then graduate students—who, as we have seen, are closely embedded in every essential function of these institutions—would create a great deal of social good if given adequate government support.

Is there any evidence, though, that suggests Romer is correct? Bloom, Van Reenan, and Williams find that social returns to R&D far exceed private returns (60% to 15%), which suggests that firms cannot internalize the costs (or benefits) of basic research, just as endogenous growth theory

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predicts.[257] They also find that there is a high correlation between private sector innovation and proximity to research universities, which suggests large spillovers from the academic sector to private industry—again, as endogenous growth theory predicts.[258] Dimos et. al. find that any form of government assistance for innovation crowds in additional private investment, which would not be possible if the private sector was providing a socially optimal level of innovation.[259] Additionally, they find that the benefits of research subsidies in particular increase over time, as governments, researchers, and businesses learn from one another and develop cooperative relationships.[260] Finally, a study from the Federal Reserve of Dallas finds that government R&D support generates large returns on investment—ranging from $1.50 to $3.00 for every $1.00 spent by the government.[261] They argue that the observed slowdown in US productivity growth since the 1960s can be explained by declining public research support,[262] which would confirm the negative case predicted by endogenous growth theory: less government support leads to a less dynamic and productive economy, which creates a drag on future economic growth.

As such, we believe the government ought to fund a large portion of these scholarships because no other institutions will, assuming we take endogenous growth theory seriously.

4.9. Conclusion

This section presents an alternative funding model for graduate students, utilizing progressively higher value—and more exclusive—merit-based awards for outstanding graduate research. The value of these scholarships would range from $7,000 to $17,500 for thesis-based master's students, and $9,500 to $24,000 for doctoral students; given that approximately 31% of thesis-based master's and doctoral students would receive a scholarship from one of the tiers, this would mean a significant portion of the graduate student population would receive funding designed to incentivize excellence in research. Moreover, at a time where Canadian graduate researchers are seeing their stipends and funding options stagnate or even decline relative to international peers, these scholarships would greatly increase Alberta's competitiveness in attracting top researcher talent.

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[257] Bloom, N., Van Reenan, J., and Williams, H. 2019. "A Toolkit of Policies to Promote Innovation," *Journal of Economic Perspectives* 33(3): 163-184.
[258] *Ibid*.
[259] Dimos, C., Pugh, G., Hisarciklilar, M., Talam, E., and Jackson, I. 2022. "The Relative Effectiveness of R&D Tax Credits and R&D Subsidies: A Comparative Meta-Regression Analysis," *Technovation* 115(1): 102450.
[260] *Ibid*.
[261] Fieldhouse, A.J. and Mertens, K. 2023. "The Returns to Government R&D: Evidence from U.S. Appropriation Shocks," *Federal Reserve Bank of Dallas Working Paper*.
[262] *Ibid*.

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Our recommendation, should this model become public policy, would be to create three funding streams—similar to the three Tri-Council granting agencies—in order to ensure that local academics and experts have an efficient, orderly process for evaluating graduate student research. That being said, we also recommend that the merit criteria incentivize interdisciplinary research, given the importance of transcending disciplinary boundaries for both producing impactful research and confronting the wicked problems society faces. We also recommend ensuring that research projects with the potential to immediately benefit industry or community groups be duly recognized. This will not only help accelerate the pace at which graduate student research can positively impact broader society, but also entice industry and not-for-profits to help fund this scholarship program.

These scholarships will not fully replace university operating grant funding as a means of compensating graduate student labour. And it should also be strongly emphasized that an alternative funding model is needed for course-based students, as research-focused scholarships would put these students at a disadvantage relative to their thesis-based peers in any awards competition. Course-based students still provide a well-spring of knowledge, and their coursework alone can be an important source of human capital for the province. That being said, researchers such as the authors of *For the Public Good* have identified gaps in graduate student coursework that will likely need to be addressed, if Alberta is to have a graduate school system that is internationally competitive from top to bottom. We do not think that scholarships are an effective tool for forcing universities to transform graduate student coursework; in regard to recommendations, then, we strongly suggest that the government investigate ways of working with universities to financially support course-based master's students in ways that reflect the unique circumstances of their programs. This may include transforming coursework to better create opportunities for experiential learning, as one example.

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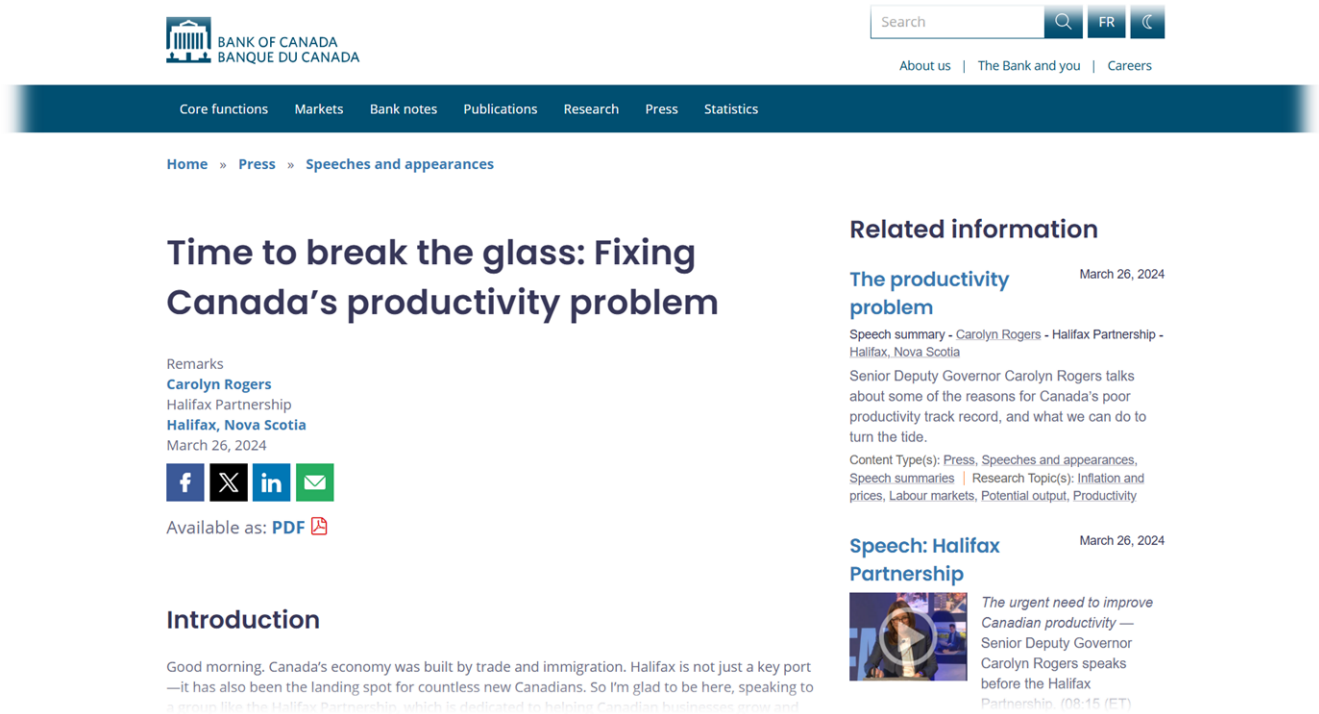
Part 5: The Future is a Foreign Land: Geopolitical Uncertainty and Canada's "Patent Productivity Paradox"[263]



[263] Title from *Ghost*'s 2024 album, "Rite Here Rite Now" (Loma Vista Recordings)

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5.1. Introduction

This white paper has argued that the integral work that graduate students perform for universities more narrowly, and the Albertan economy more broadly, is at risk of leaving for other jurisdictions for financial reasons. As such, we proposed a merit-based scholarship model that we believe will improve Alberta's ability to attract, and retain, top graduate student talent in a revenue-neutral way. To a significant extent, this paper has been crafted to address the desires of the *Expert Panel on Post-Secondary Institution Funding and Alberta's Competitiveness*, chaired by economist Jack Mintz:

- review and evaluate provincial funding for public post-secondary institutions and independent academic institutions as it relates to government direction and priorities;
- look at funding models for higher education in similar jurisdictions within Canada and globally; and
- assess Alberta's ability to compete on a global level in higher education.[264]

The Mintz Panel's research is now being conducted under the shadow of the second Trump administration. The actions of our neighbor to the south have created great uncertainty for Canadian citizens, businesses, and policymakers, with the impact of President Trump's tariffs on Canadian exports to the United States being felt from coast to coast. Economic modelling from the Canadian Chamber of Commerce predicted that under a blanket 25% tariff on Canadian goods, our economy would contract by 1.8%, or approximately $1,300 per person.[265] The Bank of Canada similarly predicted a steep decline in Canadian GDP and a rise in inflation if Canada and the United States entered a protracted trade war.[266] At time of writing (June of 2025), with several rounds of tariff pauses, increases, exemptions, and then retractions of exemptions, we have already seen economic uncertainty skyrocket[267] and Canada's unemployment reach 7%, the highest level (outside of COVID) since 2016.[268] The Conference Board of Canada estimates that this is largely due to the both the real impact of tariffs and the confusing market signals President Trump's tariff threats have created.[269]

Canada's economy has also suffers from structural problems, and these problems long predate even the first Trump administration. Chief among these problems is laggard productivity growth, especially compared to the United States. While the Bank of Canada sounded the alarm in March of

[264] https://www.alberta.ca/expert-panel-on-post-secondary-institution-funding-and-albertas-competitiveness
[265] https://businessdatalab.ca/publications/what-the-return-of-the-tariff-man-means-for-the-canadian-and-u-s-economies/
[266] https://www.bankofcanada.ca/publications/mpr/mpr-2025-01-29/in-focus-1/
[267] https://www.cpaontario.ca/insights/blog/mobilizing-cpas-to-address-canada-economic-challenge
[268] https://financialpost.com/news/economy/canada-unemployment-rate-hits-7-percent
[269] https://www.conferenceboard.ca/insights/minimal-employment-gains-and-higher-unemployment-in-may/

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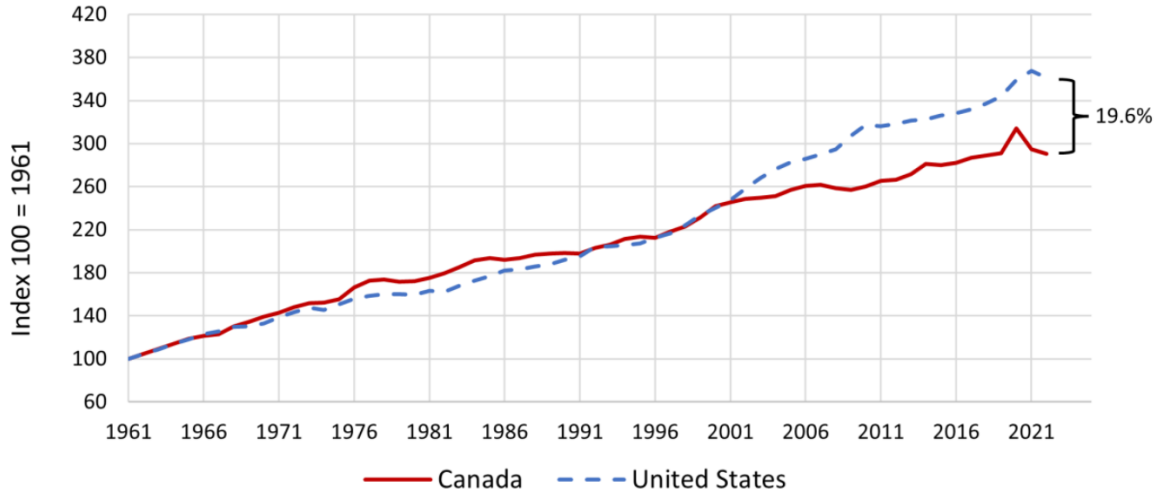
2024,[270] the widening gap between US and Canadian productivity growth has been on ongoing concern since at least 2001, when the two countries first began to diverge (***Fig.21***). What this means is that Canadians have to either work harder and longer to reach the same level of income as Americans or, alternatively, must settle for lower income—and therefore less economic security—to maintain similar amounts of leisure time. This is because productivity is a measure of how efficiently a country utilizes its resources; longer working hours are actually *negatively* correlated with worker productivity.[271,272,273,274] A country that produces 1,000 hamburgers in 100 hours of labour time is substantially more productive than a country which produces 2,000 hamburgers in 1,000 hours, even if the second country makes more hamburgers in total, and thus is better able to navigate economic shocks (like, say, a tariff on hamburgers). Low productivity growth thus suggests that Canadian workers are less secure in their incomes and less supported in their workplaces, and thus the economic potential of the country is being stymied.

Fig.21. Canadian and United States Business Productivity Growth, 1961-2022 (from Michael Willox)[275]



[270] https://www.bankofcanada.ca/2024/03/time-to-break-the-glass-fixing-canadas-productivity-problem/
[271] https://hbr.org/2015/08/the-research-is-clear-long-hours-backfire-for-people-and-for-companies
[272] https://www.ilo.org/sites/default/files/wcmsp5/groups/public/@ed_protect/@protrav/@travail/documents/publication/wcms_187307.pdf
[273] https://www.innovativehumancapital.com/article/what-research-says-about-the-dangers-of-long-working-hours#google_vignette
[274] Collewet, M. and Sauermann, J. 2017. "Working Hours and Productivity," *Labour Economics* 47(1): 96-106.
[275] https://www.linkedin.com/pulse/canada-us-productivity-gap-returns-trend-michael-willox

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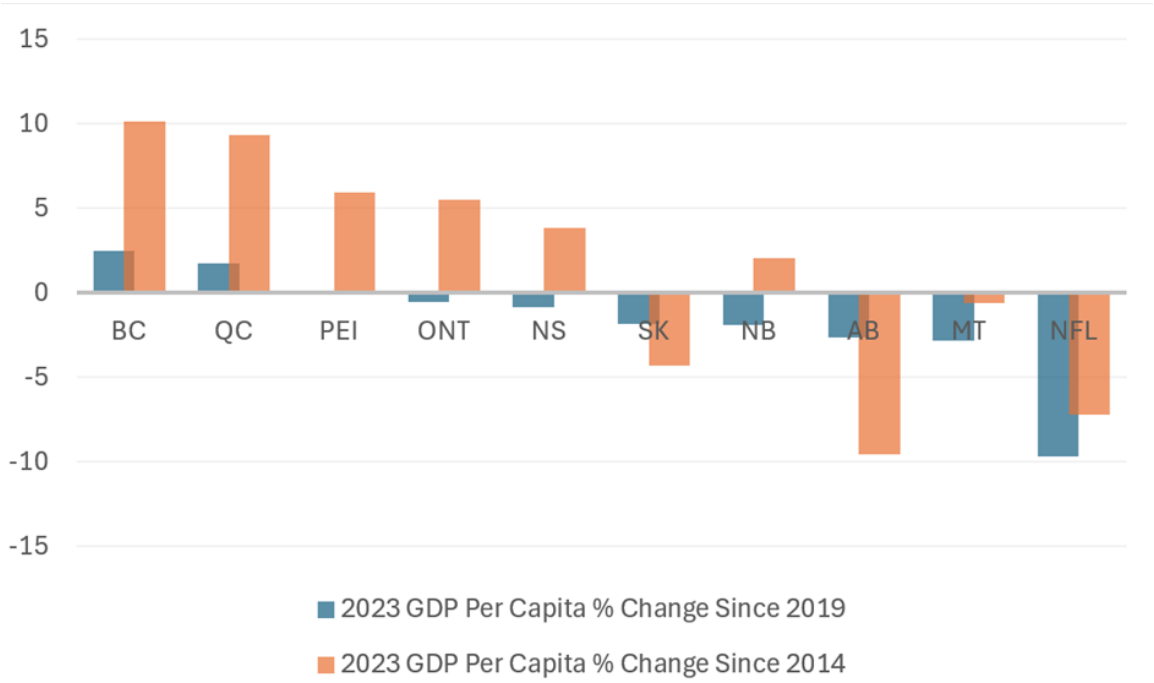
Alberta is not immune to these concerns. Our real GDP per capita, which measures economic output when adjusted for population growth and inflation, has seen steep declines since both 2020 and 2014, according to data from the Government of Alberta's Economic Dashboard (***Fig.22***).[276] Similarly, our labour productivity growth has been negative from 2019 to 2023 and second lowest among all provinces from 2014, according to the Government of Alberta Economic dashboard (***Fig.23.***).[277] According to economist Charles St. Anuand, a global collapse in the price of oil in 2014—followed by a historically weak rebound—are largely to blame for both Canada more broadly, and Alberta more specifically, underperforming in these key economic metrics.[278] Nonetheless, in a separate article, St. Anuand makes the argument that Albertans have legitimate concerns with their declining standard of living, and so long as this is not taken seriously by governments, policymakers, or advocacy groups, then discontent with the Confederation will only continue to ferment.[279]

Fig.22. %Change in Real GDP Per Capita from 2019 to 2023 and 2014 to 2023[280]



[276] https://economicdashboard.alberta.ca/dashboard/gdp-per-capita/
[277] https://economicdashboard.alberta.ca/dashboard/labour-productivity/
[278] https://albertacentral.com/intelligence-centre/economic-news/the-lost-decades-or-how-the-oil-boom-masked-canadas-economic-mediocrity/
[279] https://albertacentral.com/intelligence-centre/economic-news/11977/
[280] See Appendix F.

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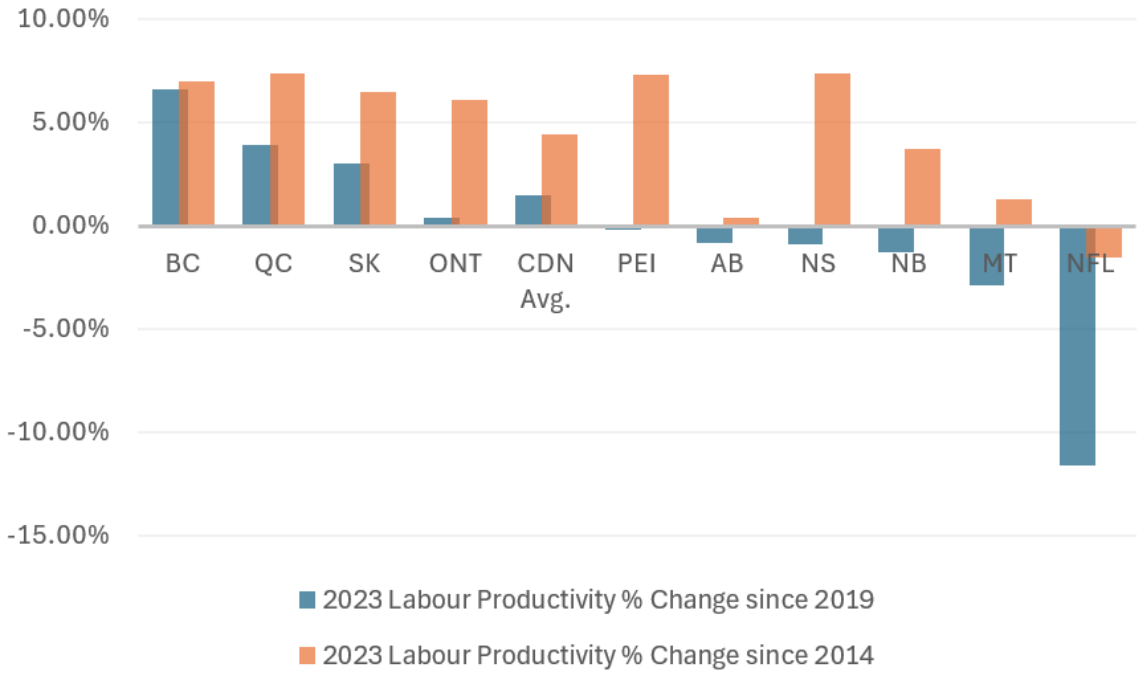
As such, any interest group that is seeking government funding during this time must show how their proposal aides the average Canadian, whether they live outside of Alberta or inside it. And as a graduate student association, we recognize that there are many more groups than ours who will be spending priorities for the Government of Alberta: teachers, nurses, doctors, businesses, and so on. We do not claim that investing in graduate students is a silver bullet to all of Canada or Alberta's economic woes. But we do want to demonstrate, in this final section, that graduate students are key players in addressing the country's declining productivity, and so our scholarship proposal in particular can help provide secure incomes even for those who have otherwise no day-to-day interactions with a university or graduate program.

Fig.23. %Change in Labour Productivity from 2019 to 2023 and 2014 to 2023[281]



5.2. The Impact of Graduate Student Work

First, we will reiterate the important roles graduate students play within a university. As mentioned in the first part of this paper, universities have two core functions: teach students and produce research. This teaching function produces human capital, which—as mentioned in the discussion around why governments must fund the majority of these scholarships, in regard to the

[281] See Appendix F.

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work of Paul Romer and endogenous growth theory—is the primary driver of innovation. Innovation can take the form of *product innovation*, which is when a new or improved (in the sense of quality or cost) consumer good is created, or *process innovation*, where new or improved (again, in terms of quality or cost) way of organizing production is discovered. Either form of innovation increases productivity growth, which allows economic actors to make more efficient use of their resources: a similar number of goods can be produced in less time and with less waste, for instance, or perhaps the same amount of time and input costs can generate substantially more goods than in the past. The impact of this productivity growth is that prices decrease, economic activity increases, and the economy grows. It should also grow *sustainably*, too, which in this sense means that economic institutions (ex: firms), relationships (ex: supply chains, credit markets, employment contracts), and macroeconomic fundamentals (ex: the inflation rate, employment rates, interest rates, real GDP growth) will be able to whether shocks to a much greater degree. In a broad survey of the innovation literature, John Van Reenen notes that a great deal of evidence exists linking higher education institutions to increases on innovation and productivity, and a key mechanism governing this relationship is the supply of university-educated students that are dispersed into the economy.[282]

This is real growth for everyone, meaning incomes increase and, with it, economic security. Thus, this is one way in which education can help create economic growth and security across the board, something shared by universities, K-12 schools, apprenticeships, and so on. In the case of *universities*, though, if **graduate students are increasingly being relied upon to perform the teaching functions of the institutions, then supporting graduate students can help universities better supply the economy with human capital and, consequently, lead to greater economic security.**

The second core function is research. Universities contribute directly to innovation by providing both foundational and applied research: i.e., they contribute to new discoveries which form the basis of innovative technologies, as well as contributing to turning this research into something practical that can be bought and sold by consumers. As mentioned in the discussion on human capital, part of the reason why universities are so integral in contributing to basic research is because of the financial risk involved in funding paradigm-shifting discoveries. Where-as profit-maximizing firms face a disincentive to invest in risky activities with positive externalities (i.e., other competing firms can benefit from their investment), universities have a different set of incentives. Their reputation is staked on the number of groundbreaking discoveries their faculty and students contribute to and their ability to collaborate with other high-quality institutions globally. They will thus prioritize funding high-impact research without facing an incentive to hoard any new knowledge. In a more mundane sense, universities can coordinate

[282] Reenen, V.J. 2020. "Innovation Policies to Boost Productivity," *Brookings Institute*. Retrieved from: https://www.hamiltonproject.org/wp-content/uploads/2023/01/JVR_PP_LO_6.15_FINAL.pdf.

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vast pools of pre-existing technology knowledge and bring it to bear on complex research questions, something that William Baumol noted is a requirement to support even independent inventors.[283]

Returning again to the role of graduate students, recall from the first part of this paper that master's and, especially, doctoral students contribute to a significant (arguably a majority) of research for institutions, both through our own research projects and by assisting faculty members on theirs. Recall, too, that tuition shocks and student debt negatively impact access to graduate school, persistence, and degree completion. These scholarships serve two functions. The first is to provide enough financial assistance to graduate students that they do not face pressure to withdraw, delay the completion of their program, or sacrifice the time and energy they could spend on research to other concerns, such as external employment or food and housing insecurity. The second function is to incentivize incoming and existing students to take research risks by rewarding outstanding graduate student research. **These scholarships will thus help universities fulfill their research mandate by increasing the quantity, quality, scope, and ambitiousness of graduate student research—and, by proxy, the stock of research knowledge that Albertan institutions have available for other researchers and other sectors of the economy.** This, much like with the human capital argument above, means that Albertan universities will have a greater ability to provide the groundwork for novel technologies and organizations, a larger influence on turning this knowledge into practical applications for civil society, a more significant impact on producing responses to external shocks, and overall lead to more innovation, productivity, economic growth, and security for all.

5.3. Creating More Canadian IP Through Graduate Students

Expanding the stock of both human capital and high-quality research in Canada more generally, and Alberta more specifically, are important steps when trying to increase our productive capacity. But they are not the only ways. Removing barriers to turning *existing* innovations into increased productivity is another important, and necessary, step. This is especially important for Canada, as our post-secondary sector already plays an outsized role in generating high-quality innovations and research for the Canadian economy. The problem lies in the commercialization process: i.e., how that research gets turned into practical use by businesses across Canada. By leveraging graduate student connections between industry demands and the production of research in universities, this scholarship proposal can help address the commercialization gap, without introducing protectionist measures.

[283] Baumol, J.W. 2004. "Education for Innovation: Entrepreneurial Breakthroughs vs. Corporate Incremental Improvements," *NBER Working Papers*. Retrieved from: https://www.nber.org/system/files/working_papers/w10578/w10578.pdf.

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First, however, let us quantify what we mean when we say universities play an outsized role in generation innovation within Canada. Research and development (R&D) spending can be split into three categories:

- financing that primarily comes from the private sector ("business expenditure on R&D," also known as *BERD*);
- financing that primarily comes from the public sector ("government expenditure on R&D," also known as *GovERD*); and
- financing that primarily comes from universities, colleges, and polytechnics ("higher education expenditure on R&D," or *HERD*).

In most developed nations, the vast majority of R&D expenditure comes from the private sector, with the rest split largely equally between GovERD and HERD. In Canada, however, as *Higer Education Strategy Associates* has pointed out, universities contribute almost as much to R&D expenditures as businesses, with a significantly smaller amount being provided by governments (***Fig.24***).[284] This means that the Canadian innovation ecosystem is more reliant on universities than in comparative countries—and, additionally, that Canada's low levels of R&D expenditures would be substantially lower if not for the higher education sector.

[284] https://higheredstrategy.com/wp-content/uploads/2023/11/2023-11-03-SPEC-2023_final-2_smaller.pdf, pg. 69.

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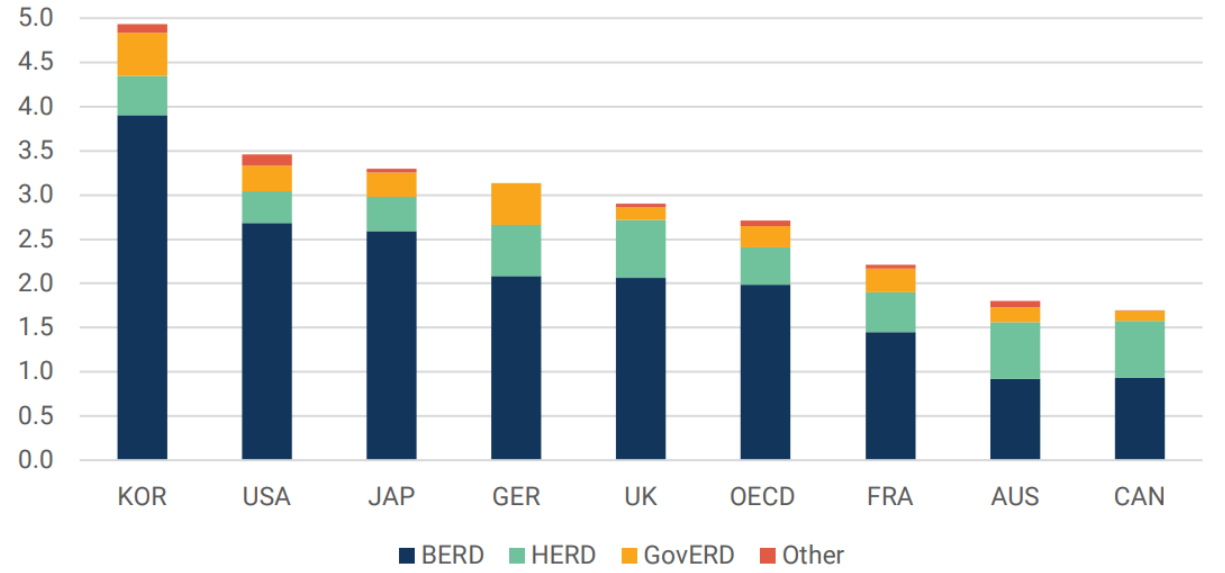
Fig.24. R&D Expenditures as a % of GDP by Sector Amongst Select OECD Countries, 2021 (from HESA)



The problem, however, is that in a competitive knowledge-based economy, firms gain their earnings by being innovation leaders and then utilizing patents, copyright, and other forms of intellectual property (IP) to accrue what are called "Schumpeterian rents": i.e., income owed to the owners of IP when other actors utilize their products. If Canadian businesses are not able to gain Schumpeterian rents, then they are less able to invest that money back into their workforce for additional productivity gains. Canadian workers not only receive lower incomes as payment for their work, but also get less support in the form of capital improvements that would allow them to work better, more efficiently, and in shorter hours for better pay. This is the core of what Iain Cockburn, Megan MacGarvie, and John McKeon call "Canada's Patent Productivity Paradox."[285] **The paradox is that Canadian firms, and Canadian inventors, should have substantially more patents than we do based on the scientific and research output of Canadian universities**.[286,287] An obstacle to increasing Canada's overall productivity, then, is that the work already done in universities is not translating to more competitive, innovative Canadian firms. Indeed, the problem may even be worse than that: according to the Council of Canadian Innovators (CCI), *foreign-owned* firms are larger beneficiaries of

[285] Cockburn, I., MacGarvie, M., and McKeon, J. 2023. "Canada's Patent Productivity Paradox: Recent Trends and Future Implications for Productivity Growth," *International Productivity Monitor* 45(1): 120-154.
[286] *Ibid*.
[287] https://www.canadianinnovators.org/content/unpacking-canadas-patent-productivity-paradox

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university-led research than domestic ones.[288,289] From a global perspective, this is a net positive, and helps Canada contribute to a more just and prosperous world. But if we are hoping to kickstart our laggard productivity, we will want to create incentives for value-added IP to stay within Canada (and without adopting inefficient protectionist measures, too).

Digging deeper into the data on universities and foreign-owned firms, James Hinton, Mardi Witzel, and Joanna Wajda, in a Centre for International Governance Innovation (CIGI) paper, provide each U15 institution a letter grade indicating how well their technology transfers lead to Canadian ownership of IP.[290] As **Figure 25** shows, the University of Alberta receives a passing grade while the University of Calgary does not. The impact of so much university-driven IP being in the hands of foreign companies is that these companies can then use their IP rights to restrict the activities of Canadian firms. According to the authors, one of the causal mechanisms explaining why Canadian universities so frequently license or sell their IP to foreign-owned firms are that professors and students lack IP education, and most do not have IP incubators to provide said hands-on experience.[291] Another—and, seemingly, more important—explanation is that the current R&D process in Canada is remarkably open: government funding for universities is not conditional on Canadian firms having right of first refusal, or that a set percentage of the ROI for university-generated innovations accrue within Canada.[292] The authors recommend that Canadian universities prioritize all technology transfers to Canadian firms first, require foreign-firms to pay fair market price or downstream ROI (whichever is higher) on any technology transfers from Canadian universities, or that Canadian companies have free access to university-generated IP.[293]

As a graduate student association, our perspective on intellectual property law is that it should ensure research is open and accessible for all and that the law does not undercut a graduate student's ability to feed themselves through compensation for their work. We do not believe it is our place to state whether Canadian firms should be prioritized for all university-driven IP or that Canadian firms should be able to freely access IP through a federally maintained repository. We do think it worth noting, however, **that universities are simply responding to economic incentives when they partner with foreign-owned firms**: if foreign firms are more willing to pay for licenses than Canadian firms, or are more able to do so, then universities are acting rationally and maximizing their revenue when

[288] https://www.canadianinnovators.org/content/cci-policy-brief-on-canadas-economic-security
[289] https://cci.docdroid.com/xtXV0Xb/cci-policyreport-mandatetoinnovate-pdf#page=20
[290] Hinton, J.W., Witzel, M., and Wajda, J. 2023. "An Economic Mirage: How Canadian Universities Impact Freedom to Operate," *CIGI Papers No. 274*: https://www.cigionline.org/static/documents/no.274.pdf
[291] Hinton et. al. "Economic Mirage," pg 17.
[292] *Ibid*, pg. 18.
[293] *Ibid*, pg. 19.

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selling their IP outside of Canada. This is especially true if universities are seeing other sources of revenue, such as provincial and federal funding, decline. Additionally, policies which mandate university-driven IP be sold primarily to Canadian firms could introduce protectionist inefficiencies. If that happens, then the benefits of greater Canadian ownership of IP to improving productivity levels would likely be diluted, and possibly even negated outright.

Fig.25. Hinton, Witzel, and Wajda's U15 Report Card for Canadian-owned University IP

University	% of IP owned by Canadians	Letter Grade	Pass/Fail
University of Manitoba	71%	B	Pass
Queen's University	64%	C	Pass
University of Alberta	63%	C	Pass
University of Ottawa	58%	C	Pass
University of Waterloo	53%	D	Pass
Dalhousie University	50%	D	Pass
Université de Montréal	49%	F	Fail
University of Saskachtewan	47%	F	Fail
Western University	46%	F	Fail
University of Calgary	40%	F	Fail
McGill University	40%	F	Fail
McMaster University	34%	F	Fail
University of Toronto	32%	F	Fail
University of British Columbia	30%	F	Fail
Université Laval	29%	F	Fail

Our scholarship model, by contrast, offers a way for policymakers to incentivize universities to work with Canadian firms—particularly Albertan firms, in our case—without placing restrictions on how IP can be sold, or adding implicit taxes on capital markets by trying to make it more expensive for foreign firms to commercialize Canadian research. Recall that graduate students are a key linkage in creating and sustaining university-industry connections, which leads to greater technology transfers

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and, thus, greater commercialization.[294,295,296,297] Increasing the scholarships of graduate students, especially if merit-criteria rewards graduate students for partnering with businesses, would thus increase the commercialization of university research via these connections. If the graduate scholarship model directs more graduate students to work with local firms, then not only would more university-driven IP be utilized by Canadian firms, but a *larger percentage of IP generated* would be utilized by Canadian firms. These scholarships can either do this directly—by inserting language that requires graduate students to partner with local firms as part of the "business connections" merit-criteria—or indirectly, by encouraging local firms to contribute capital to the funding of this project in exchange for easier access to graduate student talent. Additionally, though at an extra cost to taxpayers, the provincial government could help incentivize graduate students to prioritize working with local firms through additional "locally made" bonuses. That is to say, the value of the scholarships could receive a slight boost if graduate students assess, and ultimately pick, local firms when outlining the potential commercialization impacts of their research. These options involve far less government involvement in markets, yet still provide a mechanism for directing more university-driven IP towards local firms.

It is difficult to predict which method for incentivizing graduate students to work with local firms will be the most effective. The potential pros and cons of each method or listed below, in **Figure 26,** though this should not be treated as an exhaustive list. Some level of experimentation may be required before the appropriate method is chosen. That being said, we believe the best option would be some combination of **incentivizing private firms to donate to the scholarship for priority access to graduate students and providing a "locally made" bonus to the value of the scholarships**. We believe these options minimize government disruption of labour markets the least, due to the "carrot" approach increasing the level of competition for graduate student talent. We recognize, however, that the former method is dependent on a sufficient number of Canadian firms investing into the program, while the latter will increase the cost of the program for taxpayers. Regardless, **we recommend pursuing a combination of these methods in order for these scholarships to generate the greatest possible impact on Canada's productivity.**

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[294] Boardman, P.C. and Ponomariov, B.L. 2009. "University researchers working with private companies," *Technovation* 29(1): 142-153.
[295]Santos, P., Veloso, L., and Urze, P. 2020. "Students matter: the role of doctoral students in university-industry collaborations," *Higher Education Research & Development* 40(7): 1530-1545.
[296] Radko, N., Belitski, M., and Kalyuzhnova, Y. 2022. "Conceptualizing the entrepreneurial university: the stakeholder approach," *The Journal of Technology Transfer* 48(1): 955-1044.
[297] Canada. Parliament. House of Commons. Standing Committee on Industry, Science, and Technology. Intellectual Property and Technology Transfer: Promoting Best Practices. 1st Session, 42nd Parliament, 2017. Report 8. https://www.ourcommons.ca/Content/Committee/421/INDU/Reports/RP9261888/indurp08/indurp08-e.pdf, pg. 29.

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The methods mention Canadian firms, but we could easily substitute "Canadian" for "Albertan" and make the local business requirements even more local. Alberta's economy—and, indeed, Canada's economy more broadly—is more diversified than many realize,[298,299] though the extent to which Alberta's economic diversity differs from the rest of Canada depends substantially on the methodology you use.[300,301,302,303] Regardless, there is no *a priori* reason to assume that the Government of Alberta will have difficulty finding companies willing to invest in this program, or who wish to connect with graduate students, by virtue of focusing on Albertan firms. The main question will be if it is more beneficial for the local economy to allow Canadian firms from outside the province to invest in, and work with, the graduate student scholarship model. Ensuring a high ROI on Albertan tax dollars spent towards Albertan university research is a legitimate public policy goal, but unlike with foreign-owned firms, Alberta can still directly benefit when Canadian firms in other provinces commercialize research from Albertan universities. After all, we are part of a federation, so enhanced productivity from Canadian firms means all provinces benefit from greater federal tax revenue. It is also much easier for the federal government and provinces to collaborate on competition law to prevent Canadian firms from stymying the growth and productivity of rivals, as opposed to Canada trying to coordinate competition law with other countries. Thus, the problem Hinton et. al. identified with foreign-owned firms commercializing Canadian research and using their IP to restrict the activities of Canadian firms[304] should, in theory, not be replicated if a firm in Ontario commercializes research from the University of Calgary.

[298] https://www.fraserinstitute.org/commentary/evidence-clear-alberta-no-petrostate
[299] Tombe, T. and Mansell, R. 2016. "If It Matters, Measure It: Unpacking Diversification in Canada," *SPP Research Papers* 9(36): https://www.policyschool.ca/wp-content/uploads/2016/02/Diversification-in-Canada-Tombe-Mansell.pdf
[300] https://www.cannor.gc.ca/eng/1388762115125/1388762170542
[301] https://www.pembina.org/reports/gpi-ab99-02.pdf
[302] https://businesscouncilab.com/insights-category/analysis/economic-diversification-in-alberta/
[303] Mansell, R. 2021. "Diversification of the Alberta Economy: In Search of Stability," *SPP Pre-Publication Series*: https://www.policyschool.ca/wp-content/uploads/2021/07/AF11_Diversification_Mansell.pdf
[304] Hinton, J.W., Witzel, M., and Wajda, J. 2023. "An Economic Mirage: How Canadian Universities Impact Freedom to Operate," *CIGI Papers No. 274*: https://www.cigionline.org/static/documents/no.274.pdf

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Fig.26. Pros and Cons of Methods to Increase Canadian Ownership of IP via Graduate Students

Method	Pros	Cons
Require graduate students work with local firms	• Simplest approach; • Regulatory in nature—no additional funding needed from provincial government.	• Will create labour market distortions, which could impact human capital generation and market adaptability; • Restricts freedom of choice for graduate students; • May lead to funding problems for universities if lucrative contracts between staff (graduate students) and foreign firms are restricted.
Incentivize private firms to donate to scholarships by giving them immediate access to graduate student talent	• Increased private share of funding for scholarship model; • Increased competition for graduate student talent amongst Canadian firms; • Increased R&D funding for Canadian firms; • Labour market distortions likely milder than previous method (attempts to stimulate competition rather than restrict it)	• Increased private involvement could incentivize less risky research, if used as substitute for public funding.
Institute a "locally made" bonus to scholarship value	• Greater funding for graduate students; • "Carrot" approach likely less disruptive to labour markets; • Easy hook for any marketing campaigns	• Greater expense to government.

5.4. Entrepreneurial Training for Graduate Students

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As business testimony at the House of Commons makes clear, students are already active participants in the commercialization process.[305] There will be many graduate students who are able to navigate the commercialization process and make the most of these scholarships. However, just as the business community would like *more* students to be involved in the commercialization process, it has been identified that not all students (and faculty members, for that matter) have commercialization training.[306] Given, too, that we hope 31% of all thesis-based students—and 20% of students more broadly—will receive funding through these scholarships, we need to ensure that our members have sufficient skills and understanding to understand the legal and advocacy aspects of IP, as well as navigate the complex world of institutional collaboration, liability, and risk management. This is especially apparent from academic research into the obstacles university-industry interactions face. Santos et. al. note that a difficulty in finding business partnerships and a lack of time within their program to collaborate with outside partners are leading barriers to technology transfers.[307] Naturally, ensuring graduate students have such training will also carry additional positive spillovers, such as inculcating an entrepreneurial spirit in graduate programs.

In our submission to the Mintz Panel (***Fig.27.***), we suggested that universities and the provincial government utilize graduate student labour to help support the Technology Transfer Offices (TTOs) in the commercialization process.[308] The idea was that graduate student internships in these offices would ensure that TTOs had sufficient staffing to handle increasing—and increasingly *complex*—commercialization tasks; it would also provide graduate students with another potential form of employment, in addition to their teaching and research duties. But these internships could also be leveraged to provide graduate students with hands-on training in the commercialization process, particularly the aspects that involve meeting with businesses, assessing their research needs, and navigating the legal issues that arise out of IP negotiations. If these internships were widely available, it could expand the pool of graduate students with commercialization experience and increase the number of research proposals under this scholarship model that have high commercialization potential.

This recommendation is not something that can be addressed by the scholarship model, but if the scholarship proposal laid out in this white paper is adopted, it will be important to consider ways in

[305] Canada. Parliament. House of Commons. Standing Committee on Industry, Science, and Technology. Intellectual Property and Technology Transfer: Promoting Best Practices. 1st Session, 42nd Parliament, 2017. Report 8. https://www.ourcommons.ca/Content/Committee/421/INDU/Reports/RP9261888/indurp08/indurp08-e.pdf, pg. 29.
[306] Hinton, J.W., Witzel, M., and Wajda, J. 2023. "An Economic Mirage: How Canadian Universities Impact Freedom to Operate," *CIGI Papers No. 274*: https://www.cigionline.org/static/documents/no.274.pdf
[307] Santos, P., Veloso, L., and Urze, P. 2020. "Students matter: the role of doctoral students in university-industry collaborations," *Higher Education Research & Development* 40(7): page 1541.
[308] https://gsa.ucalgary.ca/wp-content/uploads/2024/03/UCGSA-Presentation-to-the-Mintz-Panel-final-draft-1.pdf

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which graduate students can be provided with the skills necessary to make the most out of university-industry interactions.

Fig.27. UCGSA's Recommendations on Technology Transfer Offices to the Mintz Panel

5.5. Additional Benefits of This Model

What are some other benefits to investing in this scholarship model, and therefore investing in graduate students? research has found that proximity to a university increases local firm's productivity *and* the quality of their management practices.[309] Better management and access to skilled labour, in addition to businesses having greater access to university technology transfers,[310] may be an explanation for why businesses grow faster when they have more interactions with local universities.[311] If technology transfers from universities help businesses grow, greater support for university research

[309] Feng, A. and Valero, A. 2020. "Skill-Based Management: Evidence from Manufacturing Firms," *The Economic Journal* 130(628): 1057-1080.
[310] Lindelöf, P. and Löfsten, H. 2004. "Proximity as a Resource Base for Competitive Advantage: University-Industry Links for Technology Transfer," *The Journal of Technology Transfer* 29(1): 311-326.
[311] Löfsten, H., Isaksson, A., and Rannikko, H. 2023. "Entrepreneurial Networks, Geographic Proximity, and their Relationship to Firm Growth: A Study of 241 Small High-Tech Firms," *The Journal of Technology Transfer* 48(1): 2280-2306.

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would then help Canadian firms grow, **which solves an additional cause behind Canada's low productivity growth—a lack of large domestic firms**.[312] A caveat to the proximity argument is that universities should diversify their contacts, both geographically and in other ways, in order to maximize their value creation (i.e., do the most good for society).[313] That being said, the benefits to local economies—in terms of employment, in terms of income security, and in terms of economic stability—are incredibly high, and graduate student contacts with industry are a key way of creating these conditions. It should be little surprise, then, that both the Business Council of Alberta[314] and the Calgary Chamber of Commerce[315,316] have indicated that stable funding support for Alberta's post-secondary systems are necessary for innovation and productivity.

The second way this can happen is through graduate student support for community-based not-for-profits, who do essential work in addressing everything from poverty to mental health crises. While official statistics around the number of graduate students working in the not-for-profit sector are hard to come by, graduate students *are* active in on-campus clubs and organizations that focus on giving back to the community. A more tangible connection may be that a large portion of graduate student research is not only a good for commercialization or improving the productivity of for-profit firms, but can also benefit organizations with a more social outcomes focused mission. Graduate student engineers and natural scientists are at the forefront in developing new, sustainable ways of producing energy,[317] are similarly at the cutting edge in the fields of cybersecurity and artificial intelligence.[318] Our social scientists are active in investigating how we structure trade agreements to produce the most

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[312] Plant, C. 2023. "The Missing Ingredient: Solving Canada's Shortcomings in Growing Large Firms and Increasing Productivity," *C.D. Howe Institute Commentary No. 645*: https://cdhowe.org/wp-content/uploads/2024/12/Comm20645.pdf

[313] Rossi, F., De Silva, M., Pavone, P., Rosli, A., and Yip, N.K.T. 2024. "Proximity and Impact of University-Industry Collaborations. A Topic Detection Analysis of Impact Reports," *Technological Forecasting and Social Change* 205(1): 123473. https://doi.org/10.1016/j.techfore.2024.123473.

[314] Janet Brown, "Defining the Decade: Opportunity & Prosperity: Alberta's Progress Towards Defining the Decade," prepared for the Business Council of Alberta, 2023, https://businesscouncilab.com/wp-content/uploads/2023/11/BCA_DTD_2023-Prosperity-Scorecard-FINAL.pdf.

[315] Calgary Chamber of Commerce, "Accelerate: Driving Alberta Forward" (Calgary Chamber of Commerce, 2023). https://prismic-io.s3.amazonaws.com/calgarychamberwebsite/d50d6949-e64e-4041-960e-2be0994268d8_CC+-+Accelerate+-+Driving+Alberta+Forward+2023.pdf

[316] Calgary Chamber of Commerce, "Gearing up for Growth: Recommendations for the City of Calgary to support the continued recovery and resilience of businesses" (Calgary Chamber of Commerce, 2023) https://calgarychamberwebsite.cdn.prismic.io/calgarychamberwebsite/5a0f6a9c-bb3d-4c72-b463-bfbd1f606d92_CC+-+Gearing+up+for+growth+-+Municipal+Roundtable+Report+-+Web.pdf

[317] https://www.ualberta.ca/en/engineering/about/news/2024/shaping-a-greener-future-profiles-of-graduate-students-in-sustainability.html

[318] https://www.innovatingcanada.ca/technology/graduate-students-at-the-forefront-of-ai-development/

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economic value for Canadians, secure the Arctic,[319] fix our procurement problems, analyze the challenges of food insecurity,[320] and expand our soft power[321] to create more stable alliances. And as US government slashes funding for the National Institute of Health (NIH) and the Center for Disease Control (CDC),[322,323] our doctors and medical researchers will be even more important in investigating, treating, and preventing outbreaks. Canada's rich cultural mosaic would not be complete without the fine arts, nor would our future be secure without the tireless work of teachers and education students.

Graduate students, then, have a lot to offer for Alberta and Canada. We are a resource that can contribute greatly to economic security, either through our work within the walls of universities or through our support for businesses, communities, and essential services. The scholarship model proposed in this paper should thus be seen as an investment in fortifying our province and our country—as something that will pay dividends for everyone, whether they are in graduate school or not. And if this scholarship model is adopted as part of the Mintz Panel's mandate to increase the competitiveness of Albertan higher education, we should note that this will go a long way towards reducing our vulnerability to trade-related shocks. American scientists are contemplating an exodus due to funding cuts and political attacks from the Trump administration, and Europe is poised to capitalize on this.[324,325,326,327] If graduate student stipends increased to become more competitive with Europe, and this was done by increasing research funding through merit-based scholarships, Canada could court a large number of these scientists. We could see a total reversal of the brain drain that has dogged Canada for decades and gain additional leverage over the US—in the form of technological development, productivity growth, and intellectual property—that would allow us to negotiate with them on more equal footing.

The focus of this paper has been on the monetary benefits of graduate education, and thus defended the proposed scholarship model on largely monetary grounds—including on its ability to create economic security for Albertans and Canadians outside the "ivory tower." But there are other, non-monetary benefits of education that would help strengthen our country, too. Higher levels of

[319] https://uwaterloo.ca/tri-university-history-graduate-program/news/arctic-research-dr-sam-hossack-timely
[320] https://ucalgary.ca/news/ucalgary-researchers-explore-dynamics-food-insecurity-costs-living-continue-rise
[321] https://www.concordia.ca/cunews/main/stories/2019/04/02/concordia-phd-student-examines-the-role-of-music-in-cultural-diplomacy-between-canada-and-brazil.html
[322] https://www.science.org/content/article/news-glance-flat-u-s-research-budget-cdc-nominee-dropped-and-who-writes-review-letters
[323] https://pmc.ncbi.nlm.nih.gov/articles/PMC5468112/
[324] https://www.ft.com/content/cdcbe3df-9475-4816-9a95-0df64838566f
[325] https://sciencebusiness.net/international-news/europe-could-be-haven-us-researchers-says-erc-president
[326] https://www.404media.co/french-university-to-fund-american-scientists-who-fear-trump-censorship/
[327] https://www.businessinsider.com/meta-yann-lecun-scientists-look-abroad-amid-trump-funding-cuts-2025-2

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education shield individuals from falling into poverty;[328,329,330] furthermore, education is also associated with increased levels of democratic participation in the political system.[331] It can also be a site of cultural transmission and reconciliation, if marginalized groups are able to share their voices. Broad investment into fine arts, cultural studies, or the humanities more generally can create close bonds between social groups, enhancing cross-cultural communication and strengthening society's cultural mosaic.[332] The expansion of higher education also reduces crime rates,[333] and this result is robust to multiple countries in differing economic and political contexts.[334] In each of these cases, higher education—which, as we have repeatedly stated, relies heavily upon graduate students to function—is a positive contributor to a healthier, more stable society.

5.6 Recommendations

Consequently, the University of Calgary Graduate Students' Association thus calls upon the Provincial government to:

1. Create a three-tiered, merit-based, scholarship program that rewards domestic and international thesis-based graduate students for research excellence:
    a. A first tier, that rewards the top 25% of master's and doctoral students with a scholarship valued at $7,000 and $9,500, respectively;
    b. A second tier, that rewards the top 5% of master's and doctoral students with a scholarship valued at $13,000 and $18,000, respectively;
    c. A third tier, that rewards the top 1% of master's and doctoral students with a scholarship valued at $17,500 and $24,000, respectively.

[328] Coelli, M.B., Green, D.A., and Warburton, W.P. 2007. "Breaking the Cycle? The effect of education on welfare receipt among children of welfare recipients," *Journal of Public Economics* 91(7-8): 1369-1398.
[329] Landon, R. 2006. "The Role of Post-Secondary Education in Welfare Recipients Paths to Self-Sufficiency," *The Journal of Higher Education* 77(3): 472-496.
[330] Dave, D.M., Carman, H., and Reichman, N.E. 2013. "Effects of Welfare Reform on Education Acquisition of Adult Women," *Journal of Labor Relations* 33(2): 251-282.
[331] Kiess, J. 2021. "Learning by Doing: The impact of experiencing democracy in education on political trust and participation," *Politics* 42(1): 75-94.
[332] Lee, D. 2013. "How the Arts Generate Social Capital to Foster Intergroup Social Cohesion," *The Journal of Arts Management, Law, and Society* 43(1): 4-17.
[333] Swisher, R.R. and Dennison, C.R. 2016. "Educational Pathways and Changes in Crime Between Adolescents and Early Adulthood," *Journal of Research in Crime and Delinquency* 53(6): 840-871.
[334] Noghanibehambari, H. and Tavassoli, N. 2022. "An Ounce of Prevention, A Pound of Cure: The Effects of College Expansion on Crime," *International Review of Law and Economics* 71(1): 106081. https://doi.org/10.1016/j.irle.2022.106081

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2. Structure the administration of these scholarships in a similar manner to that of the federal Tri-Council granting agencies:
    a. One stream, administered by neutral experts, for the social sciences and humanities;
    b. One stream, administered by neutral experts, for the natural sciences and engineering;
    c. One stream, administered by neutral experts, for the medical sciences.
3. In the creation of merit criteria, ensure that, among other criteria recommended by subject-matter experts:
    a. Students are rewarded for research projects that align with research demand from the private sector;
    b. Students are rewarded for research projects that help not-for-profits fulfill their mandates;
    c. The above does not mean the merit of research projects are tied to labour market outcomes or undermine the entrepreneurial potential of universities.
4. In order to save administrative costs and create best practices for commercializing research, draw from Mitacs as either consultants to the scholarship program or by connecting the scholarship program to the Mitacs network;
5. In the creation of merit criteria, ensure that students are rewarded for interdisciplinary research.
6. In the creation of merit criteria, ensure that equity-seeking groups are adequately consulted, to maximize accessibility and the diversity of voices within the innovation ecosystem.
7. Collaborate with course-based students to effectively integrate their programs into the research scholarship program, or to reform the evaluation of coursework to reward excellence in non-thesis based programs;
8. Ensure that graduate students sit on the ultimate decision-making bodies of each granting stream, in order to preserve the graduate student perspective on any governance questions, and:
    a. That rules are in place to mitigate any conflicts of interest that may arise from graduate students sitting on these bodies, so that graduate students do not have to make a choice between serving their profession and having access to external funding.
9. Ensure these scholarships result in an increase in research commercialization by:
    a. Incentivizing private businesses to invest in the model on the condition that they receive priority access to graduate student research talent and human capital;

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b. Provide a “locally made” bonus to graduate students whose work with local businesses as part of the industry engagement section of the scholarship merit-criteria.

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Part 6: Limitations

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While we believe this scholarship model will greatly benefit both graduate students and Albertans at large, there are some limitations worth mentioning.

The first, which has been alluded to already in this paper, is that course-based students will not benefit from this scholarship model. Though we have suggested some alternative funding mechanisms for course-based students, more investigation is required to ensure that course-based students have access to competitive funding.

Second is that these scholarships cannot fully replace the lost university operating funding since the 2019 fiscal year. Graduate students are, obviously enough, not the only individuals within a university whose salaries draw from the operating budget. And given that the majority of graduate students—especially when we factor in course-based students—will not win one of these scholarships, there are a significant number of master's and doctoral students who will still feel sharp financial pressure while they complete their studies. Furthermore, as we state in our brief on Graduate Program Administrators (GPAs) and IT Services,[335] there are vital support functions within universities that can only be adequately funded through operating grants. Overly lean budgets can, in fact, cause institutions to *lose* money when they are unable to pay for functions that are responsible for helping students bring in external funding (like GPAs) or ensuring the smooth operations of laboratories and classrooms (like IT services). These scholarships cannot cover those expenses.

Additionally, merit-based scholarships will help make Alberta's post-secondary sector more competitive, but they should not replace needs-based funding. A 2019 meta-analysis found that merit-based scholarships have no effect on persistence or completion, where-as needs-based funding had a substantial positive impact—increasing needs-based grant allotments by $1,000 improved both metrics by 1.5 to 2 percentage points.[336] This study is not perfectly translatable to our scholarship model, as most merit-based scholarships are highly exclusive, where-as our three-tier model captures nearly a third of all thesis-based students. It makes sense that the more exclusive a scholarship, the smaller its impact on key performance indexes like persistence; ours is, hopefully, expansive enough to have a meaningful impact on these KPIs. But increased support for needs-based scholarships is an important, complementary policy, even though those grants are unlikely to have the same ROI as merit-based scholarships, and indeed are less likely to forward commericalization efforts to the same extent, too.

Inequality within graduate students is also an important limitation to keep in mind. A recent working paper noted that the "Matthew Effect"—or, to quote Leonard Cohen, the "poor stay poor and

[335] Available in our policy library: https://gsa.ucalgary.ca/advocacy/
[336] Nguyen, T.D., Kramer, J.W., and Evans, B.J. 2019. "The Effects of Grant Aid on Student Persistence and Degree Attainment: A Systemic Review and Meta-Analysis of the Causal Evidence," *Review of Educational Research* 89(6): 831-974.

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the rich get rich"—plays a role in the distribution of merit-based scholarships.[337] The researchers found that scholars who win an award early on are more likely to continue winning awards as their career matures, which creates a widening funding gap between scholars.[338] Interesting, the mechanism driving this is that scholars who win an early award tend to apply for significantly more awards than those who do not win one, suggesting that winning an award encourages scholars to be more proactive in seeking out external funding (or, alternatively, that scholars without an award early on are discouraged from doing the same). When crafting these scholarships, then, care should be taken to mitigate the Matthew Effect. For instance, if scholars who do not win are discouraged from apply for awards later on, then ensuring all applicants receive feedback which allows them to be more competitive in the future, and rewards them for seeking out external funding, could help dampen any funding gaps that start to emerge.[339]

Finally, and in regard to Canada's "patent productivity paradox," these scholarships are unlikely to be a silver bullet. There are structural problems within Canada's research and innovation ecosystem, which have been highlighted by industry groups such as the Council of Canadian Innovators[340,341,342,343] and the Royal Bank of Canada,[344] that do not involve graduate students. However, we believe these scholarships are compatible with a great many solutions suggested by other groups within the business community. How these suggestions can be synergized is a question that policymakers should explore.

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[337] Tragg, V. Brady, E., Vincent-Lamarre, Bidel, F., Lopes-Bento, C., Andersen, J.P., and Block, C. 2025. "The Matthew Effect and Early Career Set-Backs in Research Funding—A Replication Study," *RoRI Working Paper No.16:* *https://rori.figshare.com/articles/preprint/The_i_Matthew_i_effect_and_early-career_setbacks_in_research_funding_-_a_replication_study_RoRI_Working_Paper_No_16_/29302004?file=55329143*

[338] *Ibid*.

[339] The author would like to thank Hannah Hunter for this fruitful discussion.

[340] https://www.canadianinnovators.org/content/lets-build-an-innovation-box-policy-ideas-for-ottawas-patent-box-consultation

[341] https://www.canadianinnovators.org/content/cci-policy-brief-on-canadas-economic-security

[342] https://www.canadianinnovators.org/content/a-mandate-to-innovate

[343] https://www.canadianinnovators.org/content/unpacking-canadas-patent-productivity-paradox

[344] https://www.rbc.com/en/thought-leadership/the-growth-project/a-smarter-path-the-case-for-postsecondary-education-reform/#:~:text=In%20this%20report%2C%20we%20identify,to%20sharpening%20Canada's%20competitive%20edge.

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Appendixes

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Appendix A.

Current Alberta Graduate Merit-Based Scholarships[345,346,347,348,349,350,351,352]

Scholarship	Value ($)	Requirements	# of Awards
Alberta Award for Study of Human Rights and Multiculturalism	M: 10,000 PhD: 15,000	• Full-time • Canadian Citizen/Permanent Resident/First Nations, Metis, or Inuit • Alberta resident • Scholarship that focuses on human rights, diversity, and multiculturalism • Research intended to benefit Albertans and Canada as a whole	Unknown
Alberta Graduate Excellence Scholarship	11,000 to 15,000	• Full-time • Canadian Citizen/Permanent Resident/First Nations, Metis, or Inuit • Alberta resident	Unknown
Alberta Innovates Graduate Student Scholarship	Masters: 26,000 PhD: 31,000	• Full-time • Canadian Citizen/Permanent Resident • Alberta resident • Study Information and Communications Technology (ICT) or Nanotechnology	Unknown

[345] https://studentaid.alberta.ca/scholarships/alberta-award-for-study-of-canadian-human-rights-and-multiculturalism/
[346] https://studentaid.alberta.ca/scholarships/alberta-graduate-excellence-scholarship/
[347] https://studentaid.alberta.ca/scholarships/alberta-innovates-graduate-student-scholarship/
[348] https://studentaid.alberta.ca/scholarships/arts-graduate-scholarship/
[349] https://studentaid.alberta.ca/scholarships/chief-justice-fraser-scholarship/
[350] https://studentaid.alberta.ca/scholarships/david-johnston-law-scholarship/
[351] https://studentaid.alberta.ca/scholarships/excellence-in-public-law-scholarship/
[352] https://studentaid.alberta.ca/scholarships/sir-james-lougheed-award-of-distinction/

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Arts Graduate Scholarship	15,000	• Full-time • Canadian Citizen/Permanent Resident • Alberta resident • Studying the Fine Arts	Unknown
Chief Justice Fraser Scholarship	12,500	• Full-time • Canadian Citizen/Permanent Resident • Alberta resident • Enrolled in a law program at UAlberta or UCalgary	2
David Johnston Law Scholarship	10,000	• Full-time • Canadian Citizen/Permanent Resident • Alberta resident • Enrolled in a law program at UAlberta or UCalgary	2
Excellence in Public Law Scholarship	10,000	• Full-time • Canadian Citizen/Permanent Resident • Alberta resident • Enrolled in a law program at UAlberta or UCalgary	2
Sir James Lougheed Award of Distinction	M: 15,000 PhD: 20,000	• Full-time • Canadian Citizen/Permanent Resident • Alberta resident • Not enrolled in a professional degree	M: 7 PhD: 8

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Appendix B.

Fully calculating the Government of Alberta operating funding to the University of Calgary is not as straightforward as you might assume. The numbers used throughout this paper to determine total provincial operating funding are pulled from the Ministry of Advanced Education Annual Reports.[353] However, the Annual Report's listed operating funding totals differ from what is found in the University of Calgary Consolidated Financial Statements: for example, the Government of Alberta's listed operating funding of $429 million is significantly higher than the $385 million UCalgary lists in Note 24.

The discrepancy could be caused by two factors. The first is that the Annual Reports, as currently available from the Government of Alberta's website, are unaudited; by contrast, the Consolidated Financial Statements have been audited by the Auditor General of Alberta. Theoretically, then, the Consolidated Financial Statements offer a more accurate budget, given the Auditor's additional oversight in preparing all University of Calgary financial documents. The second is that the Ministry of Advanced Education includes operating funding from other departmental programs, where-as the Consolidated Financial Statements limit the classification of "operating funding" solely to grants received from the Ministry of Advanced Education (i.e., the "Campus Alberta Grant").

In this paper, we utilize the unaudited Annual Reports as our basis for determining the total provincial operating funding allotted to the University of Calgary. The reason we do this is that it provides a more holistic account of operating funding: if some day-to-day operations are funded from grants given to the university through a research agreement, or through a targeted enrollment expansion that includes operating funding, then the number reported in the Annual Report will capture that. The alternative would be to take the budgetary line-item "Total Advanced Education" from UCalgary's Consolidated Financial Statements and use that as a proxy for operating funding. However, doing so would overestimate the total operating funding allotted by the provincial government, as this line-item includes restricted funding like capital grants, which can only be spent on things like building repairs and maintenance.

If we had used the "Total Advanced Education" line-item from the Consolidated Financial Statements, though, we would see an even more substantial cut to the University of Calgary. In nominal terms, the University of Calgary received $621 million in total funding from the Ministry of Advanced Education; in 2024, this decreased to $484 million, a **$136 million** decline, or **22%**. In contrast, the Ministry Annual Report numbers show a nominal decrease of **$78 million**, or **15%**.[354] The Consolidated Financial Statement number is not wrong or even misleading: it includes cuts to capital

[353] See Appendix C.
[354] See Appendix C.

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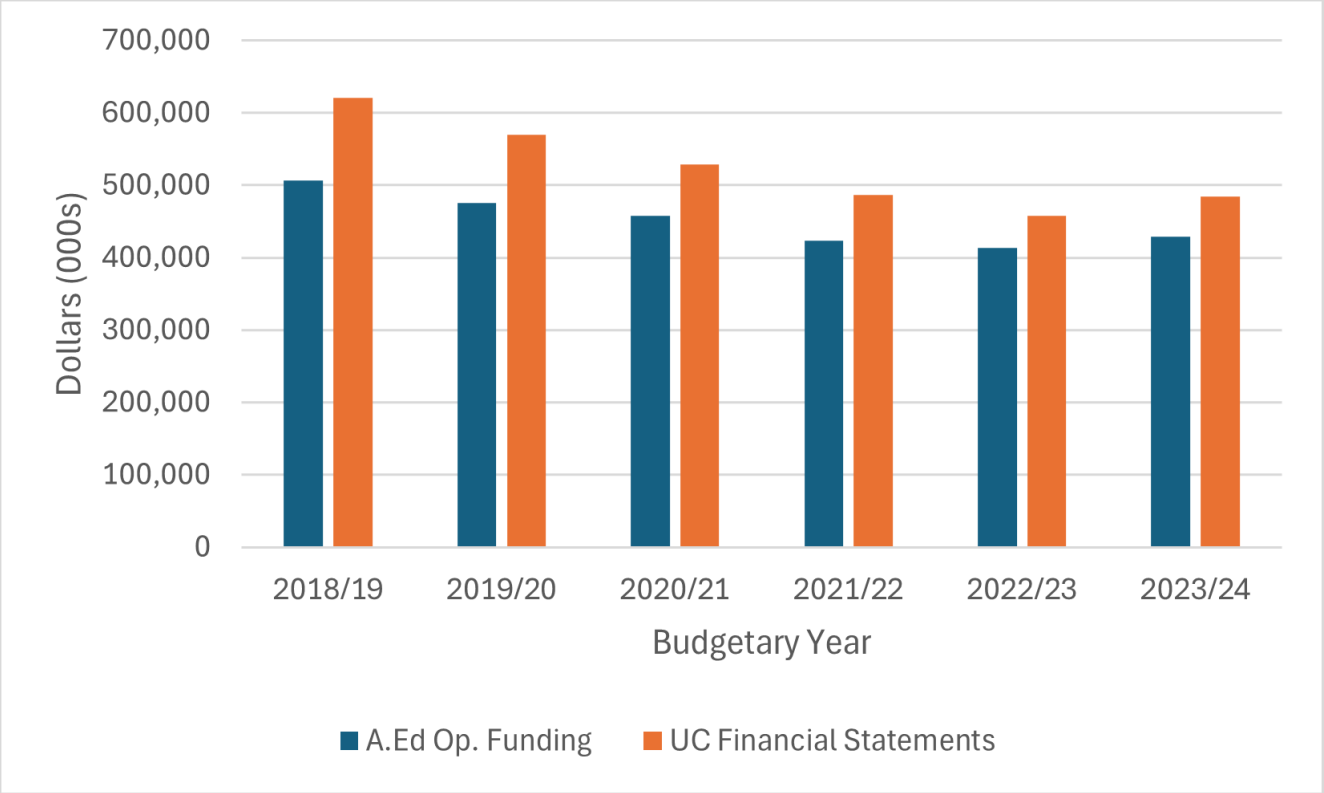
grants that are just important to the post-secondary experience as operating funding. It is simply the case that you cannot spend capital grant money directly on graduate students.

As **Figure 28** below shows, however, we could have used this number to paint an even more stark picture of the state of post-secondary funding in Alberta.

Fig.28. Ministry of Advanced Education Annual Report vs. UCalgary Consolidated Financial Statements (Nominal)



A final note is that, as of writing, the consolidated financial statements from the University of Calgary had not been released yet. As such, data only extended to the end of the 2024 fiscal year.

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Appendix C.

Provincial operating grant numbers are taken from the Ministry of Advanced Education annual reports, from 2019 to 2024, and adjusted for inflation using the Bank of Canada's Inflation calculator (July 2019 to July 2024 CPI, with some numbers using October CPI).

All UCalgary revenue, including funding from the Government of Canada, and tuition data is taken from the University of Calgary Yearly Financial Statements for the years ending in 2019 to 2024, and adjusted for inflation using the Bank of Canada's Inflation Calculator (July 2019 to July 2024 CPI, unless it's October numbers).

UCalgary Provincial Operating Grant and Tuition Revenue since 2018/19 (Nominal)

Year	UCalgary Provincial Operating Grant Revenue (thousands of $)	% change in Operating Grant revenue from previous year	UCalgary tuition revenue (thousands of $)	% change in tuition revenue from previous year
2018/19	506,486	--	231,792	--
2019/20	475,395	-6.1%	238,632	+3.0%
2020/21	457,126	-3.8%	268,155	+12.4%
2021/22	423,283	-7.4%	300,952	+12.2%
2022/23	413,582	-2.3%	328,805	+9.3%
2023/24	428,673	+3.6%	372,591	+13.3%
Cumulative Change	***-77,813***	***-15.4%***	***+140,799***	***+41.9%***

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UCalgary Provincial Operating Grant and Tuition Revenue Since 2018/19 (Real, 2024 dollars)

Year	UCalgary Provincial Operating Grant Revenue (thousands of $)	% change in Operating Grant revenue from previous year	UCalgary tuition revenue (thousands of $)	% change in tuition revenue from previous year
2018/19	599,280	--	274,259	--
2019/20	561,673	-6.3%	281,941	+2.8%
2020/21	520,732	-7.3%	305,467	+8.3%
2021/22	448,166	-13.9%	318,643	+4.3%
2022/23	424,046	-5.4%	337,124	+5.8%
2023/24	428,673	+1.1%	372,591	+10.5%
Cumulative Change	***-170,607***	***-28.5%***	***+98,332***	***+35.9%***

Other Government of Alberta Funding Since 2018/19

Year	Other Government of Alberta Funding (nominal $)	Other Government of Alberta Funding (real, 2024 $)	% Change in real funding
2018/19	56,126	66,480	--
2019/20	39,814	46,850	-29.5
2020/21	46,718	52,529	+12.1
2021/22	43,830	46,110	-12.2
2022/23	50,330	51,345	+10.2
2023/24	60,212	60,212	+17.3
Cumulative Change	***+4,086***	***-6,268***	***-9.4***

Alberta Health Funding to UCalgary Since 2018/19

Year	Alberta Health Funding (nominal $)	Alberta Health Funding (real, 2024 $)	% Change in real funding
2018/19	74,935	88,795	--
2019/20	77,528	91,229	+2.7
2020/21	84,261	94,742	+3.9
2021/22	86,630	91,136	-3.8
2022/23	76,738	78,286	-14.1
2023/24	80,196	80,196	+2.4
Cumulative Change	***+5,261***	***-8,599***	***-9.7%***

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Non-Tuition, Private Funding to UCalgary (Real, 2024 dollars)

Year	Sales of Services/Products (thousands of $)	Donations and other grants (thousands of $)	Investment Income (thousands of $)	Total Non-Tuition, Private revenue (thousands of $)	% change from previous year
2018/19	152,495	241,000	65,234	458,729	--
2019/20	150,781	185,274	57,237	393,292	-14.3%
2020/21	134,828	186,627	68,642	390,097	-0.8%
2021/22	90,565	164,503	72,020	327,088	-16.2%
2022/23	122,828	160,573	76,030	359,431	+9.9%
2023/24	122,151	190,040	106,045	418,236	+16.4%
Cumulative Change	***-30,344***	***-50,960***	***+40,811***	***-40,493***	***-8.8%***

Government of Canada Funding to UCalgary since 2018/19

Year	Nominal Funding (thousands of $)	% Change	Real Funding (thousands of $, Oct. 2024 CPI)	& Change
2018/19	175,472	--	207,843	--
2019/20	186,965	+6.5	220,007	+5.9
2020/21	194,316	+3.9	218,487	-0.7
2021/22	200,020	+2.9	210,424	-3.7
2022/23	204,329	+2.2	208,452	-0.9
2023/24	229,471	+12.3	229,471	+10.1
Cumulative Change	***+53,999***	***+30.8***	***+21,628***	***+10.4***

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Advanced Education Research Funding since 2018/19

Year	Advanced Education Research Funding (nominal $)	Advanced Education Research Funding (real, 2024 $)	% Change in real funding
2018/19	6,415	7,598	--
2019/20	10,546	12,410	+63.3
2020/21	9,066	10,194	-17.9
2021/22	8,413	8,851	-13.2
2022/23	12,417	12,668	+43.1
2023/24	9,253	9,253	-27.0
Cumulative Change	*+2,838*	*+1,655*	*+21.8*

Provincial PSE Spending as % of GDP (2019/20)[355]

Province	PSE Spending % of GDP (2019/20)	Difference from EU "Significantly Underfunded" Average
NL	1.4%	+0.6%
PEI	1.1%	+0.3%
NS	1.2%	+0.4%
NB	0.9%	+0.1%
QC	1.2%	+0.4%
ON	0.6%	-0.2%
MB	1.0%	+0.2%
SK	0.8%	--
AB	***0.7%***	***-0.1%***
BC	0.7%	-0.1%
AB (2024)	***0.02%***	***-0.78%***

[355] Data available here: https://www.caut.ca/resources/almanac/2-canada-provinces.

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Appendix D.

When calculating total graduate student enrollment by Tri-Council funding stream, we assigned the categories used by Statistics Canada to a granting agency based on what we thought was the closest possible fit. For some categories, this was quite easy: "Humanities" very clearly belonged in SSHRC, for example. Others, such as "Personal, Protective, and Transportation Services," were more difficult. That being said, the largest degree streams were among the easiest to place, so any miscategorization on our part will not appreciably affect the percentages used in the white paper. For the total number of students, we simply selected "Total, field of study," so categorization had no impact on the calculated percentage. The Statistics Canada categories, as we divided them between the granting agencies, are listed below, alongside the total enrolled students per the 2022/23 intake year.

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StatsCan Field of Study	Enrolled Students (Master's)	Enrolled Students (Doctoral)
SSHRC		
Education	20,361	3,327
Visual and Performing Arts and Communications Technologies	2,424	984
Humanities	4,896	3,255
Social and Behavioural Sciences and Law	29,568	9,354
Business Management and Public Administration	29,634	1,647
Personal Improvement and Leisure	6	--
Total	*86,889*	*18,567*
NSERC		
Physical and Life Sciences and Technologies	8,283	7,080
Mathematics, Computer, and Information Sciences	5,433	1,770
Architecture, Engineering, and Related Technologies	10,479	4,599
Agriculture, Natural Resources, and Conservation	4,767	1,119
Personal, Protective, and Transportation Services	729	3
Total	*29,741*	*14,571*
CIHR		
Health and Related Fields	54,936	4,353
Total	*54,936*	*4,353*
Combined Total	***171,566***	***37,491***

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Appendix E.

Cumulative Cost of the Model vs. Cumulative Economic Activity Generated

Year	Direct Cost (000s)	Total Cost (000s)	R.O.I Rate	Yearly Economic Activity (000s)	Cml. Economic Activity (000s)	Cml. Cost (000s)
2025/26	$42,935	$53,669	2.40/1.00	$103,044	$103,044	$53,669
2026/27	$47,289	$59,036	4.80/1.00	$226,987	$298,921	$112,705
2027/28	$51,951	$64,939	4.80/1.00	$249,365	$548,292	$177,644
2028/29	$57,146	$71,433	4.80/1.00	$274,301	$822,593	$249,077
2020/30	$62,861	$78,576	4.80/1.00	$301,733	$1,124,326	$327,653

Yearly economic activity is calculated by taking the direct cost of the scholarship (i.e., only the money given to graduate students) and multiplying that by 4.8 (except for in the first year, where we assume that the ROI for the program will be half as much as our estimate due to potential inefficiencies and lag during implementation). The cumulative total is each yearly total added together.

To calculate the cumulative cost, we add both the direct and indirect (i.e., administrative) costs together for each year, and then add all years together. Indirect costs are not factored into cumulative economic activity because we assume that administrative costs do not contribute to the ROI for research grants. This may be an erroneous assumption, as proper management practices actually *add* value, and some scholars suggest that this is in fact more important in R&D intensive fields (such as the tech sector).[356] Regardless, this provides a conservative estimate on the funding gap that will need to be made up through reallocations or savings in order to make the proposal revenue neutral. Should we have underestimated the total potential savings for the government, or underestimated the value-added of administrative support for the scholarship program, then the gap between yearly/cumulative economic activity and the yearly/cumulative cost of the program will be substantially smaller.

When determining *Difference (Conservative Estimates*), we took the yearly economic activity, times it by 0.10 (our assumption that all newly generated economic activity would be taxed at 10%), then subtracted that by total cost. This gives us the total costs that would have to be made up in savings elsewhere in order to make this program revenue neutral.

[356] Bloom, N., Brynjolfsson, E., Foster, L., Jarmin, R., Patnaik, M., Saporta-Eksten, I., and Van Reenan, J. 2019. "What Drives Differences in Management Practices?" *American Economic Review* 109(5): 1648-83.

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When determining *Difference (Fully-Costed Estimates*), we followed a similar structure. We took the total direct cost, times it by 3.00 (the fully-costed savings rate), then subtracted that from the total cost to arrive at our surplus. Again, we may be underestimating the value added of administrative support for the program, which would bias our results downwards.

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Appendix F.

Real GDP Per Capita By Province in 2023, 2019, and 2014[357]

Province	2023 GDP Per Capita	2019 GDP Per Capita	2014 GDP Per Capita	% Change from 2023 to 2019	% Change from 2023 to 2014
British Columbia	$55,310	$53,970	$50,240	+2.5%	+10.10%
Quebec	$49,020	$48,200	$44,850	+1.7%	+9.30%
PEI	$41,730	$41,770	$39,400	-0.1%	+5.91%
Ontario	$54,740	$55,040	$51,880	-0.6%	+5.51%
Nova Scotia	$41,730	$41,770	$39,400	-0.9%	+3.9%
Saskatchewan	$63,860	$65,080	$66,740	-1.9%	-4.3%
New Brunswick	$41,880	$42,700	$41,050	-1.9%	+2.0%
Alberta	***$72,530***	***$74,530***	***$80,220***	***-2.7%***	***-9.6%***
Manitoba	$48,140	$49,560	$48,430	-2.9%	-0.6%
NFL	$53,520	$59,240	$57,700	-9.7%	-7.2%

Labour Productivity ($/hr) By Province in 2023, 2019, and 2014[358]

Province	2023 $/hr	2019 $/hr	2014 $/hr	% Change from 2023 to 2019	% Change from 2023 to 2014
British Columbia	$56.70	$53.20	$53.00	+6.6%	+7.0%
Quebec	$55.30	$53.20	$51.50	+3.9%	+7.4%
PEI	$41.20	$41.30	$38.40	-0.2%	+7.3%
CDN Avg.	*$59.10*	*$58.20*	*$56.60*	*+1.5%*	*+4.4%*
Ontario	$57.10	$56.90	$53.80	+1.5%	+6.1%
Nova Scotia	$43.30	$43.70	$40.30	-0.9%	+7.4%
Saskatchewan	$75.80	$73.60	$71.20	+3.0%	+6.5%
New Brunswick	$44.60	$45.20	$43.00	-1.3%	+3.7%
Alberta	***$75.80***	***$76.40***	***$75.50***	***-0.8%***	***+0.4%***
Manitoba	$53.50	$55.10	$52.80	-2.9%	+1.3%
NFL	$70.60	$79.90	$71.70	-11.6%	-1.5%

[357] https://economicdashboard.alberta.ca/dashboard/gdp-per-capita/
[358] https://economicdashboard.alberta.ca/dashboard/labour-productivity/

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