mitacs

Fueling Innovation

Measuring the Economic Impact of Mitacs

2024

Fueling Innovation: Measuring the Economic Impact of Mitacs

This report is based on an analysis by Statistics Canada, which evaluated the effects of Mitacs programs on the business performance indicators of its industry partners.

Prepared by:

Fatima Rais, Economist, Impact Evaluation and Assessment, Mitacs
Karla Nievas, Senior Evaluation Officer, Mitacs

2024

Acknowledgements

Table of Contents

1. Executive Summary

Mitacs is a Canadian not-for-profit organization that fuels innovation by bringing together researchers, post-secondary talent and Canadian enterprises to find solutions for today's key challenges.

Mitacs plays a pivotal role in Canada's economic and innovation landscape by bridging enterprise and research and facilitating the transition of highly skilled graduates into industry. It's programs are designed to ensure that companies have access to the expertise they need to solve their challenges while providing research interns with opportunities to apply specialized skillsets in real-world, impactful scenarios.

This approach has a far-reaching effect. Mitacs mitigates the risks associated with high-risk innovation projects and hiring new talent, encouraging firms to innovate and develop new products and services. Mitacs fosters growth and the creation of sustainable, highly skilled jobs, and boosts Canada's economic prosperity.

While Mitacs routinely gauges client satisfaction through regular assessments, we sought an impartial, quantifiable evaluation of our impact on accelerating business growth. To achieve this, we enlisted the expertise of Statistics Canada to assess Mitacs's influence on industry partners that received our support between 2009 and 2018.

Statistics Canada constructed a comprehensive longitudinal database comprising Mitacs partners (the "study group") and non-Mitacs partners (the "control group"). As much as possible, the performance of both cohorts was rigorously compared throughout the period, ensuring parity in various demographic and business metrics.

Leveraging advanced statistical methods, Statistics Canada scrutinized several hypotheses concerning Mitacs's effect on the business performance of our industry partners. Six key performance indicators were analyzed: sales, revenue, productivity, employment, R&D expenditure, and survival rates post-Mitacs project.

The analysis decisively demonstrated Mitacs's positive impact across all performance metrics:

- By the third year after the partnership with Mitacs, the profiled companies recorded positive increases in total revenues, sales, and labour productivity.

- Mitacs-supported firms are hiring on average more employees and spending more on R&D over time whereas there is a declining trend on these indicators for the control group.

- The data also demonstrate that Mitacs-supported firms have a 6 percent higher survival rate than the comparable group when measured seven years after funding.

In addition to benefiting Mitacs industry partners, these outcomes demonstrate — through economic modeling and research findings — the alignment of our programs with the overarching goal of supporting Canada's innovation ecosystem and promoting increased economic growth.

2. Introduction

Mitacs mandated the Centre for Special Business Projects (CSPB) at Statistics Canada to assess the economic impact on the companies we supported between 2009 and 2018 through the Accelerate and Elevate programs. To this effect, CSPB carried out an objective analysis that included a quantifiable comparison between businesses that received support from Mitacs and a similar group that did not receive Mitacs funding.

The study was conducted by connecting a dataset built and shared by Mitacs to the Linkable File Environment (LFE), which represents a collection of over two decades of linked files containing tax information and survey data about enterprises. The dataset included information on 3,286 small and medium enterprises participating in Accelerate or Elevate programs between 2009 and 2018.

CSPB produced and used a series of analytic datasets, creating tables for the Mitacs-supported companies and the control group. These tables describe various financial tax variables in aggregate form.

As a first step, the data was used to assess the impact of Mitacs programs on key financial perfomance variables such as total revenue, sales and labour productivity by the third year following funding. Then, Mitacs-supported companies were compared to those in the control group to analyze R&D expenditures, employment, and survival rates. Further details on the research methodology are provided in the appendix.

The report is structured to present short-term and long-term results. Revenue, sales, and labour productivity are shown for three years following Mitacs support. For variables like R&D expenditure, employment, and survival rate, a longer-term cohort analysis was conducted to assess performance over time compared to the control group of firms. To facilitate the interpretation of the results, the long-term charts present indexed values that take 2009 as the initial year.

3. Findings

This section presents the comprehensive findings on Mitacs's influence on the economic performance of small and medium-sized enterprises (SMEs) that benefited from the Accelerate or Elevate programs between 2009 and 2018. While the first sub-section presents short- to medium-term trends, R&D spending, employment, and survival rates were analyzed for the long term.

3.1. Revenue, Sales, and Labour Productivity

In the short to medium run, Mitacs-supported companies experienced positive increases in their total revenues, total sales, and labour productivity. By the third year following funding, these enterprises exhibited growth rates of **9 percent for total revenue, 16 percent for total sales,** and **11 percent for labour productivity.**

Revenue

By the third year, the total revenue of Mitacs-supported companies exhibited a 9 percent average increase, as shown in Figure 1. Results also revealed that, in general, revenues were higher than sales, suggesting potential alternative revenue streams beyond the sale of goods and services. Detailed results are shown in the appendix.
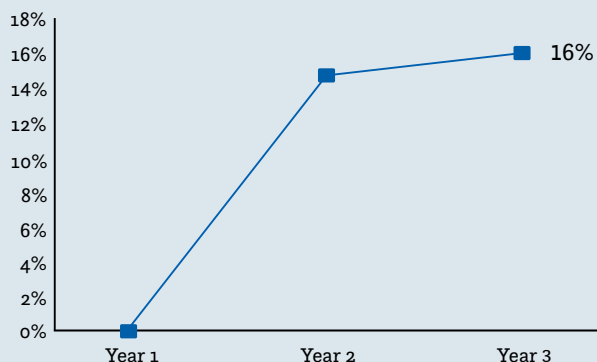
Figure 1. Revenue growth after Mitacs support
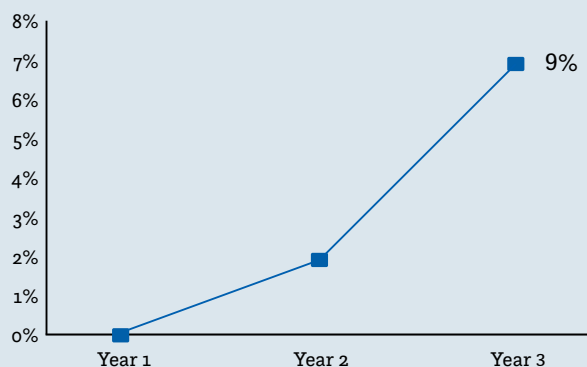
Sales

Similarly, total sales of Mitacs-supported companies presented a growing trend. As illustrated in Figure 2, the trend presents a 16 percent average growth rate three years after funding.

**Figure 2. Sales growth after Mitacs support**

Labour productivity

Labour productivity is a measure of enterprises' efficiency in delivering their outputs. It is calculated by dividing total sales by employment. Unsurprisingly, the significant increase in sales of the Mitacs-supported companies translated into greater productivity.

As shown in Figure 3, Mitacs-supported companies recorded, on average, an 11 percent increase in labour productivity.

Figure 3. Labour productivity growth after Mitacs support

The productivity gains recorded by Mitacs-supported enterprises are significant. As a comparison, companies in Canada experienced on average an increase of 0.8 percent in their productivity in the same period (source: Conference Board of Canada).
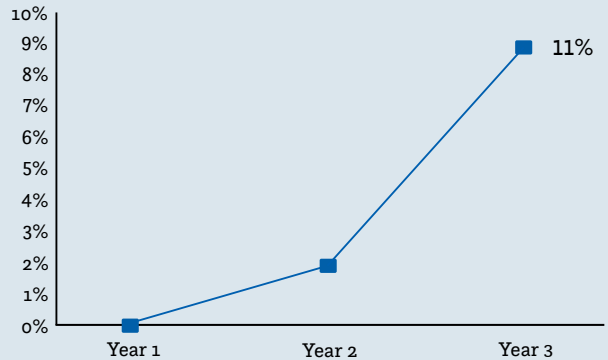
3. 2. Research and Development Spending

Long-term data allows for comparison with a control group built for this assessment. In the long term, Mtacs-funded enterprises maintained an upward trend in their R&D spending compared to the companies in the control group.

As indicated in the left-hand chart in Figure 4, seven years after receiving Mitacs funding, companies increased their R&D expenditures by 37 percent (index growing from 100 to 137), for an average annual growth rate of 5 percent, while the control group decreased theirs by 54 percent (from 100 to 46).

As shown in the right-hand chart in Figure 4, the average inflation-adjusted R&D expenditure for Mitacs-supported firms went from approximately $385,000 in the first year to $633,000 in the seventh year.

Figure 4: R&D expenditure after Mitacs support

R&D Spending
(Index: Year 1 = 100)

Average R&D Spending
Mitacs Supported Companies
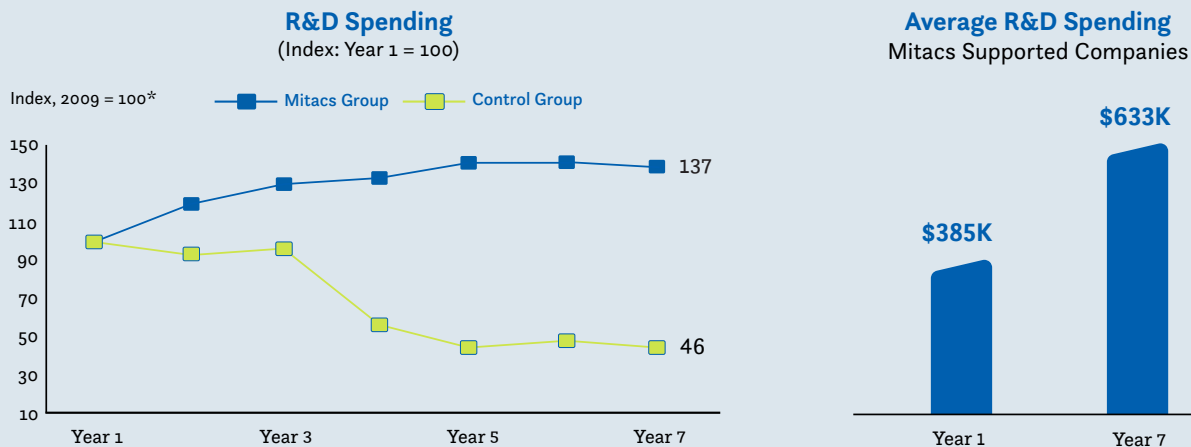
3.3. Employment

Mitacs-supported companies tend to hire more employees than non-supported companies.

As illustrated in Figure 5, over seven years, the Mitacs group experienced a steady increase in their employment levels (18 percent) while the control group presented a downward trend and a reduction of 5 percent of their workforce.

Figure 5: Employment after Mitacs support
(Index: Year 1 = 100)

Index, 2009 = 100*   ■— Mitacs Group □— Control Group
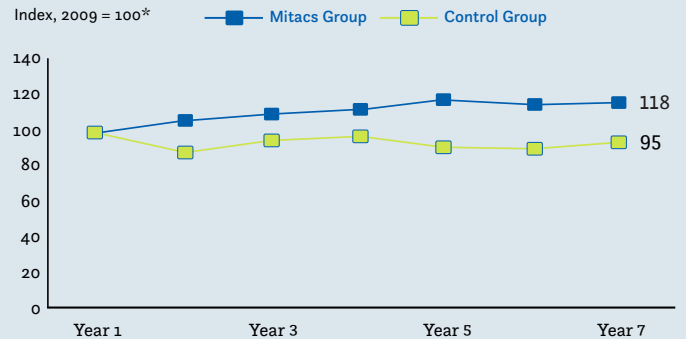
3.4. Survival Rate

The survival rates declined for both groups over time. However, despite a 17 percent average decrease, Mitacs enterprises survived at a higher rate than non-supported enterprises, with a difference of 6 percent.

Figure 6: Survival rate after Mitacs support
(Index: Year 1 = 100)

Index, 2009 = 100*   ■— Mitacs Group □— Control Group
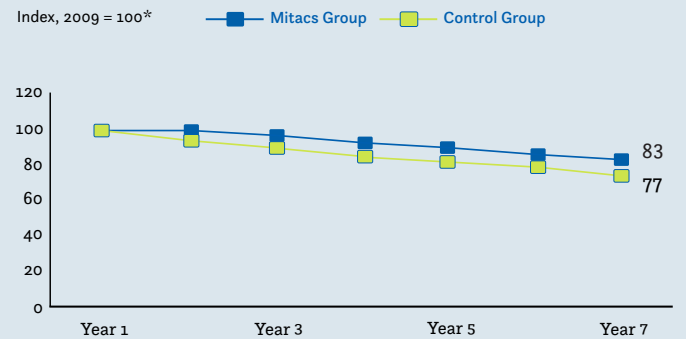
4. Conclusion

Mitacs is committed to helping our partners innovate and improve their economic performance. A key finding of this study is the positive impact that Mitacs-supported enterprises experience on revenue, sales, employment, labour productivity, and R&D expenditure.

The short- and medium-term results showed that Mitacs-supported companies recorded positive increases in total revenues, sales, and labour productivity. By the third year after support, the Mitacs group exhibited growth rates of 9 percent for total revenue, 16 percent for total sales, and 11 percent for labour productivity.

In the long term, the analysis revealed that Mitacs-supported companies, on average, are hiring more employees (18 percent increase over seven years) and spending more on R&D over time (37 percent increase).

In contrast, for the control group, a declining trend is observed for both these indicators. The data also demonstrates that companies have a 6 percent higher survival rate seven years after participating in a Mitacs program than the control group over the same period.

These results highlight strategies adopted by enterprises that prove successful after participation in a Mitacs program. These strategies involve investing steadily in R&D, which generates higher sales and translates into higher productivity. As a result, Mitacs-supported companies boost revenue and create more employment than non-supported firms.

Through sound economic modelling and analysis, the outcomes represented in this study substantiate the alignment of Mitacs programs with the overarching goal of supporting Canada's innovation ecosystem and promoting increased economic growth.

5. References

Gertler, Paul J.; Martinez, Sebastian; Premand, Patrick; Rawlings, Laura B.; Vermeersch, Christel M. J. (2016). Impact Evaluation in Practice, Second Edition. Washington, DC: Inter-American Development Bank and World Bank. https://openknowledge.worldbank.org/handle/10986/25030 License: CC BY 3.0 IGO.

Guo, S., & Fraser, M. W. (2015). Propensity score analysis: Statistical methods and applications. SAGE PUBLICATIONS INC

Rubin, Donald B. and Thomas, Neal. (1996). Matching Using Estimated Propensity Scores: Relating Theory to Practice. Biometrics, Vol. 52, No. 1 (Mar. 1996), pp. 249-264.

The Conference Board of Canada. (2013). Labour Productivity Growth. How Canada Performs. Retrieved August 9, 2024, from Labour Productivity Growth - The Conference Board of Canada

6. Appendix

6.1 Research Methodology

The studies look at the economic performance of companies that participated in Mitacs programs between 2009 and 2018 (over 3,000 companies were successfully matched to detailed business records held by Statistics Canada) and compared those with the outcomes of a group of similar companies that did not participate in Mitacs programs during this period.

These two groups have similar characteristics in terms of revenue, employment, sales, assets, industry, and province. Matching was performed using coarsened exact matching (CEM) and propensity score matching (PSM) for the comparative analysis. Statistics Canada used statistical regressions and difference-in-differences analysis to test a series of hypotheses that assess Mitacs influence on the business performance of industry partners.

Statistics Canada, using their Business Register, tracked data of private sector small and medium enterprises who were partners in an Accelerate internship or Elevate fellowship between 2009 and 2018 (3,286 enterprises).

Mitacs industry partner data was matched to Statistics Canada's Linkable File Environment (LFE). LFE is a collection of linked data files that contain tax and survey data about enterprises. The LFE covers over two decades and is connected to Statistics Canada's Business Register, which has basic demographic information about all Canadian businesses. This linkage allows administrative data on LFE, such as tax information, to be used in the impact analysis of Mitacs programs.

Series of analytic datasets were produced and used by CSBP to produce custom-designed tables of non-confidential aggregate statistics for Mitacs. These tables describe various financial tax variables in aggregate form after receiving support in the program. Additionally, a control group of similar enterprises was tabulated. The control group was selected using a matched pairs analysis method based on propensity score matching (PSM). The enterprise demographic and financial variables came from LFE, and these variables were used in modelling and comparative analysis.

The objective of the comparisons was to assess the impact of the Mitacs programs on key financial performance variables. Financial performance variables included revenue, sales, the number of employees, salaries and wages, profitability, productivity, R&D expenditures, liabilities, and assets and these are all compared after some of these variables are used in the propensity score matching.

Comparative results from the PSM are shown through growth rates of performance variables after recipients received the Mitacs program benefits. For some variables, particularly, R&D expenditure, employment, and survival, a longer-term cohort analysis was performed to assess the performance of these variables over time in comparison to the control group of firms.

The propensity score selection of a control group allows comparison between similar enterprises. The relationship between various economic performance indicators has been established using statistical regressions, growth rate, and difference-in-differences analysis. Additionally, in certain cases, provincial and industry-specific analysis resulted in a small sample size given limited Mitacs participation, rendering the statistical significance of such results insignificant. After careful consideration and consultation with Statistics Canada, Mitacs has only reported statistically significant results.

6.2 Limitations of Methodology

The analysis conducted by Statistics Canada was very thorough and followed strict and systematic procedures. Statistics Canada experts are confident that they provided reliable statistical evidence to support the assessment of the impact of Mitacs on key business performance indicators. However, as pointed out in technical reports provided by Statistics Canada, the analyses present some limitations:

- **Missing data and sample attrition**
  Some Mitacs firms could not be matched with comparable non-Mitacs firms due to a problem of missing data over impact years. Various factors contributed to this problem. For instance, a significant portion of the records had missing values in key variables for panel data and could not be matched or used for the regression analyses.

- **Heterogeneity**
  Potential bias could have arisen because of the heterogeneity in the frequency of Mitacs assistance. Enterprises that received multiple instances of assistance within the first period of intervention were reduced to one, and subsequent records of intervent ions were removed from the dataset. This heterogeneity in the frequency of assistance could potentially bias estimates of the impact of Mitacs on business performance.

- **Estimation bias**
  Procedures were undertaken by Statistics Canada to match the control group and Mitacs group through parallel trends assumption using revenue and number of employees. The other variables and the number of employees were used as covariates in the propensity score matching. NAICS was also used in matching.

  Even when trends are equal before the start of the intervention, bias in the difference-in -differences estimation may still appear and go undetected. That happens because the difference-in-differences approach attributes to the intervention any differences in trends between the treatment and comparison groups that occur from the time intervention begins. If any other factors are present that affect the difference in trends between the two groups and they are not accounted for in multi-variate regression, the estimation will be invalid or biased.

6.3 Detailed Results in Sales and Revenue for Mitacs-Supported Companies

Years after support	Sales	Revenue
1	$9.7 BN	$12.5 BN
2	$11.2 BN	$12.7 BN
3	$11.3 BN	$13.6 BN