



Simon Fraser University
Institutional Research and Planning

The Economic Impact of Simon Fraser University

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Institutional Research and Planning
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Executive Summary

In merely four decades, Simon Fraser University (SFU) has grown from a small, innovative institution to a major Canadian research university with campuses in Burnaby, Vancouver and Surrey. Aside from providing quality education to over 30,000 undergraduate and graduate students in the community, SFU also serves as a social, cultural, and knowledge centre with a dynamic impact on the economies of Metro Vancouver, BC, and Canada.

This report provides measures of the economic impact of SFU, recognizing that there are numerous explicit and implicit impacts which are difficult to quantify. A combination of methodologies is employed including:

- A short-term cash flow model to quantify the economic stimulus provided by SFU through the multiple pathways including direct SFU spending and other spending of students and visitors induced by SFU;
- Estimation of the education premium of SFU's alumni as a component of SFU's impact; and
- Estimation of the total factor productivity attributable to SFU as a proxy for the research impact of SFU.

This report shows the relationship between SFU research and economic growth by demonstrating how university research and knowledge creation are commercialized and employed by the private sector through knowledge spillover, publication output, and development of start-up companies.

Results indicate an impact of \$3.65 billion by SFU on the local economy in fiscal year 2009/10 (summarized in Table 1).

Table 1: SFU Economic Impact

Type of Expenditure	Total Impact (\$M)
SFU spending	658.5
Students	295.1
Visitors	165.5
Alumni Education Premium	1,682.1
Impact of SFU Research	851.7
Total Impact of SFU	3,652.9

In addition to these quantifiable effects, there are other impacts of SFU that are not easily measured. These include social impacts, the effects from community engagement, and the development of a sustainable economy and community. The report discusses these impacts and gives examples of how SFU affects the socioeconomic environment of the local, national and global communities.

1. Introduction

Founded in 1965, Simon Fraser University (SFU) is a research intensive university with a commitment to innovate, embrace bold initiatives, and reach out to the wider community. SFU continuously seeks to be socially engaged, both locally and internationally, through its teaching and research activities.

Since its inaugural year, SFU has educated and trained over 100,000 alumni who actively contribute to their local community. With 8 Faculties, 60 departments and schools, and 63 institutes and centres, SFU continuously produces well-rounded graduates. In 2009, SFU conferred over 5,000 degrees and 500 certificates and diplomas.

As a research university, knowledge generation and knowledge transfer through research, scholarship and training are fundamental to the mission of SFU. The university's strength lies in its international reputation in liberal arts and sciences, and its promotion of interdisciplinary research and education. In November 2010, Maclean's ranked SFU as #1 amongst all Canadian universities in the comprehensive category for the third time in a row.

Apart from providing education and research, SFU also makes a significant impact on the community by providing entertainment, culture, and employment while fostering diversity. SFU helps to enhance the vitality of the community through various arts performances and exhibitions, workshops and seminars that are open to the public. Community members benefit particularly from the opportunity to enrol in continuing education programs at all three campus locations.

This report attempts to quantify all the various channels through which SFU impacts the local economy. The methodology section below outlines the approach used to estimate the direct and indirect economic impact of SFU. Undoubtedly, SFU plays a significant role in the wider national and global economies as well. Without putting dollar values on these impacts, this report will provide some examples of the role SFU has played at the national and international levels.

2. Methodology

The approach used to determine the economic impact of SFU in this study is primarily to estimate:

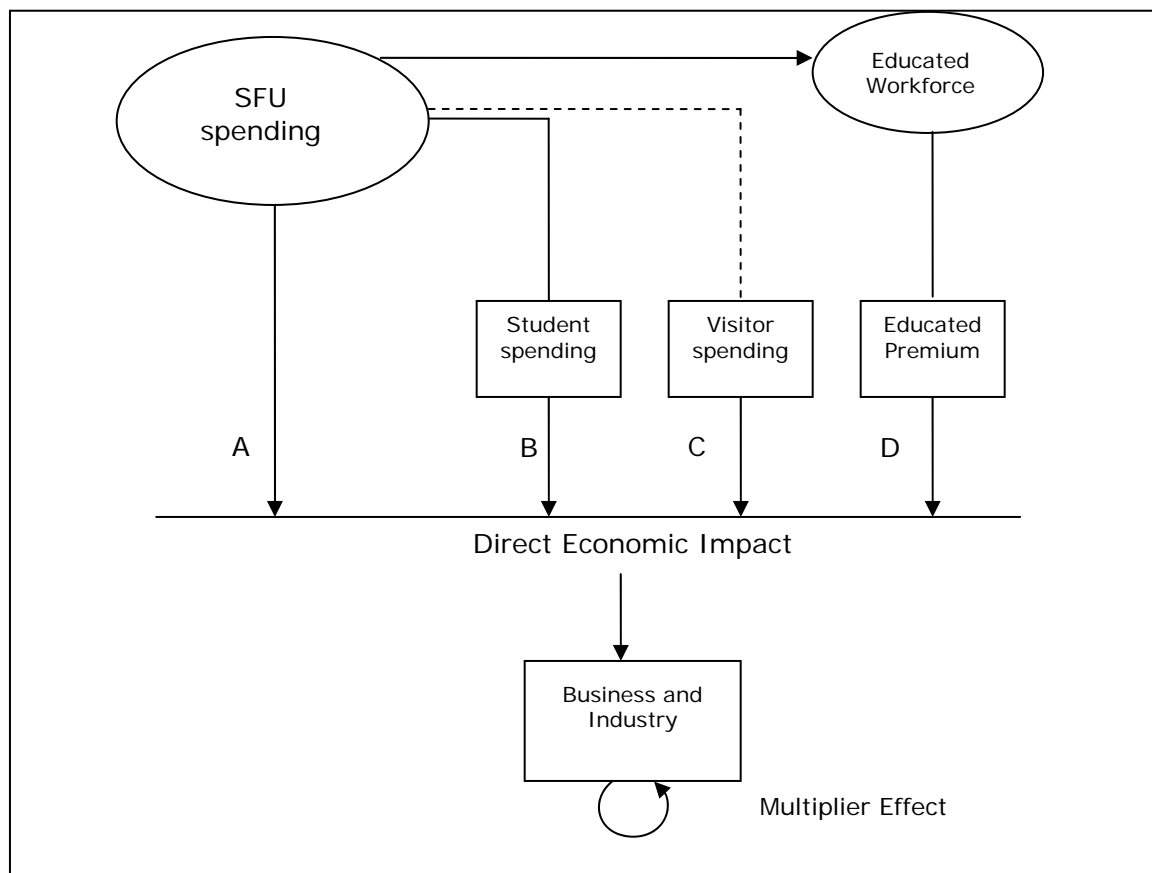
- The increase in the economic base, recognizing that SFU provides an economic stimulus, and is an important source of local expenditures and local employment.
- The income generated from increases in the skill base, recognizing that SFU graduates have a higher employment income than individuals who do not have a university education.
- The value of SFU research in the British Columbian economy through the generation of new knowledge and knowledge transfer.

To determine the increase in the economic base, a measurement is taken of the direct and indirect economic impact of total expenditures generated by the SFU community. This study draws on the technique developed by Caffrey and Isaacs (1971) to identify university spending, and the spending of its students and visitors by using a series of impact indicators generated by simple linear cash flow formulas.

To estimate the income generated from increases in the skill base, this study follows Carr and Roessner (2002) to estimate the education premium - the differential earnings of a graduate from SFU. The estimate is based on calculating the net income of SFU graduates that is over and above what they would have earned if they only had an education below a bachelor's degree.

This study estimates the spending of the University (A), Students (B), Visitors (C) and the Education Premium (D) of SFU graduates (Figure 1). The aggregate spending from these sources (A+B+C+D) provides a reasonable approximation of the total cash flow injected into Metro Vancouver as a result of SFU's presence. Applying the multiplier provides us with an estimate of the final economic impact.

Figure 1 : Economic Impact Model for SFU



The study also estimates the impact of SFU research on the economy. The quantification of SFU research mirrors that of the economic impact study of UBC, which is based on the work of Fernand Martin (1988). Martin's approach is to estimate the fraction of the total research and development in the province by universities and then apply that fraction to the portion of the total output growth in the economy which cannot be explained by increases in capital or labour.

While this model provides for reasonable estimates of the economic impact of SFU, it has its limitations. It does not take into account the long term impacts of SFU on the non-local economy, or its community enhancement in relation to culture and recreation. For example, university-educated individuals tend to have lower mortality rates and provide higher philanthropic giving. However, it is difficult to estimate the relative magnitude of these impacts.

3. Economic Impact of SFU

The estimated \$3,653 million total economic impact of SFU is composed of the direct and indirect impacts of spending and education premium, as well as an estimate of the impact of SFU Research (Table 1).

Table 1: Total Economic Impact 2009/10

Type of Expenditure	Direct Impact (\$M)	Indirect Impact (\$M)	Total (\$M)
SFU spending	439.0	219.5	658.5
Student spending	196.7	98.4	295.1
Visitor spending	110.3	55.2	165.5
Alumni Education Premium	1,121.4	560.7	1,682.1
Subtotal	1,867.4	933.8	2,801.2
Impact of SFU Research			851.7
Total	1,867.4	933.8	3,652.9

The direct impact of spending includes all spending incurred as a result of the university, which includes direct SFU spending and spending induced by SFU including spending by SFU students, visitors and alumni. The indirect impact refers to the subsequent re-spending of money in the economy as a result of the initial spending as determined by a multiplier. Every dollar spent by SFU, students, visitors and alumni in the local economy creates secondary rounds of spending which leads to an increase in consumption in the economy, and these secondary rounds of income are measured by the income multiplier.¹ Thus, the direct spending of SFU has an even larger total economic impact through the multiplier effect which adds the indirect impact.

The direct impact of the education premium is the increased income from attaining a higher education. We discuss how more educated employees improve the productivity and income of those that they work with, which accounts for the indirect impact of the education premium. In this report, a conservative income multiplier of 1.5 is used.

The impact of SFU research is based on Martin's (1998) total factor productivity. In this report we assume that 37% of all research and development in BC takes place in universities and 12% of university research takes place at SFU.

3.1. Direct Economic Impact

The total direct spending of SFU is estimated at \$1,867 million, calculated as the sum of direct spending of SFU, its students and visitors, and the education premium of its alumni (Table 1).

3.1.1 SFU Spending

The university's primary business is to educate students as well as create new knowledge. Like any educational institution, its primary direct spending includes: 1) salaries and benefits (for faculty and staff who carry out its mission to advance knowledge through teaching, research, and engagement with the

¹ For example, if a SFU visitor eats at a local restaurant, the amount of money he or she spends at the restaurant will be used to pay wages for employees at the restaurant and to purchase local goods and services, which will trigger another round of spending and will create demand for goods and services in the local economy.

community); 2) supplies and other (including supplies for building construction, renovations and alterations); 3) scholarships and bursaries (for students on merit and need bases to attract or enable them to attend university); and 4) all other expenses (including amortization, professional services, cost of goods sold, utilities, and travel expenses).

Table 2 indicates that SFU spending in the local economy in the 2009/10 fiscal year is approximately \$439.0 million. It lists the direct spending by the four primary components and the percentage of spending that is considered "local" spending.²

Table 2: Direct SFU Spending

Spending Type	Direct Expenses (\$M)	Est. Local Expenditure (%)	Direct Local Income Generated (\$M)
Salaries & Benefits	333.4	98	326.7
Supplies & Other	53.8	78	42.0
Student Aid	27.2	100	27.2
All other expenses	123.1	35	43.1
Total	537.5		439.0

Source: Annual Financial Report, March 2010

3.1.2 Student Spending

The total spending of students is estimated at approximately \$196.7 million in 2009/10. Table 3 shows the total direct economic impact from student spending.

Table 3: Direct Economic Impact from Student Spending

Credit Program Students	\$193,900,000
Continuing Studies Students	\$2,800,000
Total estimated SFU economic impact from Student Spending	\$196,700,000

Credit Program Students

Students are at the core of SFU's business and student spending plays an important role in the local economy. Although many of SFU students are local residents their spending should still be accounted for in the local economy. The relevant question for the purpose of economic impact is: what would happen in the absence of SFU to SFU-bound students? The assumption made is that if SFU did not exist, most of the full-time students would still attend a university elsewhere. While some would attend UBC, it would not have the capacity to educate SFU-bound students and hence these students would attend research universities in other regions that have the capacity to educate them. These regions would then reap the benefits of SFU student spending. It is assumed that the number of SFU part-time students approximates the students who would have chosen to not attend university at all or attend alternative colleges or teaching universities in the region, and hence their spending is excluded.

Using a monthly budget estimate of \$1,329³ obtained from SFU Financial Aid and Awards, the local spending of SFU full-time graduate and undergraduate students is estimated at \$193.9 million, as shown in Table 4.

² Percentages of local spending are consistent with those used by Sudmant, W. (2009), "The Economic Impact of the University of British Columbia".

Table 4: Spending of Full-Time Students

Student Type	Headcount	Monthly expenses (\$)	No. of Months	Spending (\$M)
Undergraduate	13,833	1,329	8	147.1
Graduate	5,685	1,329	8	60.4
Less payments to SFU				13.6
Total				193.9

Note: Estimates are based on 8 months of study because the majority of students register for two terms a year.

Continuing Studies Students

Every year thousands of courses, workshops, seminars, colloquia and conferences, round tables and dialogues are offered to the community by SFU Continuing Studies. In 2009/10, more than 1,300 non-Metro Vancouver residents registered for the offerings and contributed \$2.8 million to the local economy (see Table 5).

Table 5: Spending of Continuing Studies Students

Student Category	No of Students	Average Number of Days Students Meet for Class	Average Daily Spending (\$)	Estimated Total Spending (\$M)
BC (Non-GVRD)	693	3.7	54.24	0.1
Non-BC	208	3.2	122.68	0.1
International	420	50.2	122.68	2.6
Total	1,321			2.8

In 2009/10, 1,321 non-GVRD students came to SFU to attend continuing studies courses. Of these students, 693 were BC residents living outside Metro Vancouver, 208 were living outside BC, and 420 were international students.

For students living outside Metro Vancouver, we assume that they would commute to SFU and no overnight accommodation would be required. Their estimated daily expenditure is derived from domestic student spending and estimated at \$54.24 per day⁴. For out-of-province and international students, the daily rate of \$122.68⁵ is used.

Note that the numbers by student category above are a conservative estimate because they only include students with registration and residence information that were recorded by SFU. Many seminars and workshops hosted by SFU do not require such information from participants.

³ Estimated student cost per term from SFU Financial Aid is \$8,265 (<http://students.sfu.ca/financialaid/budget.html>). After excluding costs for tuition fees, books and supplies, this leaves an estimated cost of \$5,316 per term or \$1,329 per month.

⁴ Daily spending was derived from student semester spending of \$5,316. A semester can be 13 or 14 weeks long. For this study, 14 weeks was assumed.

⁵ This daily rate is based on Vancouver Economic Development's estimate of \$117.00 for 2006, adjusted to 2009 by applying an inflation rate based on the average Consumer Price Index (CPI) from 2006 to 2009. See <http://www.vancouvereconomic.com/page/tourism>

3.1.3 Visitor Spending

The direct spending of visitors is estimated at approximately \$110.3 million in 2009/10 as shown in Table 6. With the multiplier effect, using a multiplier of 1.5, the total impact of SFU visitors is estimated at \$165.5 million.

Table 6: Total Direct Economic Impact from Visitor Spending

Visitors	\$103,950,000
FIC Students	\$6,300,000
Total Estimated SFU economic impact from Visitor Spending	\$110,250,000

Visitors

Every year, SFU attracts many visitors to SFU for academic and non-academic events. Not all SFU offices keep track of the number of guests that attend events, but those that do suggest that there are at least 110,000⁶ visitors to SFU.

- SFU Guest Accommodations counted over 19,900 rooms booked for fiscal year 2009/10.
- SFU Meeting, Event, and Conference Services estimates over 73,000 visitors in fiscal year 2009/10 who used our facilities at the SFU Harbour Centre, Segal Graduate School of Business, and Morris J Wosk Centre for Dialogue.
- SFU Meeting, Event, and Conference Services also estimates over 5,000 guests who attended various conferences and events held at SFU Burnaby. These events include Tamwood International Camps, Prophets International Conference, International Igorot Consultation, and Heritage Woods Secondary School Commencements.
- SFU Student Central estimates approximately 1,500 prospective students and visitors participated in tours of the university for fiscal year 2009/10.
- SFU Art Gallery estimates 8,000 visitors annually.

The above visitor estimates include local residents. However, as previously discussed, if SFU did not exist then local residents would have to rely on other universities with the capacity to accommodate them and their events. Table 7 shows the visitor spending attributable to SFU.

Table 7: Visitor Spending

Estimated number of visitors	110,000
Average length of stay in Metro Vancouver	3
Spending per day ⁷	\$315
Total visitor spending	\$103,950,000

⁶ Note that Waterloo University, with enrollment of approximately 24,000 undergraduates estimates over 350,000 visitors annually; Tufts University, with undergraduate enrollment of about 5,000 undergraduates has estimated 70,000 visitors annually. University of British Columbia, with undergraduate enrollment of approximately 38,000 estimates over 200,000 visitors annually.

⁷ The amount for spending per day is based on Tourism Vancouver's 2007 average daily spending of \$307.34 for meetings and conventions in Metro Vancouver adjusted to 2009 using Consumer Price Index (CPI) from 2007 to 2009 from the Bank of Canada.

Fraser International College

Fraser International College (FIC), located on the SFU Burnaby campus, is a private educational institution for international students. FIC operates on a tri-semester system under an agreement with SFU to offer programs that prepare FIC students to transition and enrol in SFU degree programs.

The agreement between SFU and FIC provides employment for local residents by virtue of the presence of FIC. In addition, the arrangement brings visitors to the Burnaby Campus: about 3,000 FIC international students who spent their money in the region while attending FIC. If SFU did not exist, FIC would likely have a business relationship with another university like SFU in some other region or province, and the local economy would not be enriched by the spending of these visitors. It is assumed that 30% of these visitors' spending is attributable to SFU. FIC estimates cost of living expenses of approximately \$7,000⁸ per term per student. Table 8 displays the estimated direct SFU economic impact from FIC students.

Table 8: SFU Impact from FIC students

Estimated number of FIC students for fiscal year 2009/10 ⁹	3,000
Estimated expense per student	\$7,000
Total FIC student spending	\$21,000,000
Percentage attributable to SFU ¹⁰	30%
FIC student spending attributable to SFU	\$6,300,000

3.1.4 Education Premium

Data from Statistics Canada show that university graduates with a degree enjoy higher earnings (the education premium) than those without university degrees (see Table 9). The university educated workforce is a driver for increased spending in the economy.

⁸ <http://www.fraseric.ca/index.php/about-canada-mainmenu-19/cost-of-living-mainmenu-71.html>

⁹ Source: Fraser International College

¹⁰ This percentage is based on the estimated proportion of FIC students that are expected to enroll at SFU.

Table 9: Employment Income for Full-Time Employees by Age, Gender and Education Level

Age	Gender	Average Employment Income in 2009*			Income Differential	
		Certificate or Diploma Below Bachelors	Bachelor's	Above Bachelor	Bachelor's vs. Below Bachelor's	Above Bachelor's vs. Below Bachelor's
55-64	Male	\$57,652	\$106,671	\$121,983	\$49,020	\$64,331
	Female	\$39,482	\$62,907	\$78,044	\$23,425	\$38,563
45-54	Male	\$61,114	\$105,725	\$121,377	\$44,611	\$60,263
	Female	\$42,274	\$68,152	\$80,454	\$25,879	\$38,180
35-44	Male	\$55,702	\$87,966	\$104,585	\$32,264	\$48,883
	Female	\$39,556	\$62,746	\$73,645	\$23,190	\$34,088
25-34	Male	\$44,732	\$61,176	\$66,370	\$16,443	\$21,637
	Female	\$32,866	\$48,315	\$53,970	\$15,449	\$21,104

Source: Statistics Canada, 2006 Census of Population, Statistics Canada catalogue no. 97-563-XCB2006054

* Employment income is based on the 2005 average income of full-time employees adjusted to 2009 based on Consumer Price Index (CPI) from 2005 to 2009 from the Bank of Canada.

Since its inaugural year, SFU has graduated more than 100,000 alumni in the disciplines of arts and humanities, social sciences, education, applied sciences, science, and business. The estimated education premium for those graduates living in the Metro Vancouver area is approximately \$1,121 million based on their annual earnings in 2009 (Table 10).

Table 10: Education Premium for SFU Alumni

Credential	Education Premium (\$M)
PhD	33.9
Master	188.5
Graduate Diploma	22.8
Post Baccalaureate Diploma	36.5
Bachelor	783.0
Professional Development Program	56.6
Total	1,121.4

The calculation¹¹ of the earnings differential between an individual with a bachelor's degree or higher and a person with an education below a bachelor's degree is based on data from the 2006 Statistics Canada Census. The census provides 2005 average employment income for full-time individuals by education level, gender, and age. The earnings were adjusted to 2009 levels using Consumer Price Index (CPI) from the Bank of Canada. Also, appropriate federal and provincial taxes were deducted based on the 2009 tax year. The study distinguishes between baccalaureate and post-baccalaureate degrees but does not differentiate by field of study. Calculation of the education premium involves taking the difference

¹¹ Includes SFU graduates between the ages 25 – 64. If the graduates received more than one credential from SFU, only the highest level of education was included. Education premiums are calculated for each age group, gender and degree type conferred. 2009 labor force participation rates from Statistics Canada are applied based on age and gender. Data is adjusted to reflect the number of SFU graduates currently in Metro Vancouver. SFU Alumni estimates 73% of alumni are in the Metro Vancouver area. It is assumed alumni spend 100% of their net earnings in Metro Vancouver.

between the estimated net income of earners with an education at the bachelor's level or above and the net income of those with an education below a bachelor's degree. Appendix A contains the data used in this study.

In addition to higher earnings, a university education provides for an increase in skill base that may also have a secondary effect or spillover benefit. Moretti (2004) finds that a one percent increase of college graduates in the workforce can increase wages of high school dropouts, high school graduates, and other college graduates by as much as 1.3 percent. This indicates that individuals with higher levels of education can affect the people that they work with; Siegfried, Sanderson, and McHenry (2006) claim that the spillover benefit "can be added to direct local economic effects." There is much literature on the value and effects of university education in the economy, and it is clear that a university educated workforce has a positive impact, both directly and indirectly, to the economy.

3.1.5 Research Impact

To determine the economic impact of SFU research, this study will employ the methodology used by *The Economic Impact of Canadian university R&D* by Fernand Martin (1998). Economic growth is a function of productivity, which is dependent on inputs such as capital and labour. As capital and labour increase, productivity increases and the economy is expected to grow. However, it has been noted that the economy is outperforming this expected growth and that there are other factors beside the traditional inputs of capital and labour that are increasing productivity. Martin (1998) proposes that the innovation and improvements developed from university research accounts for this increase in productivity, which is referred to as an increase in "total factor productivity". The total factor productivity is the portion of growth in Gross Domestic Product (GDP) not accounted for by capital or labour increases.

Before calculating the economic impact of SFU research using total factor productivity, this section examines the relationship between SFU research and economic growth. Evidences of this relationship lend support to the notion of "total factor productivity" as proposed by Martin.

Innovation and improvements developed from SFU research flow into industry via:

- Spillover Effects
- Publications
- Knowledge Transfer and Startups

Spillover Effects

The goal of this section is to demonstrate that SFU's presence, along with its research, is a driving factor for economic growth within the region. Obviously, the effect is not as great as the Silicon Valleys or Route 128s, but SFU is largely responsible for the establishment of over 70¹² spin-off companies with over 40 companies within the Information Technology sector. "Research and innovation are increasingly shifting away from the corporate lab and back to where they began: the university campus. And as the global economy grows increasingly dependent on the generation and dissemination of knowledge, universities are seen as natural partners for both business and government."¹³ These partnerships can be seen through SFU's licensing revenue, which indicates that SFU research, leading to innovations and process improvements, is being sought after by the private sector. Table 11 shows the licensing income for SFU

¹² <http://www.sfu.ca/io/spinoff.html>

¹³ DeVol, R, Bedroussian A. *Mind to Market: A Global Analysis of University Biotechnology Transfer and Commercialization*. Milken Institute. 2006

for each fiscal year from 2004/05 to 2009/10. This gives clear evidence that SFU is a driver of business for those who aim to utilize and commercialize SFU research and development.

Table 11: SFU Research Activity

	2004/05	2005/06	2006/07	2007/08	2008/09	2009/10
Total license income received (\$000)	343	183	300	339	360	1,457
License/option agreements	2	0	1	3	2	2
Total US patents issued	10	2	2	2	1	0
Total Start-up companies	1	0	2	3	0	2

Source: BCHeadset

A 2006 study by the Milken Institute investigated the commercialization performance of universities. The study evaluated universities in three stages: long-term (data from 1996 to 2004), short-term (data from 2000 to 2004), and a one-year snapshot (data from 2004). Universities were ranked, at each stage in: absolute terms (average of short- and long- term), normalization by million dollars of research expenditures, and productivity (e.g. patents filed per invention disclosure).

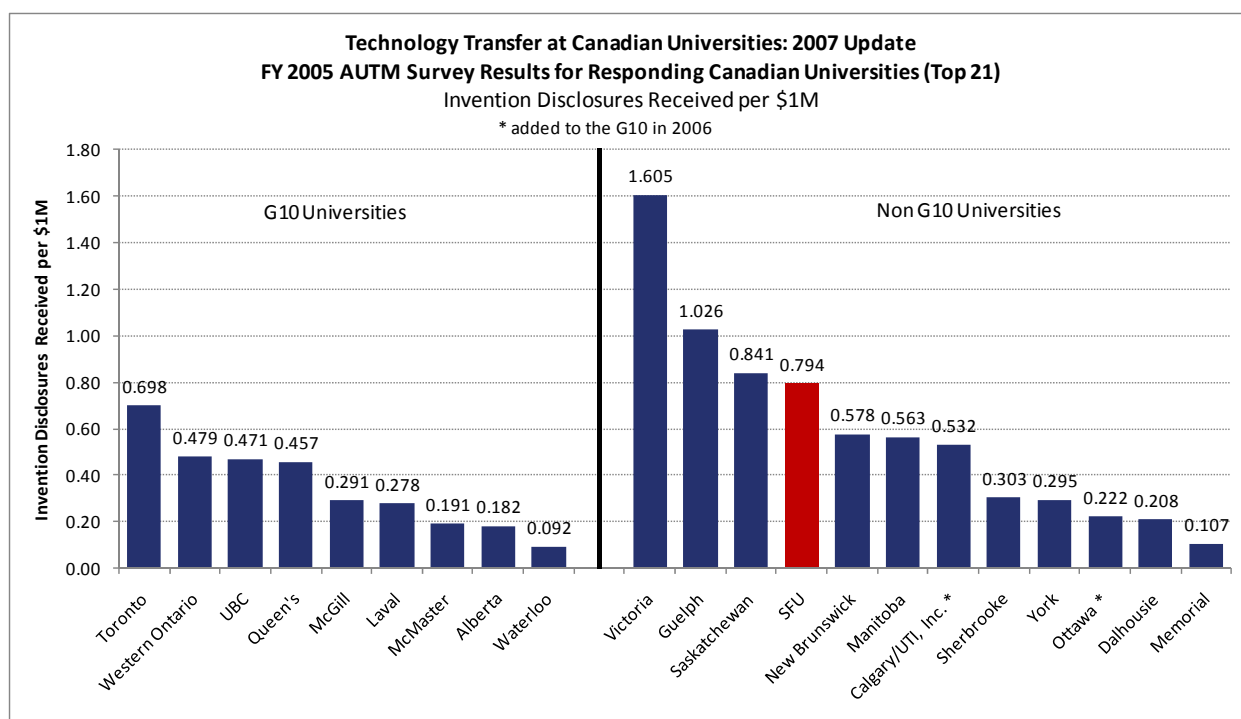
Based on this study, SFU had the highest ratio of invention disclosures per million dollar research expenditures between 2000 and 2004 amongst Canadian universities, as shown in Table 12. SFU's results indicate that its innovations are being recognized and valued, worthy enough to file for invention disclosures, which often leads to the filing of patents. The study also found that during the same time period, SFU and McGill University were the highest ranking Canadian institutions with a 0.14 ratio of patents issued per million dollar research expenditures. The University of Akron was ranked first with a ratio of 0.39, while Stanford University was ranked tenth with a ratio of 0.17.

Table 12: Innovation Pipeline Rankings: Invention Disclosures Per \$M Research Expenditures, 2000-2004

Rank	University	Country	Ratio
1	Brigham Young University	US	5.63
2	University of Akron	US	1.17
3	Michigan Technological University	US	1.14
4	Simon Fraser University	Canada	1.13
5	California Institute of Technology	US	1.12
6	East Carolina University	US	1.00
7	UTI Inc./University of Calgary	Canada	0.99
8	Arizona State University	US	0.94
9	Rice University	US	0.92
10	École de Technologie Supérieure	Canada	0.83

Source: *Mind to Market: A Global Analysis of University Biotechnology Transfer and Commercialization* by the Milken Institute

The Milken Institute findings were confirmed by Clayman, (2003, 2007). Clayman examined the transfer of technology from Canadian Universities to the private sector. Among Clayman's findings, based on 2005 data, was that SFU was one of the top ranking universities in terms of invention disclosures per million dollar expenditures (see Figure 2). See Appendix B for results from Clayman's 2007 report.

Figure 2: Invention Disclosures Received per \$1M

Source: *Technology Transfer at Canadian Universities: Fiscal Year 2007 Update* by Clayman

Business Incubators

Not only is SFU research being transferred to the private sector through invention disclosures and the eventual filing of patents, but research is also being commercialized and fostered via business incubators. Business incubators are programs that provide resources and services to help develop and support startup companies commercialize their innovations. Startup companies apply for admission into an incubator program and acceptance is usually dependent on its product and its goals as a business. Companies that graduate from business incubator programs will have developed the infrastructure and clientele necessary for continued success. Technology, Innovation, Management & Entrepreneurship Ventures (TIME Ventures) is SFU's business incubator, which offers office space, mentoring services, and discounts on educational seminars to technology-based startup companies, joint ventures, and special projects¹⁴. SFU's TIME Business Centre enhances the interactions within the startup community by offering access to work and meeting space for entrepreneurs.

SFU student and faculty entrepreneurs can also utilize programs like Venture Connection and Venture Labs¹⁵ offered by the university. These programs allow SFU students and faculty with innovative ideas to engage and connect with local entrepreneurs and to successfully commercialize their concepts and products.

Apart from the benefit of increasing local businesses, incubators are also valuable to the economy for their potential generation of local tax revenue. The National Business Incubation Association (NBIA), an organization of incubator managers and developers, estimates that for every \$1 of government funding in

¹⁴ <http://www.sfu.ca/io/incubator.html>

¹⁵ <http://ventureconnection.sfu.ca/index.php?/about/>

incubator programs approximately \$30¹⁶ in local tax revenue is generated by companies who complete such programs.

Startups are adding to the economic growth as they thrive and sustain themselves in industry. A study for the Economic Development Administration (EDA), an agency of the US Department of Commerce, reported that 87 percent¹⁷ of startups that complete NBIA member incubator programs are still in business. Moreover, 84 percent¹⁸ of these graduates of incubator programs stay in their communities.

Table 13: Local Jobs Generation Per \$10,000 and Cost Per Job (EDA Study)

Project Type	Estimated Local Jobs Generated (per \$10,000 incremental EDA Investment)	Federal Cost Per Job
Business Incubators	46.3 – 69.4	\$144 – 216
Commercial Structures	9.6 – 13.4	\$744 – 1008
Roads & Other Trans.	4.4 – 7.8	\$1,291 – 2,293
Industrial Park Infrastructure	5.0 – 7.3	\$1,377 – 1,999
Community Infrastructure	1.5 – 3.4	\$2,920 – 6,872

Source: *Construction Grants Program Impact Assessment Report* by Grant Thornton

Not only do business incubators help firms remain engaged with the community, they also tend to increase economic productivity through greater job creation. A study by Grant Thornton (2008) conducted for the EDA, showed that business incubators can create up to 20 times more jobs than community infrastructure projects (e.g. water and sewer projects). The study reports that business incubators create between 46.3 and 69.4 jobs and community infrastructure projects create between 1.5 and 3.4 jobs per \$10,000 in government funding, as shown in Table 13.

Publications

A key aspect of university research is its ability to create new knowledge. Students and faculty work to produce academic literature, much of which goes through a rigorous peer review process in order to be published and recognized around the world. As long as the knowledge or innovations developed from this research is not patented or protected in any way, it is free and available to anyone interested in using it. Moreover, this knowledge can be used many times over without ever being depleted. As such, economists classify knowledge as a “public good.” Caballero and Jaffe (1993) note that the “public-good aspects of knowledge create economy-wide increasing returns.” That is, as more people gain this knowledge and are able to apply it, the more valuable it is to understand the knowledge for future innovation and collaboration. Caballero and Jaffe go on to state that the public stock of knowledge is a fundamental input in the generation of new ideas. Work by James Adams (1990) also identifies the connection between academic publications and economic growth. Based on the Web Of Science database as of March, 2011, there have been over 28,500 publications associated with SFU since 1966. There are over 1,300 publications from the Engineering, Electrical & Electronic subject area, over 1,100 publications from the Biochemistry & Molecular Biology subject area, and over 1,000 publications from both the History and Mathematics subject areas.

¹⁶ http://www.nbia.org/resource_library/faq/index.php#8

¹⁷ http://www.nbia.org/resource_library/works/files/EDA_study_PR_FINAL.pdf

¹⁸ http://www.nbia.org/resource_library/works/files/EDA_study_PR_FINAL.pdf

ReSearch Infosource, a Canadian consulting firm, ranked SFU 17th in 2009 amongst 45 research universities in Canada. ReSearch Infosource defines publications as articles, notes and reviews published by researchers affiliated with Canadian universities or research hospitals. They use approximately 9,900 peer-reviewed scientific international journals, covering different fields of natural science, health science and social science and humanities to source their data. Points are awarded to each university based on the total number of publications published by researchers affiliated with that particular university.

Knowledge Transfer and Start-ups

As discussed previously, one outcome of universities is a university educated workforce that contributes to the growth in the economy through increased earnings and spillover effects. In addition to these impacts, university graduates have the skills and knowledge to interpret the information of university research. Salter and Martin (2000) cite that “Information only becomes knowledge (and therefore valuable) when users have the capabilities to make sense of it; without these, information is meaningless.” Further evidence that universities aid the transfer of knowledge to industry is discussed by McMahon (1992), who estimates that 73% of knowledge from university research is distributed into the economy through university graduates. Furthermore, members in the academic community such of faculty and university graduates help industry process the research to be better able to use it appropriately.

University research also enters industry by way of start-up companies. The 2006 Milken Institute study uses start-ups as a direct measure of the quality of university-based intellectual property. The study defines start-ups as the “establishment of companies dependent upon a university’s technology for initiation.” The study asserts that startups, created by members in the university community, give an indication of a university’s capacity to innovate. Startups also give evidence that university technology and research is being transferred into industry for commercialization and ultimately economic growth. The Milken Institute study ranks SFU first when normalizing the number of startups by million dollar research expenditures for the period 2000 – 2004, shown in Table 14.

Table 14: Innovation Pipeline Rankings – Start-ups Per Million Research Expenditures, 2000 - 2004

Rank	University	Country	Ratio
1	Simon Fraser University	Canada	0.194
2	Brigham Young University	US	0.135
3	École de Technologie Supérieure	Canada	0.080
4	University of Waterloo	Canada	0.066
5	Kent State University	US	0.054
6	East Carolina University	US	0.053
7	Université de Sherbrooke	Canada	0.049
8	University of Akron	US	0.048
9	Rice University	US	0.042
10	Arizona State University	US	0.037

Source: *Mind to Market: A Global Analysis of University Biotechnology Transfer and Commercialization* by the Milken Institute

Economic Impact of SFU Research using Total Factor Productivity

There is substantial evidence that SFU's research impacts economic growth. Table 15 shows the results of applying Martin's (1998) theory of total factor productivity to SFU research¹⁹.

Table 15: The Economic Impact of SFU Research

GDP growth in BC since 1971	139,000,000,000
Growth attributable to Total Factor Productivity (TFP)	20%
TFP	27,800,000,000
Exclusion of foreign R&D effects (x 69%)	19,182,000,000
Share of R&D by BC Universities (x 37%)	7,097,340,000
Share of R&D by SFU (12%)	\$851,680,800

4. Other Impacts of SFU

SFU also makes an economic impact in Metro Vancouver in ways that are difficult to quantify due to lack of data and appropriate measurement techniques. Such impacts include: social impacts, community enhancement, building and developing sustainable communities, and national and global impacts.

4.1 Social Impacts

We have seen that SFU contributes to the economy through its spending, induced student and visitor spending, and research. We have also seen that by producing a university educated workforce, SFU enables university graduates to earn higher income, which further drives economical growth through available spending. But having a university degree has other impacts on society that are not easily measured such as better health, lower crime rates, and increased civic participation.

There are many studies that note the impact of education on health (Becker, 1993, Lleras-Muney, 2005, Grossman, 2005). Kenkel (1991) observed that the better educated are more likely to choose healthy lifestyles that generally lead to better health outcomes. The study notes that education is linked to better health choices such as reduced smoking, more exercise and lower alcohol consumption and that it is the understanding and use of health knowledge where the effects of education on health are most evident. A study conducted by Vafaei, Rosenberg, and Pickett (2010) notes that in both rural and urban regions, a higher percentage of individuals with post-secondary education is associated with better population health. Better population health means that a portion of taxpayers' dollars that would otherwise be spent on health care could be redirected to further education or to help the poor and homeless or other public services.

Higher education is also associated with lower criminal activity. Alstadaeter and Sievertsen (2009) note that higher education is related to less crime and lower incarceration rates. SFU research also plays a role in the reduction of criminal activity. Researchers in SFU's Criminology department are investigating online crimes such as money laundering, terrorism, and child pornography²⁰, with the goal of reducing cybercrimes. Faculty members are working to bring more public attention to these topics by organizing conferences and obtaining funds for further research. Other SFU researchers in the Faculty of Applied

¹⁹ The application of Martin's total factor productivity theory to estimate SFU's research impact in this report is consistent with UBC's approach to estimate UBC's research impact. However, while UBC assumed its share of R&D is 70%, SFU's share is assumed to 12%, consistent with its share of research dollars among BC research universities.

²⁰ http://www.sfu.ca/pamr/media_releases/media_releases_archives/media_10050902.html

Sciences are also contributing to the fight against crime by utilizing nano-technology to produce anti-counterfeiting methods that can be applied to banknotes, authenticating legal documents, retail merchandise, concert tickets, and passports²¹.

Higher education also enhances civic participation by: 1) increasing the quality of decisions made by the electorate in terms of selecting able leaders; 2) increasing the citizenry's ability to understand the issues and to hold government accountable for misconduct; and 3) increasing the effectiveness of their participation in the political process through enhanced knowledge, interest and involvement in political issues (Milligan, Moretti, and Oreopoulos, 2004). They report that in Canada, the probability of voting is 83% for high school drop outs, 84% for high school graduates, 86% for individuals with some post-high school education, and 90% for university graduates. Volunteering in the community is a key component of citizenship and plays a role in the impact to society. Williams et al. (2008) found that gender, university education, and household income all independently increase the likelihood of volunteerism.

4.2 Community Enhancement

SFU is an engaged partner within the local communities of Metro Vancouver. In 2009, SFU won the gold award from the Institute of Public Administration of Canada (IPAC)/Deloitte for public sector leadership in education, particularly noting our pioneering moves to become firmly rooted in the local community.

The SFU Gallery holds exhibitions free of charge all year round. It is estimated that a typical exhibition in the SFU gallery will be seen by 8,000 visitors. In addition, SFU Burnaby is home to the Museum of Archaeology and Ethnology which showcases artefacts from around the world, with a focus on British Columbia. Events and performances are often held at the Cornerstone open area, located at SFU Burnaby, and are open to students and community residents.

SFU offers free public lectures and a Philosophers' Café program which provide opportunity for local community members to discuss various social issues. SFU faculty and researchers participate in these events and engage with the community by providing their field-specific knowledge to the discussion. In 2009, Dr. Yosef Wosk, founder of the Philosophers' Café program, was awarded the British Columbia Achievement Award. The award recognizes "British Columbians who go above and beyond in their dedication and service to others and who devote time and energy to making their communities more caring, dynamic, beautiful, healthy and unique."²²

Quite frequently, SFU community members are on the news, asked by the media as issues arise, to share their expert knowledge with the public on many subjects and issues: the HST, tuberculosis outbreak in Port Alberni, addiction to videogames, firearms, hospital emergency overflows, the Criminal Code and war-on-crime legislation, earthquakes and tsunamis are just some of them.

SFU Surrey is located in the hub of downtown Surrey and is a prime setting for community events as a result of its central location. Located in an architecturally acclaimed building, shared by retailers and offices, it welcomes shoppers, employees, students and passersby with places to sit and relax, as well as courses and programs in a smaller supportive learning community.

SFU Woodward's, located in downtown Vancouver, is home to SFU's School for the Contemporary Arts. The School is host to thousands of arts and culture enthusiasts at more than 100 events annually²³, which take place at SFU facilities including the Fei & Milton Experimental Theatre. A recent donation by

²¹ http://www.sfu.ca/pamr/media_releases/media_releases_archives/butterfly-wings-behind-anticounterfeiting-technology.html

²² <http://www.sfu.ca/philosopherscafe/media.htm>

²³ http://www.sfu.ca/pamr/media_releases/media_releases_archives/media_09030901.html

Goldcorp will allow SFU to further support its programs that encourage community engagement within the Downtown Eastside. Currently these programs include usher and gallery sitter programs, ticket distribution outreach, and media, internet and theatrical presentation, training and professional development programs²⁴.

A recent study²⁵ by SFU researchers in the Faculty of Health Sciences investigates the number of homeless people in British Columbia. The report indicates that actual numbers exceed previous government estimates. In addition, the study provides recommendations to help solve the homelessness issue and reduce costs to the province by as much as \$32 million. This type of research adds to the impact of SFU by creating public awareness about social issues as well as solutions to problems that will enhance the community.

4.3 Building/Developing Sustainable Economy and Communities

4.3.1 SFU Infrastructure and Buildings

SFU is an active player in the environmental sustainability movement. SFU is the first North American post-secondary institution to receive the Go-Green certification from the Building Owners and Managers Association of Canada. SFU's new Saywell Hall (Arts and Social Sciences Complex) also won the Earth Award from the same association for its use of active and passive environmental systems and green construction materials.

Not only is SFU an environmentally conscious institution, it is also a supporter of the local film industry. The Burnaby campus is well known for its location atop Burnaby Mountain. SFU's architecture and surroundings are often showcased in films and television imitating courtroom scenes, military academies, a place on an imaginary planet, and CIA headquarters. Filming at SFU brings many famous actors to the Lower Mainland including Arnold Schwarzenegger, Richard Dean Anderson, Michelle Pfeiffer, Keanu Reeves, Jennifer Connelly, Ashton Kutcher, Kathy Bates, Hillary Duff and Frankie Muniz.

4.3.2 UniverCity

Since it first opened in 2004, the UniverCity community at SFU has won various planning and environmental awards such as the 'Best Community Development' from the Canadian Home Builders Association Sales and Marketing (SAM) in 2005 and a Green Planning Award from American Planning Association (APA).

Aside from its efforts in building an environmentally sustainable community, another goal of UniverCity is to build an economically sustainable community. When it is fully completed, it will be a community of 10,000 residents with an elementary school and local businesses. UniverCity not only attracts residents from outside Metro Vancouver to move into the area by offering environmentally friendly and below market price housing, it also helps the local economy by imposing a local vendors-only policy within the community. This policy helps keep the additional income generated in the local economy.

²⁴ <http://sfuwoodwards.ca/community.html>

²⁵ <http://www.sfu.ca/sfunews/Stories/sfunews031908014.shtml>

4.4 National and Global Impacts

SFU also plays a significant role on the national and international stages. This section provides a few examples of SFU's impact in the areas of monetary policy, education, pharmaceutical spin-offs and radiation awareness.

In 2009, David Andolfatto, an economics professor, was awarded a research fellowship from the Bank of Canada. Mark Carney, Governor of the Bank then stated that, "Professor Andolfatto's outstanding work contributes to excellence in monetary policy in this country."²⁶

Beginning in 2004, SFU's office of International Development partnered with various institutions in Thailand, Cambodia and Lao PDR to create the Adult Education for Economic Development²⁷ project. The project would help individuals in those countries gain access to quality continuing education and training, enabling them to actively participate in the social and economic growth of their communities. SFU collaborated with institutions in those countries to effectively create and deliver continuing education programs to achieve the project's goals. In 2007, a similar project began in Bolivia with the Community Economic Development²⁸ project focusing on programs for people working in development organizations and local government. SFU's Centre for Sustainable Community Development worked together with Universidad Andina Simon Botivar to design training programs to help participants work more effectively with local communities to create initiatives that foster sustainable and appropriate livelihoods. SFU also engaged in several other educational partnerships with institutions in India, China and other countries.

In 2010, Alectos, an SFU spin-off company, partnered with pharmaceutical giant Merck to help develop and research treatments to slow or stop Alzheimer's disease. University Industry Liaison Office Director, Ian Hand said, "Alectos is a true exemplar of how SFU spin-off companies are partnering with global leaders to bring revolutionary research innovations and exciting new products into the world."²⁹

Most recently, in March 2011, SFU researchers brought attention to local BC residents about increased levels of radioisotope iodine-131 in BC seaweed and rainwater samples. SFU nuclear scientist, Dr. Kris Starosta and his research team attributed the increased radiation levels to fallout from the damaged Fukushima Dai-Ichi nuclear reactor as a result of the 9.0 magnitude earthquake and tsunami in Japan. The rainwater tested was collected at SFU's campus on Burnaby Mountain and in downtown Vancouver, while seaweed samples were collected in North Vancouver near the Seabus terminal. Starosta's research findings suggest that "the levels we're seeing are not harmful to humans" but they will continue to monitor iodine 131 levels.³⁰ SFU and its researchers are often called upon in these situations for their expert knowledge to inform the local and national communities on important issues.

5. Conclusion

As discussed above, SFU clearly has a significant economic impact on the Metro Vancouver area. Table 16 shows the various types of impacts that SFU contributes to the economy and the dollar value of each. Through multiplier analysis, the estimated total economic impact of SFU in 2009/10 was \$3,653 million. As SFU continues to grow and further its engagement with the community this impact can only increase. Increases in student population will have a positive impact on university income which may initiate the

²⁶ http://www.sfu.ca/pamr/media_releases/media_releases_archives/media_03240901.html

²⁷ <http://www.sfu.ca/cs/international/projectpdfs/T1Abstract.pdf>

²⁸ <http://www.sfu.ca/cstudies/international/bolivia.htm>

²⁹ http://www.sfu.ca/pamr/media_releases/media_releases_archives/sfu-spinoff-targets-alzheimers-with-merck-partnership.html

³⁰ http://www.sfu.ca/pamr/media_releases/media_releases_archives/radiation-from-japan-reaches-bc-shores.html

need for more faculty positions, thereby adding to the employment and capital streams of the economy. As the world transitions from the industrial economy to the new knowledge economy, the demand for a university education workforce will grow, with the added benefits of earning higher income available for the local economy.

SFU's commitment to its students by providing quality faculty and facilities also has secondary benefits. Already under way is the renovation of SFU's chemistry wing in the Shrum Science Centre, updating the facility to meet modern – and green – standards. The initiative has an estimated cost of \$49.4 million, a major economic boost to the local construction industry.

We have also shown that beyond consumption and employment impacts that are easy to quantify, SFU also drives many qualitative impacts, such as the cultivation of start-up companies via incubators, the provision of cultural and recreational centers, and the promotion of environmental sustainability. In conclusion, SFU is without doubt an important contributor to the local economy and will continue to be in the years to come.

Table 16: Total Economic Impact of SFU

Type of Impact	Direct Impact (\$M)	Total Impact (\$M)
SFU spending	439.0	658.5
Students	196.7	295.1
Visitors	110.3	165.5
Alumni Education Premium	1,121.4	1,682.1
Impact of SFU Research	851.7	851.7
Total	2,719.1	3,652.9

6. Appendix A

Alumni Education Premium by Credential

Age Group	Sex	Graduates	Net Income	Education Premium				
				Per degree	Total	Work Participation	% in Metro Vancouver	Net Education Premium (2009)
PhD							33,930,665.11	
55-64	Male	192	85,255.69	40,932.84	7,859,104.33	0.61	0.73	3,447,199.64
	Female	139	58,473.70	27,011.60	3,754,612.31	0.49		1,331,103.93
45-54	Male	811	84,896.12	38,139.71	30,931,303.52	0.61		13,567,243.01
	Female	330	60,100.03	26,587.98	8,774,033.22	0.49		3,110,614.13
	Unspecified	28	72,762.43	32,628.20	913,589.61	0.55		362,306.80
35-44	Male	311	74,938.55	31,986.22	9,947,713.54	0.91		6,591,852.38
	Female	253	55,504.01	23,984.04	6,067,961.87	0.82		3,620,601.15
25-34	Male	118	50,451.48	15,211.05	1,794,904.49	0.91		1,189,393.46
	Female	77	41,734.43	15,461.24	1,190,515.16	0.82		710,350.63
Masters								188,499,820.19
55-64	Male	702	85,255.69	40,932.84	28,734,850.22	0.61		12,603,823.68
	Female	961	58,473.70	27,011.60	25,958,146.95	0.49		9,202,812.05
45-54	Male	1,360	84,896.12	38,139.71	51,870,003.44	0.61		22,751,480.26
	Female	1,384	60,100.03	26,587.98	36,797,763.56	0.49		13,045,727.13
35-44	Male	3,812	74,938.55	34,804.32	132,674,061.22	0.91		87,916,466.66
	Female	2,533	55,504.01	12,551.67	31,793,388.19	0.82		18,970,319.90
	Unspecified	41	65,512.41	23,969.12	982,733.99	0.87		618,790.74
25-34	Male	1,074	50,451.48	15,211.05	16,336,673.04	0.91		10,825,496.39
	Female	1,362	41,734.43	15,461.24	21,058,203.18	0.82		12,564,903.38
Graduate Diploma								22,829,528.26
55-64	Male	94	85,255.69	40,932.84	3,847,686.50	0.61		1,687,691.49
	Female	389	58,473.70	27,011.60	10,507,512.14	0.49		3,725,175.74
45-54	Male	148	84,896.12	38,139.71	5,644,676.84	0.61		2,475,896.38
	Female	377	60,100.03	26,587.98	10,023,668.25	0.49		3,553,640.99
35-44	Male	194	74,938.55	31,986.22	6,205,326.13	0.91		4,111,959.36
	Female	357	55,504.01	23,984.04	8,562,301.93	0.82		5,108,911.50
25-34	Male	106	50,451.48	15,211.05	1,612,371.83	0.91		1,068,438.19
	Female	119	41,734.43	15,461.24	1,839,887.06	0.82		1,097,814.61
Post Bach								36,463,705.21
55-64	Male	167	85,255.69	40,932.84	6,835,783.46	0.61		2,998,345.52
	Female	720	58,473.70	27,011.60	19,448,351.51	0.49		6,894,926.82
45-54	Male	334	84,896.12	38,139.71	12,738,662.61	0.61		5,587,495.89
	Female	703	60,100.03	26,587.98	18,691,349.56	0.49		6,626,550.70
35-44	Male	189	74,938.55	31,986.22	6,045,395.04	0.91		4,005,981.03
	Female	598	55,504.01	23,984.04	14,342,455.33	0.82		8,557,784.53
25-34	Male	25	50,451.48	15,211.05	380,276.37	0.91		251,990.14
	Female	167	41,734.43	15,461.24	2,582,026.38	0.82		1,540,630.59

			Education Premium					
Age Group	Sex	Graduates	Net Income	Per degree	Total	Work Participation	% in Metro Vancouver	Net Education Premium (2009)
Bachelors								783,047,826.91
55-64	Male	813	76,175.80	31,852.94	25,896,441.06	0.61		11,358,826.46
	Female	1,998	48,017.17	16,555.07	33,077,029.91	0.49		11,726,634.03
45-54	Male	3,265	75,614.57	28,858.15	94,221,865.24	0.61		41,328,065.64
	Female	3,879	51,704.72	18,192.67	70,569,372.14	0.49		25,018,606.66
35-44	Male	20,432	64,803.64	21,851.30	446,465,845.36	0.91		295,850,592.42
	Female	20,073	47,904.40	16,384.44	328,884,767.11	0.82		196,237,318.41
	Unspecified	2	56,659.33	19,382.29	38,764.58	0.87		24,408.60
25-34	Male	11,601	46,800.02	11,559.59	134,102,801.74	0.91		88,863,221.57
	Female	16,436	37,758.94	11,485.75	188,779,742.92	0.82		112,640,153.11
Professional Development Program								56,614,268.97
55-64	Male	145	76,175.80	31,852.94	4,618,676.45	0.61		2,025,866.96
	Female	386	48,017.17	16,555.07	6,390,257.03	0.49		2,265,505.87
45-54	Male	1,467	75,614.57	28,858.15	42,334,908.52	0.61		18,569,149.25
	Female	2,834	51,704.72	18,192.67	51,558,030.58	0.49		18,278,610.79
35-44	Male	288	64,803.64	21,851.30	6,293,175.58	0.91		4,170,172.80
	Female	865	47,904.40	16,384.44	14,172,536.42	0.82		8,456,398.17
25-34	Male	65	46,800.02	11,559.59	751,373.34	0.91		497,897.54
	Female	343	37,758.94	11,485.75	3,939,611.33	0.82		2,350,667.59
Total								1,121,385,814.66

Source: Statistics Canada, 2006 Census of Population, Statistics Canada catalogue no. 97-563-XCB2006054.
 Inflation rates based on Consumer Price Index (CPI) rates from the Bank of Canada
 Tax rates from Canada Revenue Agency
 Work participation rates from Statistics Canada, CANSIM Table 282-0002
 Percent in Metro Vancouver based on data from SFU Alumni

7. Appendix B

Technology Transfer at Canadian Universities: 2007 Update

Technology Transfer at Canadian Universities: 2007 Update
FY2005 AUTM Survey Results for Responding Canadian Universities (Top 21)
Survey Results Normalized by Sponsored Research Expenditures (All figures in US\$)

University	Invention Disclosures Received per \$1M	Total Sponsored Research Expenditures	Invention Disclosures Received	License & Options Executed	License & Options Executed per \$1M	License Income Received	License Income Received per \$1M	U.S. Patents Issued	U.S. Patents Issued per \$1M	Startup Companies Formed	Startup Companies Formed per \$1M
1 University of Victoria	1.605	\$39,887,500	64	2	0.050	\$148,333	\$3,719	3	0.075	2	0.050
2 University of Guelph	1.026	\$103,328,886	106	40	0.387	\$1,114,285	\$10,784	7	0.175	0	0.000
3 University of Saskatchewan	0.841	\$98,727,578	83	26	0.263	\$909,221	\$9,209	12	0.301	0	0.000
4 Simon Fraser University	0.794	\$44,105,043	35	2	0.045	\$285,820	\$6,480	10	0.251	1	0.025
5 University of Toronto *	0.698	\$321,035,738	224	34	0.106	\$1,413,729	\$4,404	8	0.201	3	0.075
6 University of New Brunswick	0.578	\$27,694,642	16	3	0.108	\$43,762	\$1,580	2	0.050	2	0.050
7 University of Manitoba	0.563	\$81,701,633	46	5	0.061	\$1,397,147	\$17,101	8	0.201	0	0.000
8 University of Calgary / UTL, Inc.	0.532	\$234,837,926	125	14	0.060	\$2,862,854	\$12,191	10	0.251	0	0.000
9 University of Western Ontario *	0.479	\$168,954,530	81	35	0.207	\$3,635,863	\$21,520	8	0.201	5	0.125
10 University of British Columbia *	0.471	\$303,335,806	143	50	0.165	\$13,321,844	\$43,918	25	0.627	2	0.050
11 Queen's University *	0.457	\$113,710,000	52	10	0.088	\$745,637	\$6,557	8	0.201	3	0.075
12 Université de Sherbrooke	0.303	\$79,189,178	24	31	0.391	\$9,726,183	\$122,822	3	0.075	0	0.000
13 York University	0.295	\$40,666,667	12	6	0.148	-	-	0	0.000	0	0.000
14 McGill University *	0.291	\$322,520,000	94	31	0.096	\$1,316,066	\$4,081	10	0.251	1	0.025
15 Université Laval *	0.278	\$190,494,021	53	9	0.047	\$293,348	\$1,540	3	0.075	0	0.000
16 University of Ottawa	0.222	\$198,333,333	44	6	0.030	\$93,490	\$471	3	0.075	1	0.025
17 Dalhousie University	0.208	\$77,080,833	16	1	0.013	\$123,716	\$1,605	1	0.025	0	0.000
18 McMaster University *	0.191	\$240,490,833	46	192	0.798	\$1,272,778	\$5,292	2	0.050	2	0.050
19 University of Alberta *	0.182	\$323,349,167	59	13	0.326	\$877,931	\$2,715	10	0.251	2	0.050
20 Memorial University	0.107	\$75,057,986	8	0	0.000	\$37,500	\$500	1	0.025	0	0.000
21 University of Waterloo *	0.092	\$87,293,333	8	34	0.389	\$648,308	\$7,427	0	0.000	2	0.050

* University is part of the G-10

Source: Table 3, Technology Transfer at Canadian Universities: 2007 Update by Bruce P. Clayman

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