

ANALYSIS OF THE ECONOMIC IMPACT  
AND RETURN ON INVESTMENT OF EDUCATION

# Demonstrating the Value of Calgary's Postsecondary Institutions

November 2016

## EXECUTIVE SUMMARY

# Study Highlights

## ECONOMIC IMPACT ANALYSIS

- Altogether, Calgary PSIs and their students, visitors, and entrepreneurial activities added **\$8.6 billion** to the Calgary Census Metropolitan Area economy.
- The Calgary Census Metropolitan Area received approximately **\$1.7 billion** in added income in Fiscal Year (FY) 2014-15 due to the spending toward Calgary PSIs' day-to-day operations, the spending of out-of-region and retained students, and the spending of visitors to the region.
- Research spending by Calgary PSIs, along with start-up and spin-off companies and other spillover effects attributable to Calgary PSIs, contributed another **\$663.3 million** in added income to the Calgary Census Metropolitan Area in FY 2014-15.
- Former students of Calgary PSIs who were active in the regional workforce in FY 2014-15 generated another **\$6.3 billion** in added income through their higher earnings and increased productivity of their employers.

## INVESTMENT ANALYSIS

- For every \$1 students invest in Calgary PSIs, they receive a cumulative **\$3.10** in higher future earnings over the course of their working careers.
- Society as a whole in Alberta receives **\$20.3 billion** in added income and **\$110.3 million** in social savings related to reduced crime, lower unemployment, and improved health across the province in FY 2014-15.
- Provincial taxpayers receive a rate of return of **17.6%** on their investment in Calgary PSIs.

# Introduction

Calgary's Postsecondary Institutions create value in many ways. This study investigates the economic impacts created by Calgary PSIs on the regional economy and the benefits that the institutions generate in return for the investments made by their key stakeholder groups—students, society, and taxpayers.

Calgary's Postsecondary Institutions (Calgary PSIs) play a key role in helping students increase their employability and achieve their individual potential. However, the contribution of Calgary PSIs consists of more than just influencing the lives of students. The institutions serve a range of industries in the Calgary Census Metropolitan Area and supply local businesses with skilled workers. Society as a whole in Alberta benefits from an expanded economy and improved quality of life. The benefits created by Calgary PSIs extend as far as the provincial government, in the form of increased tax revenues and public sector savings.

The following two analyses are presented:

- **Regional economic impact analysis** measuring the income created by the institutions and their students, visitors, and entrepreneurial activities in the Calgary Census Metropolitan Area.
- **Investment analysis** weighing the benefits to students, society, and taxpayers in return for the costs of supporting the institutions.

The results of the study reflect the Fiscal Year (FY) 2014-15. Data and assumptions are based on academic and financial reports from the institutions, industry and employment data from Statistics Canada, outputs of Emsi's Canadian regional input-output model, and a variety of studies and surveys relating education to social behaviour. The study applies a conservative methodology and follows standard practice using only the most recognized indicators of economic impact and investment effectiveness. For a full description of the data and approach, please contact Calgary Economic Development for a copy of the technical report. Note that this analysis does not include the University of Calgary's Qatar campus.

# Regional economic impact analysis

Economic impact analysis measures the net added income created by Calgary PSIs in the regional economy through their own spending and the spending of their students and visitors, as well as the enhanced productivity of the workforce. The backdrop for the analysis is the Calgary Census Metropolitan Area.

The Calgary Census Metropolitan Area economy is impacted by Calgary PSIs in a variety of ways. The institutions are some of the region's largest employers and significant buyers of goods and services. They attract monies that would not have otherwise entered the regional economy through their day-to-day operations, their research activities, and the expenditures of their out-of-region students and visitors. Further, they foster the development of new start-up and spin-off companies and other spillover effects, and provide students with the knowledge, skills, and abilities they need to become productive citizens and contribute to the overall output of the region.

Results of the regional economic impact analysis are broken out according to the following seven impacts: 1) impact of institutional operations, 2) impact of spending on research, 3) impact of start-up and spin-off companies, 4) impact of total factor productivity, 5) impact of student spending, 6) impact of visitor spending, and 7) impact of the skills acquired by former students who are still active in the Calgary Census Metropolitan Area workforce.

## IMPACT OF INSTITUTIONAL OPERATIONS

Calgary PSIs are important employers in the Calgary Census Metropolitan Area. In FY 2014-15, the institutions employed faculty and staff equivalent to 10,221 full-time employees. Of these, 96% lived in the Calgary Census Metropolitan Area. Total payroll at Calgary PSIs was \$1.2 billion, much of which was spent in the region for groceries, eating out, clothing, and other household expenses.

Calgary PSIs are themselves large-scale buyers of goods and services. In FY 2014-15, the institutions spent \$849.9 million to cover their expenses for facilities, professional services, and supplies.

The total income that Calgary PSIs created during the analysis year as a result of their day-to-day operations (excluding research activities) was \$1.6 billion, equivalent to 26,369 job equivalents. This figure represents the institutions' payroll for non-research operations, the multiplier effects generated by the spending of the institutions and their employees, and a downward adjustment to account for funding that the institutions received from local sources.

### ADDED INCOME CREATED BY CALGARY PSIS IN FY 2014-15

<b>\$1.6 billion</b>
Impact of institutional operations
<b>\$663.3 million</b>
Impact of research
<b>\$94.1 million</b>
Impact of student spending
<b>\$4.5 million</b>
Impact of visitor spending
<b>\$6.3 billion</b>
Alumni impact
<b>\$8.6 billion</b>
Total impact

## IMPACT OF RESEARCH

The research activities of Calgary PSIs impact the regional economy through research-related expenditures and broader spillover effects borne from innovation. The total impact of research at Calgary PSIs is measured by the research spending impact, the impact of start-up and spin-off companies related to Calgary PSIs, and total factor productivity.

### Research spending Impact

Research activities impact the economy by employing people and requiring the purchase of equipment and other supplies and services. Over the last four years, Calgary PSIs published 20,225 research articles, received 375 invention disclosures, and produced 45 licenses.

In FY 2014-15, Calgary PSIs collectively spent around \$322.3 million on research and development activities. These efforts attracted new dollars into the region to support a large portion of the research activities, with 27% of funding received from federal sources. The research activities also brought in additional funds from sources within the region, including from foundations and provincial and local governments.

The expenditures on research activities by Calgary PSIs stimulated other economic activity in the region that resulted in an additional \$278.6 million in regional income for businesses and households. This is equivalent to adding 4,732 jobs. As with the institutional operations spending impact, this impact is beyond the opportunity cost to the regional economy of carrying out research at Calgary PSIs.

### Business start-up & spin-off impact

Calgary PSIs create exceptional environments that foster innovation and entrepreneurship, evidenced by the number of start-up and spin-off companies related to Calgary PSIs created in the region. Start-up companies, created specifically to license and commercialize institution-owned intellectual property, have a strong and clearly defined link to Calgary PSIs. Spin-off companies, created and fostered through institutional programs or faculty, students, and alumni, do not have license agreements with Calgary PSIs, but still have a clear and important, if less direct, link.

In FY 2014-15, start-up and spin-off companies related to Calgary PSIs added \$50.5 million in income to the Calgary Census Metropolitan Area economy. Of this added income, \$40.2 million, equivalent to 683 new jobs, was due to the start-up companies. The remaining \$10.3 million, equivalent to 175 jobs, can be attributed to the spin-off companies.

### Total factor productivity impact

The research spending impact and the impact from start-up and spin-off companies help demonstrate the impact from the research operations of the Calgary PSIs and touch upon the impacts created through the entrepreneurial and innovative activity stemming from the institutions. However, they do not fully capture the broader spillover effects that stem from the research at the institutions. This can include but is not limited to impacts from other businesses not captured within the start-up and spin-off impacts, business efficiencies from the creation of new technology, and medical breakthroughs for healthier and therefore more productive citizens.

## INTELLECTUAL PROPERTY CREATED BY CALGARY PSIS

RESEARCH PUBLICATIONS	INVENTIONS	LICENSES
4,481	77	4
2011-12		
5,208	61	5
2012-13		
5,422	124	15
2013-14		
5,114	113	21
2014-15		
20,225	375	45
Total		

To account for these spillover effects, we turn toward total factor productivity, which measures the portion of GRP stemming from research and development. In FY 2014-15, the total factor productivity impact attributable to Calgary PSIs amounted to \$334.2 million in added income, equivalent to 5,677 average-wage jobs.

## IMPACT OF STUDENT SPENDING

Approximately 7,904 students relocated to the Calgary Census Metropolitan Area to attend school at Calgary PSIs in FY 2014-15, including international students. In addition, a number of in-region students would have left the area for other education opportunities if not for the existence of Calgary PSIs. While attending, these out-of-region and retained students spent \$236.7 million to purchase groceries, rent accommodation, pay for transportation, and so on. A significant portion of these expenditures occurred in the region, generating \$94.1 million in new income in the economy during the analysis year, equivalent to 1,599 new jobs.

## VISITOR SPENDING IMPACT

Thousands of visitors from outside the region were attracted to Calgary PSIs during the analysis year to attend commencements, sports events, and other activities sponsored by the institutions. While in the region, visitors spent money for lodging, food, transportation, and other personal expenses. The off-campus expenditures of these out-of-region visitors generated a net impact of \$4.5 million in new income for the regional economy in FY 2014-15, equivalent to creating 77 new jobs.

## ALUMNI IMPACT

Calgary PSIs' greatest impact results from the education and training they provide for local residents. Since the institutions were established, students have studied at Calgary PSIs and entered the workforce with newly acquired skills. Today, thousands of former students are employed in the Calgary Census Metropolitan Area.

During the analysis year, former students of Calgary PSIs generated \$6.3 billion in added income in the region, equivalent to 106,624 new jobs. This figure represents the higher wages that former students earned during the year, the increased output of the businesses that employed the former students, and the multiplier effects that occurred as former students and their employers spent money at other businesses.

## TOTAL IMPACT

The overall impact of Calgary PSIs on the regional economy during the analysis year amounted to \$8.6 billion, equal to the sum of the institutional operations spending impact, the research spending impact, the start-up and spin-off impact, the total factor productivity impact, the student spending impact, the visitor spending impact, and the alumni impact. Calgary PSIs added 145,936 new jobs to the Calgary Census Metropolitan Area economy. This added income was equal to approximately 7.0% of the region's Gross Regional Product.

### JOB EQUIVALENTS BASED ON INCOME

Job equivalents are a measure of the average-wage jobs that a given amount of income can potentially support. They are calculated by dividing the added income specific to each type of impact by the average annual wages per worker in the region. Based on the added income created by Calgary PSIs, the job equivalents are as follows:

*Impact of institutional operations*  
= **26,369** job equivalents

*Impact of research spending*  
= **4,732** job equivalents

*Impact of start-ups and spin-offs*  
= **858** job equivalents

*Impact of total factor productivity*  
= **5,677** job equivalents

*Impact of student spending*  
= **1,599** job equivalents

*Impact of visitor spending*  
= **77** job equivalents

*Alumni impact*  
= **106,624** job equivalents

Overall, the added income created by Calgary PSIs and their students supported **145,936** average-wage jobs.

# Investment analysis

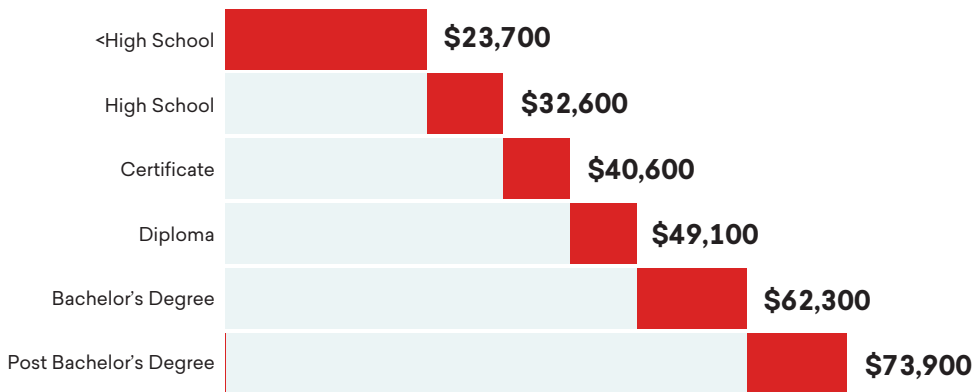
Investment analysis is the process of evaluating total costs and measuring these against total benefits to determine whether or not a proposed venture will be profitable. If benefits outweigh costs, then the investment is worthwhile. If costs outweigh benefits, then the investment will lose money and is considered unprofitable. This study considers Calgary PSIs as an investment from the perspectives of students, society, and taxpayers. The backdrop for the analysis is the entire Alberta economy.

## STUDENT PERSPECTIVE

In FY 2014-15, Calgary PSIs served 87,783 credit students and 39,937 non-credit students. In order to attend school, students paid for tuition, fees, books, and supplies. They also gave up money that they would have otherwise earned had they been working instead of attending school. The total investment made by Calgary PSIs' students in FY 2014-15 amounted to \$1.8 billion, equal to \$496.7 million in out-of-pocket expenses plus \$1.3 billion in forgone time and money.

In return for their investment, Calgary PSIs' students develop the skills required for an increasingly globalized workplace and receive a stream of higher future wages that will continue to grow throughout their working lives. As shown in Figure 1, mean income levels at the midpoint of the average-aged worker's career increase as people achieve higher levels of education. For example, the average bachelor's degree graduate from Calgary PSIs will see increased earnings of \$29,700 per

**FIGURE 1:** Annual income by education level at career midpoint in the Calgary Census Metropolitan Area



## STUDENT PERSPECTIVE

<b>\$5,515,003</b>
Benefits (thousands)
<b>\$1,796,876</b>
Costs (thousands)
<b>\$3,718,128</b>
Net present value (thousands)
<b>3.1</b>
Benefit-cost ratio
<b>13.5%</b>
Rate of return

year at their career midpoint compared to someone with a high school diploma or equivalent. Over a working lifetime, this increase in earnings amounts to an undiscounted value of approximately \$1,128,937 in higher income.

The present value of the higher future wages that Calgary PSIs' students will receive over their working careers is \$5.5 billion. Dividing this value by the \$1.8 billion in student costs yields a benefit-cost ratio of 3.1. In other words, for every \$1 students invest in Calgary PSIs in the form of out-of-pocket expenses and forgone time and money, they receive a cumulative of \$3.10 in higher future wages. The return on investment to students (i.e., the benefit-cost ratio less the cost of the original investment) thus comes to \$2.10 in benefits returned over and above every \$1 in costs.

The average annual rate of return for students is 13.5%. This is a favourable return compared, for example, to the less than 1% return per annum that is generally expected from saving money in today's standard bank savings accounts.

**SOCIAL PERSPECTIVE**

Calgary PSIs aim to improve the socioeconomic well-being of the local and provincial community by increasing students' earning potential and by positively influencing the health and lifestyle habits of students. As a result, society as a whole in Alberta benefits from the presence of Calgary PSIs in two major ways. The first and largest benefit to society is the added income created in the province. As discussed in the previous section, students earn more because of the skills they acquire while attending Calgary PSIs. Businesses also earn more because the enhanced skills of students make them more productive. Together, higher student wages and increased business output stimulate increases in income across the province, thereby raising prosperity in Alberta and expanding the economic base for society as a whole.

Benefits to society also consist of the savings generated by the improved lifestyles of former students. Education is statistically correlated with a variety of lifestyle changes that generate social savings across three main categories: 1) health, 2) crime, and 3) income assistance. Health savings include avoided medical costs associated with smoking, alcoholism, obesity, and mental illness. Crime savings include reduced Criminal Justice System expenditures, lower victim costs, and increased productivity of individuals who are working rather than spending time in custody. Income assistance savings include the reduced demand for employment insurance benefits and employment-related social assistance.

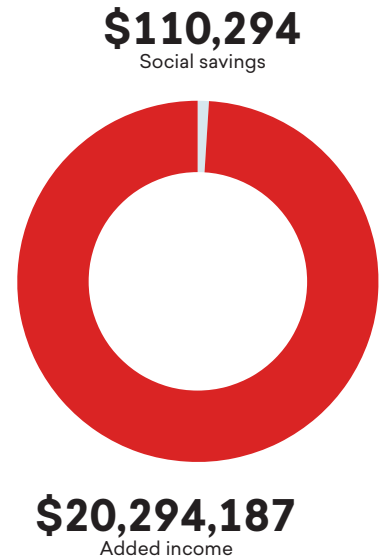
Figure 2 shows the present value of the added income and social savings that will occur in Alberta over the working lifetimes of Calgary PSIs' FY 2014-15 students. Added income amounts to a present value of \$20.3 billion due to the increased lifetime incomes of students and associated increases in business output. Social savings amount to \$110.3 million, the sum of health, crime, and income assistance

**SOCIAL PERSPECTIVE**

<b>\$20,404,481</b>
Benefits (thousands)
<b>\$3,376,005</b>
Costs (thousands)
<b>\$17,028,476</b>
Net present value (thousands)
<b>6.0</b>
Benefit-cost ratio

\* The rate of return is not reported for the social perspective because the beneficiaries of the investment are not necessarily the same as the original investors.

**FIGURE 2:** Present value of added income and social savings in Alberta (thousands)





savings in Alberta. Altogether, total benefits to society equal \$20.4 billion (in present value terms).

Society invested \$3.4 billion in educations from Calgary PSIs during the analysis year. This includes all expenditures by Calgary PSIs, all student expenditures, and all student opportunity costs. For every \$1 of this investment, society as a whole in Alberta will receive a cumulative value of \$6.00 in benefits, equal to the \$20.4 billion in benefits divided by the \$3.4 billion in costs. These benefits will occur for as long as Calgary PSIs' FY 2014-15 students remain employed in the provincial workforce.

## TAXPAYER PERSPECTIVE

From the taxpayer perspective, benefits consist primarily of the taxes that provincial government will collect from the added income created in the province. As Calgary PSIs' FY 2014-15 students earn more, they will make higher tax payments. Employers will also make higher tax payments as they increase their output and purchase more supplies and services. By the end of the students' working careers, provincial government will have collected a present value of \$3.5 billion in added taxes.

A portion of the savings enjoyed by society also accrues to provincial taxpayers. Former students are more employable, so the demand for income assistance reduces. Improved health habits lower the former students' demand for provincial health care services. Former students are also less likely to commit crimes, so the demand for law enforcement services reduces. All of these benefits will generate a present value of \$42.3 million in savings to provincial taxpayers.

Total benefits to taxpayers are \$3.5 billion, equal to the sum of the added taxes and public sector savings. Comparing this to the taxpayer costs of \$993.7 million—equal to the funding that Calgary PSIs received from provincial government during the analysis year—yields a benefit-cost ratio of 3.5. This means that for every \$1 of public money invested in Calgary PSIs, taxpayers receive a cumulative value of \$3.50 over the course of the former students' working lives. In other words, taxpayers fully recover the cost of the original investment and also receive a return of \$2.50 in addition to every \$1 they paid. The rate of return is 17.6%, a solid investment that compares favourably with other long-term investments in both the private and public sectors.

### TAXPAYER PERSPECTIVE

<b>\$3,526,936</b>
Benefits (thousands)
<b>\$993,684</b>
Costs (thousands)
<b>\$2,533,252</b>
Net present value (thousands)
<b>3.5</b>
Benefit-cost ratio
<b>17.6%</b>
Rate of return

## Conclusion

The results of this study demonstrate that Calgary PSIs create value from multiple perspectives. The institutions benefit local businesses by increasing consumer spending in the region and supplying a steady flow of qualified, trained workers into the workforce. They enrich the lives of students by raising their lifetime incomes and helping them achieve their individual potential. They benefit society as a whole in Alberta by creating a more prosperous economy and generating a variety of savings through the improved lifestyles of students. Finally, they benefit provincial taxpayers through increased tax receipts across the province and a reduced demand for government-supported social services.



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