Graduate Students and Research Funding: A Position Paper

Office of the University and Government Relations Advisor

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Introduction

The shift towards a knowledge-based economy in Canada came later than in most other OECD countries. The economic recession of the early 1980's had a particularly devastating effect in this regard, leading to a massive disinvestment in higher education and academic research, setting the country back at least 15 years. In fact, the federal and provincial governments continued to make significant cuts to their fundamental research and university budgets for many years, restoring some of this funding only after getting the public sector's structural deficits under control in the mid to late 1990's. At this point, the federal government and provinces like Québec and then Ontario and Alberta decided to invest significant amounts in public research to try to keep up with or surpass better performing jurisdictions in the United States and elsewhere in the world. But since these new investments were often done in a highly targeted manner that favoured applied or industrial research, often focusing on specific sectors or large projects, universities as a whole have yet to recover fully from almost two decades of neglect and underfunding. Although this situation clearly had a major impact on all university faculty, staff and students, graduate students is one of the groups most affected by this new and in some ways harsher academic landscape.[1]

This report in no way aims to be a comprehensive analysis of Canadian federal and provincial investment in the research ecosystem since the late 1990's. Instead, the author aims to provide a succinct analysis of some of the major trends that have prevailed in the past decade or so in Canada, British Columbia and UBC in order to suggest some broad advocacy positions that might be defended by UBC Vancouver's Alma Mater Society or Graduate Student Society.

GDP and R&D Investment

Since 1995, British Columbia has seen a remarkable increase in the amount invested in research and development (R&D). In theory, this should be a positive development for the province's graduate students, but as some of the figures show, there still is room for improvement in this area.

Total domestic expenditures on research and development (R&D) as a percentage of gross domestic product (GDP) in British Columbia increased from 1% in 1995 to 1.5% in 2009. This 50% bump represents one of the biggest relative increases for this indicator among Canada's provinces, as well as the G7 and four leading OECD[2] countries (Finland, Israel, South Korea and

[1] This paragraph was inspired in large part by Garth Williams, "Doctoral Education in Canada 1900-2005," 2005.
[2] OECD: Organisation for Economic Co-operation and Development.

Sweden). In Canada, only Prince Edward Island did better[3] and among the 11 countries on Statistic Canada's list, only Israel and Norway showed more improvement.[4]

In any given year, however, the province's R&D vs. GDP ratio remained firmly below the national average, which oscillated between 1.7% in 1995 and 2.0% in 2005-2007 (it dropped to 1.9% in 2009). Compared to the G7 and four OECD countries, the intensity of B.C.'s R&D investment most closely resembled Italy's, the weakest country on the list in this respect.[5]

It must be said, however, that the B.C. government's direct R&D investment increased significantly in relative terms between 2000 and 2009, from $27 million to $113 million (a 319% increase). This represented 5.4% of the total R&D investment in the province in 2000 and 9.8% in 2009. This last figure was slightly more than the national average (9.5%) and was only surpassed by the investments of the provincial governments of Saskatchewan (10.6%) and Alberta (20.7%).[6]

As the following tables demonstrate, the global amount of R&D funding and the number of research projects at UBC has tended to increase between 2002-2003 and 2011-2012:

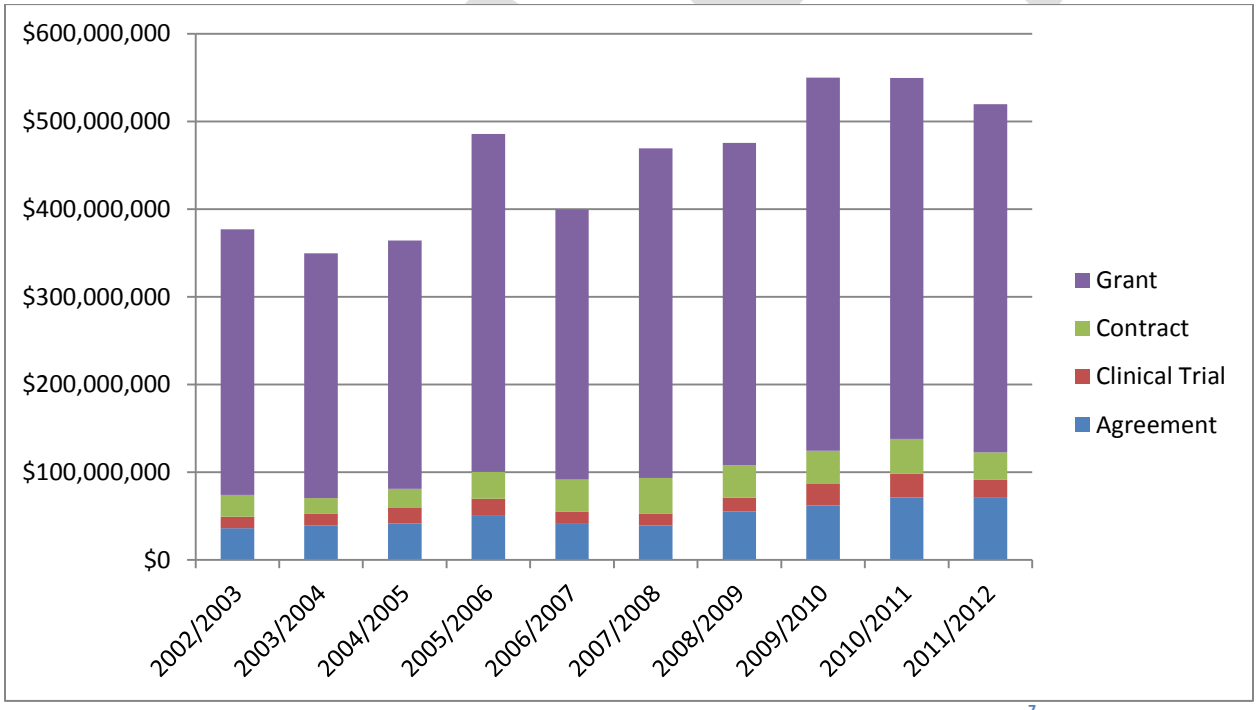

Figure 1: UBC R&D funding amounts, by type of funding, 2002-2003 to 2011-2012[7]

[3] P.E.I.'s impressive performance in this regard may not be so significant, however, because its relatively small economy is more susceptible to important fluctuations.
[4] Statistics Canada, table D.4.2.
[5] Statistics Canada, table D.4.2.
[6] Statistics Canada, table D.4.5.
[7] Source: "2011/2012 Research Awards: 10 Years Summary – Award Type." OVPRI, UBC. Accessed 2012/01/16.

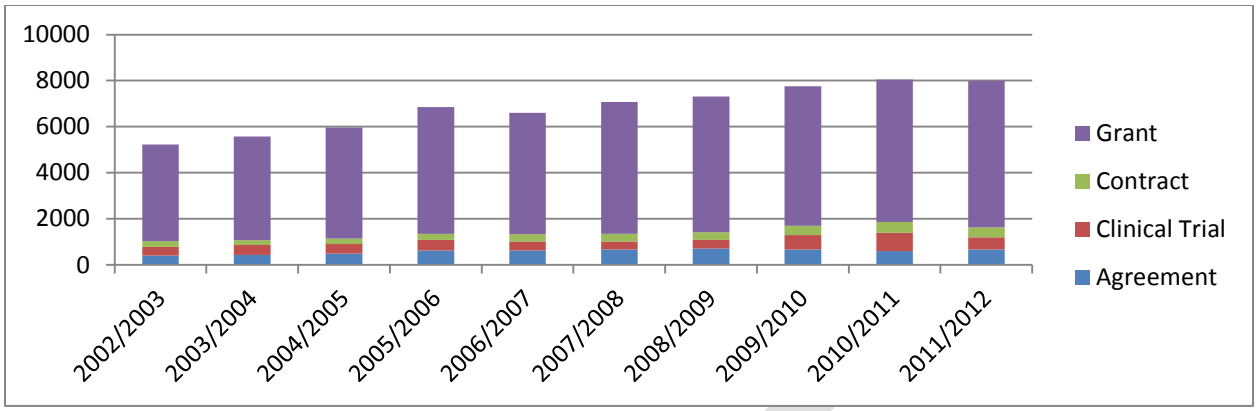

Figure 2: Total number of R&D projects funded, by type of funding, 2002-2003 to 2011-2012

But as the following table shows, the average amount per project has actually tended to remain fairly flat or even decrease in the same period, a trend that would be even more manifest if the following table took inflation into account:

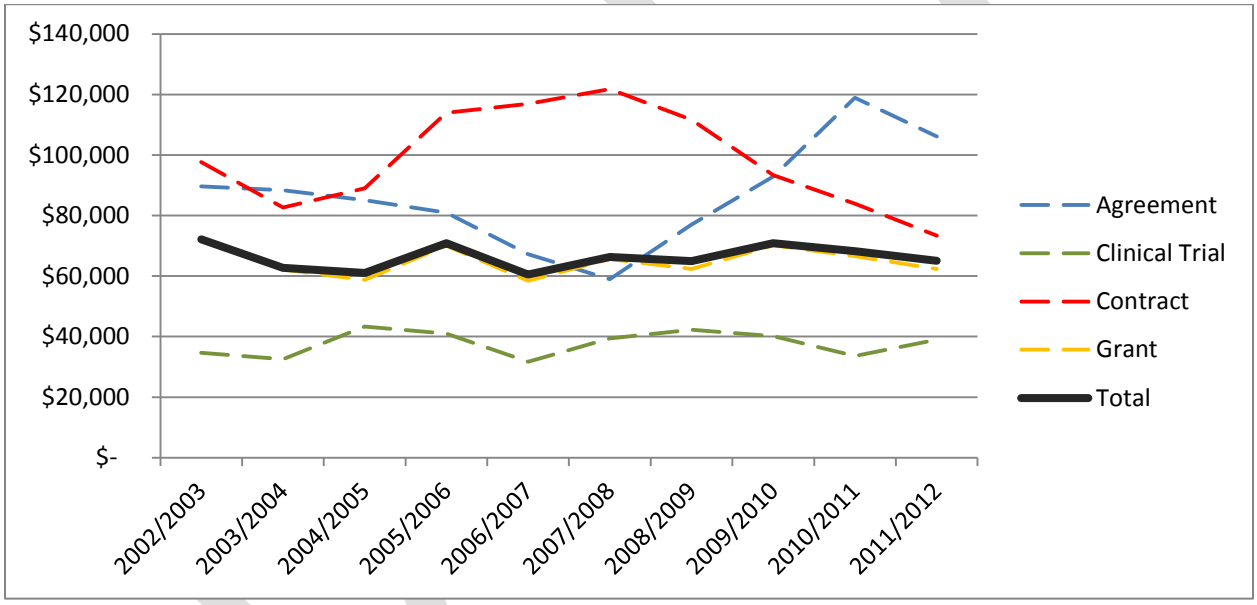

Figure 3: Average amount of funding received per R&D project, by type of funding, 2002-2003 to 2011-2012

One of the most important points demonstrated by these graphs is the relative volatility of research funding, which becomes even more evident when inflation is taken into account.

Compelling as it is, the data does not demonstrate one of the major issues associated with research funding: almost all of these grants fund specific projects with timelines and objectives defined by one or more faculty member. Although principal investigators and faculty associated to these projects generally integrate graduate student researchers to their endeavours, their first duty is to ensure that their research project succeeds. They are therefore not obliged to meet a student's particular pedagogical, research or professional needs. In other words, although research grants are and will remain an important source of funding for graduate

training, they should not replace the more stable and targeted resources that universities and governments must devote to this issue.

Role of University Education in Canada's Economy

The following graph[8] illustrates the overall importance of the education provided by Canada's universities to the national economy:

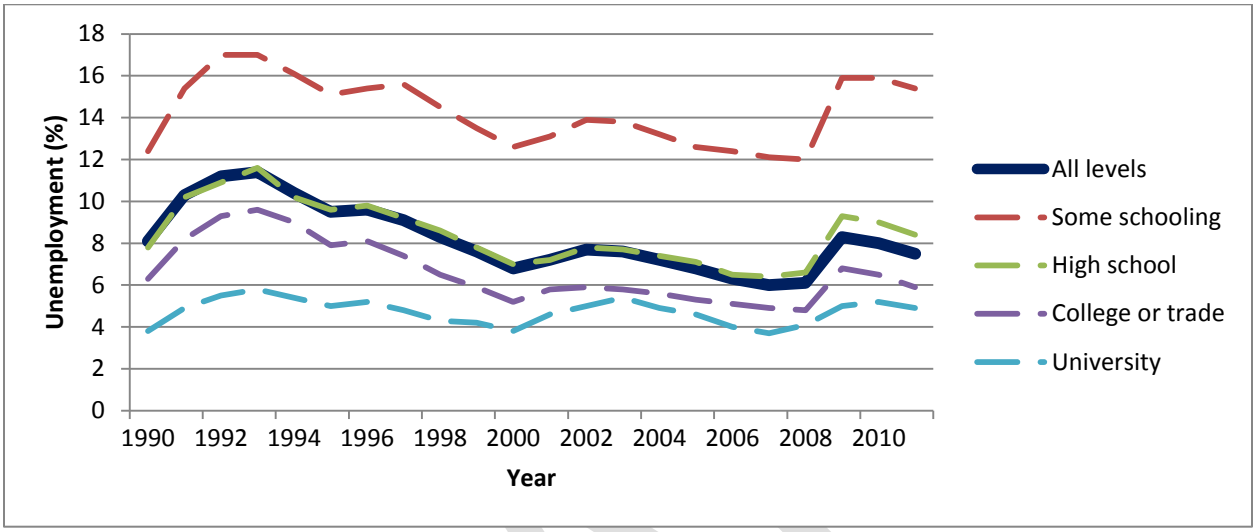

Figure 2: Unemployment rates of Canada's population aged 15 and over, by educational attainment, 1990 to 2011

These numbers illustrate that Canadians with a university degree are much less likely to be unemployed than the rest of the population and that this segment of the population is much less sensitive to dips in economic activity. These figures are confirmed in other publications that provide more detailed statistics for the provinces.[9] With respect to the stability of employment numbers, workers with a university education fare particularly well in British Columbia. In effect, the sum of this evidence provides compelling evidence that a university degree is important to a person's employability and that postsecondary education boosts the health of the economy. Indirectly, it provides a good argument for the need to put more resources on preparing graduate students for their increased role in undergraduate teaching.

Turning more specifically to graduate students, the number of full-time workers holding an advanced degree doubled over a twenty-year period, going from about 550,000 full-time workers in 1990 to 1.1 million in 2009.[10] These figures also show that university graduates are the only population group that contribute a significantly larger percentage of income taxes

[8] Information taken from the following table: "Unemployment rates of population aged 15 and over, by educational attainment, Canada, 1990 to 2011".

[9] This fact is confirmed in chart A.3.3, "Variability of the employment rates of the 25- to 64-year-old population between 1998 and 2010, by highest level of education attained" and table A.3.2, "Trends in employment rates of 25- to 64-year-olds, by highest level of education attained, Canada, provinces and territories, 1998 to 2010," in *Education Indicators in Canada: An International Perspective*, p. 44 and 114.

[10] AUCC, *Trends in Higher Education*, Vol. 1, 37. For part-time workers, the numbers grew from about 50,000 in 1990 to almost 200,000 in 2009.

(~44%) than their total earnings (~37%), demographic weight (~24%) or share of government transfers (~16%).[11] In other words, graduate education represents an excellent investment for both the government and society at large.

From 2004 to 2010, employment growth for university graduates (and especially graduate students) outpaced other levels of education:

- 4% for high school graduates;
- 5% for trade school graduates;
- 17% for college and CEGEP graduates;
- 28% for bachelor's graduates; and
- 33% for those with graduate degrees.[12]

According to the AUCC, "Canadian universities [currently] award proportionally fewer master's and PhD degrees than is common in several OECD countries."[13] All of this means that it could be very difficult for Canada to keep up with the most economically competitive countries and for its employers to fill the highest-paying jobs.

To conclude this section, it should be added that although immigration should continue to play an important function in keeping B.C. and the rest of the country competitive, this mechanism on its own cannot be expected to fill Canada's current and future knowledge deficit or its highly-skilled labour shortage. And although enrolment statistics presented below suggest that a more educated work force is already being prepared to enter the market over the next few years, the new generation of graduate students, especially at the doctorate level, will take some time to cycle into the postsecondary system or the wider economy.

Demographics and University Enrolment (Canada, British Columbia and UBC)

To provide some context for the enrolment numbers presented below, it is necessary to look at the change in the student-aged population of Canada and British Columbia:

Student-Aged Population Change in Canada and British Columbia[14]

Age category:	Canada			British Columbia		
	2000	2011	Change	2000	2011	Change
18-24 years	2.9 million	3.3 million	14.1%	372,292	447,957	20.3%
20-29 years	4.1 million	4.8 million	16.5%	538,841	655,306	21.6%

Enrolment numbers for Canada's universities have increased significantly since 2000, far in excess of demographic growth, in fact, even among the student-aged population indicated in the table above.

[11] AUCC, *Trends in Higher Education*, Vol. 1, 45-46.
[12] AUCC, Trends in Higher Education, vol. 1, table 2, p. 34.
[13] Ibid., p. 37.
[14] Source for this paragraph: Statistics Canada, table 051-0001, "Estimates of Population."

The following table, which summarizes the number and percentage increase of undergraduate and graduate students in Canada in 2000 and 2011, shows this quite clearly:

University Enrolment in Canada[15]						
	Undergraduate			Graduate		
	2000	2011	Change	2000	2011	Change
Full-time	541,200	777,500	43.7%	81,100	147,700	82.1%
Part-time	210,700	237,600	12.8%	37,000	47,700	28.9%

Although Statistic Canada's enrolment figures for British Columbia do not include figures for 2010 or 2011, they still demonstrate that the number of students in the province increased significantly in the past few years, as summarized in the following table:

University Enrolment in British Columbia[16]						
	Undergraduate			Graduate		
	1999	2009	Change	1999	2009	Change
Full-time	41,817	60,900	45.6%	10,026	16,242	62.0%
Part-time	15,312	38,703	152.8%	2,283	3,198	40.1%

UBC's administration also provides detailed institutional statistics. The following table compares the number of undergraduate and graduate students enrolled on November 1st in 2000 and 2011:

Enrolment at UBC[17]						
	Undergraduate			Graduate		
	2000	2011	Change	2000	2011	Change
Full-time	20,204	26,057	29.0%	5,281	8,642	63.6%
Part-time	8,607	12,390	44.0%	1,156	1,355	17.2%

As all three tables illustrate rather clearly, although the undergraduate population has increased significantly in this period, the change in the number of graduate students was even greater.

Full-time Teaching Staff (Canada, British Columbia and UBC)

Another indicator of the changing situation in Canada's universities, especially with respect to graduate students, may be illustrated by the change in the number of full-time teaching staff, especially those who are classified as professors: Between 1999 and 2010, the total number of full-time teaching staff at Canadian universities increased by 32.9%. Although this is a significant change, it falls far short of the increase of full-times students, especially at the

[15]Information drawn from "Back to School Quick Facts," p. 2.
[16]Information taken from Statistics Canada, Table 477-019, "Public Postsecondary Enrolments."
[17]Information taken from the following tables: "UBC Vancouver Winter Sessions 2000-2012, Full-time/Part-time Registrants."

graduate level. Indeed, the situation for the latter is even more problematic when one considers that for the most part, only professors (assistant, associate and full) teach graduate-level courses and act as formal advisors. For this faculty category, the increase over the same period only reached 26%. This relative reduction in the "weight" of professors compared to the rest of their full-time teaching colleagues may be expressed in another way: in 1999, professors accounted for 95.3% of all full-time teaching staff in Canadian universities; by 2010, that proportion had fallen to 90.3%.[18]

The situation is in part better in British Columbia, since the overall increase for all full-time postsecondary teachers between 1999 and 2010 was 94.1%. For professors, the increase was 47.3%, which is more than the increase in undergraduate students, but less than full-time graduates. With respect to the percentage of professors compared to all full-time faculty, however, the province does much more poorly than the rest of the country, having fallen from 93.7% of the total in 1999 to 72.1% in 2010. This important drop may have been largely due to the inclusion in the survey of several new universities in 2009-2010 and 2010-2011,[19] which in turn led to sudden and significant increases in the number of full-time university faculty who were not university professors. But this state of affairs cannot go unaddressed for long if the newly created universities wish to establish their presence in the province or the country. Such a change will require important investments on the part of governments, much more than is currently planned at the provincial level.

Indeed, as the following table demonstrates, the B.C. government's overall support for universities and students is actually set to go down for the next two fiscal years:

B.C. Government – Expenditures for Postsecondary Institutions (in $000)[20]

Expense category:	2011/12 (Revised estimates)	2012/13 (Estimates)	2013/14 (Plan)	2014/15 (Plan)
Institutional Operating Grants	1,858,014	1,867,129	1,847,129	1,817,129
Student Support Programs	84,594	84,594	84,594	84,594
Executive and Support Services	20,761	20,215	20,215	20,215
Total	**1,963,369**	**1,971,938**	**1,951,938**	**1,921,938**

In other words, between the 2012-13 estimates and the 2014-15 plan, the government will freeze the budgets for institutional executive and support services and student support programs. It will also impose a $50 million (or 2.7%) cut to the amount transferred to institutions. When factoring in inflation,[21] these cuts will almost certainly have a significant negative impact on student support and services.

[18]Source for this paragraph: Statistics Canada, table 477-0017, "Full-time teaching staff at Canadian universities."
[19]In 2009-2010, data from Thompson Rivers University, Vancouver Island University, Kwantlen Polytechnic University and the University of the Fraser Valley were first integrated into the survey, followed in 2010-2011 by Capilano University and the Emily Carr University of Art and Design.
[20]2012/13 – 2014/15 Service Plan, Victoria, BC, Ministry of Advanced Education, February 2012, p. 21.
[21]In the MAE Service Plan (p. 22), the government acknowledges at least in part the inflationary pressures facing B.C. higher education institutions by forecasting that their overall expenses will increase by 2.8%. For the next two

Turning to UBC, the total number of full-time faculty climbed from 1,740 in 2000 to 2,372 in 2011, a 36.3% increase.[22] Turning to the teaching staff at the full, associate or assistant professor level, the numbers went from 1618 in 2000 to 2079 in 2011, a 28.5% bump. As was the case nationally, therefore, the increase in permanent, tenure-track or tenured faculty at UBC did not come close to matching the rise in graduate enrolment, which is of particular concern for graduate students.

Direct Financial Support for Graduate Students: Tri-Councils

Although funding for graduate students in Canada comes from a variety of sources, the graduate awards of the federal Tri-Councils – Social Sciences and Humanities Research Council (SSHRC), Natural Science and Engineering Research Council (NSERC) and Canadian Institutes of Health Research – represent an important portion of the mix.[23] Unfortunately, because the publicly available statistical tables for the Tri-Councils are of limited use when it comes to useable data, the following analysis will focus mainly on the current and the future situation of their graduate grants.

When the Tri-Councils' new graduate student grants programs – and most notably the Canada Graduate Scholarships – were launched in 2003-2004, the maximum amount awarded for individual doctoral fellowship categories were as follows:[24]

- $21,000 for Doctoral Fellowships;
- $35,000 for Canada Graduate Scholarships and
- $50,000 for the Vanier Canada Graduate Scholarships.

Until 2012, all of these amounts remained unchanged. To demonstrate how the value of these awards has been eroded over time, here is what each would have to be in 2012, merely to reflect the rather modest general inflation rate:[25]

- $24,148 for Doctoral Fellowships;
- $40,246 for Canada Graduate Scholarships and
- $57,495 for the Vanier Canada Graduate Scholarships.

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fiscal years, however, the government is predicting that these increases will somehow remain under 1%, well below the current rate of inflation.

[22]Information found in the following table: "UBC Full-Time Faculty, 31 October, 1999-2011."

[23]At UBC, for instance, the total research funding provided by the Tri-Councils jumped considerably in the decade between 2002-2003 and 2011-2012, both in absolute and relative terms, increasing from 80.3 million (a 21.3% share of the total) to 196.6 million (or a 37.8% share) in 2012. Source: "UBC Research Awards – Tri-Council," OVPRI-UBC, accessed 2012/01/16.

[24]Source: SSHRC, NSERC and CIHR websites. Although these numbers are relatively accurate for graduate students working in disciplines covered by the SSHRC and NSERC, they may not be entirely accurate for the health or veterinary sciences, since grant holders often have a portion of their salaries, research or training funded by sources outside of the Tri-Councils (including hospitals, regional health authorities and pharmaceutical companies, to name a few).

[25]These amounts were obtained by using the Bank of Canada's inflation calculator. For most students in Canada (including British Columbia), the actual purchasing power loss is underestimated, given that university tuition and fees have increased significantly in most provinces since 2004. And in the Lower Mainland, where most of the province's graduate students may be found, the cost of housing has gone up faster than in any other region of the country.

In the years following the 2003-2004 launch of the new graduate studies fellowships, SSHRC, NSERC and CIHR began to look at a variety of ways to improve these programs and especially to reduce the differences between each them, in the hopes of creating a less cumbersome application process and finding administrative efficiencies to maximize the impact of their limited budgets. This process moved ahead substantially in the summer of 2012, when the three council presidents agreed to use the results of smaller pilot projects to look at ways of harmonizing their flagship graduate program, the Canada Graduate Scholarships. This process should in theory be completed by 2014-2015.[26]

The "Update on the renewal of SSHRC's Talent Program" provides additional information in this regard. Among other things, SSHRC will increase the value of its Doctoral Fellowships (the smallest but most abundant award of its type in Canada) to $25,000 per year for up to three years. [27] This increase has the merit of recognizing the impact of general inflation on the grants. SSHRC does indicate, however, if the award will now be indexed to inflation. We are also not told if this increase will be funded by a corresponding growth in SSHRC's budget or by cutting other programs, as is explicitly the case with the increase proposed for Postdoctoral Fellowships.

Another aspect of this update deserves special attention: in the future, SSHRC proposes to "allow postsecondary institutions and employers from the private, public or not-for profit sectors to submit proposals focused on innovative approaches to research training." Such activities may include internships and co-op programs. SSHRC is also looking to expand these opportunities by establishing new partnerships with other organizations.[28] Although this kind of professional development is already funded to a great extent in the natural sciences, engineering and health, extending it to the social sciences and humanities is a positive step and should increase the employability of fellowship holders.

On the whole, the changes proposed by SSHRC seem to go in the right direction, but their actual impact will be greatly affected by the manner in which they are implemented and by the resources that will be committed to seeing them through. One of the most important factors that will lead to success with respect to graduate student training and pedagogy is a sustained commitment of human and financial resources to and by postsecondary institutions.

[26]Source: "Tri-Council Harmonization Project," Press release of the Tri-Councils (SSHRC, NSERC and CIHR). Accessed 2013/01/30.
[27]Source: "Update on the renewal of SSHRC's Talent program," SSHRC web site, accessed: 2013/01/30.
[28]Source: "Update on the renewal of SSHRC's Talent program," SSHRC web site, accessed: 2013/01/30.

Conclusion and Recommendations

At UBC and in the rest of the province and Canada, universities depend increasingly on project-based research grants and support, a type of funding that can increase the precarious nature of graduate studies if resources are not committed to support the pedagogical and training needs of students. Unfortunately, a dramatic rise of graduate enrolment that has not been accompanied by a similar increase in the number of full-time faculty, especially tenure-track or tenured, has probably made the situation more difficult for students by reducing the amount of time and effort that each faculty member can spend with students in general and graduate students in particular. This situation has also forced graduate students to play a much greater role in the education of undergraduates, most notably as teaching assistants.

For all of these reasons, student societies should advocate that improved support and training, as well as more resources, be provided to graduate students to improve their research skills and to make them more prepared for their teaching duties and the job market. In the longer term, unless graduate enrolment numbers suddenly and unexpectedly begin to drop, universities will have to hire more permanent faculty to mentor graduate students. Alternatively, innovative and highly effective methods and tools will have to be devised and fully implemented to assist professors in their teaching, training and mentoring duties.

On a broader macro-economic level, governments should continue to invest in research directly and indirectly, through a variety of mechanisms such as grants, contracts and tax credits. This would be especially important in British Columbia, which lags behind most comparable jurisdictions in the intensity of its overall R&D investment. One of the direct results of such an investment, especially if it was sustained over a long period of time, would be increased support and opportunities for students, especially with respect to graduate research.

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