

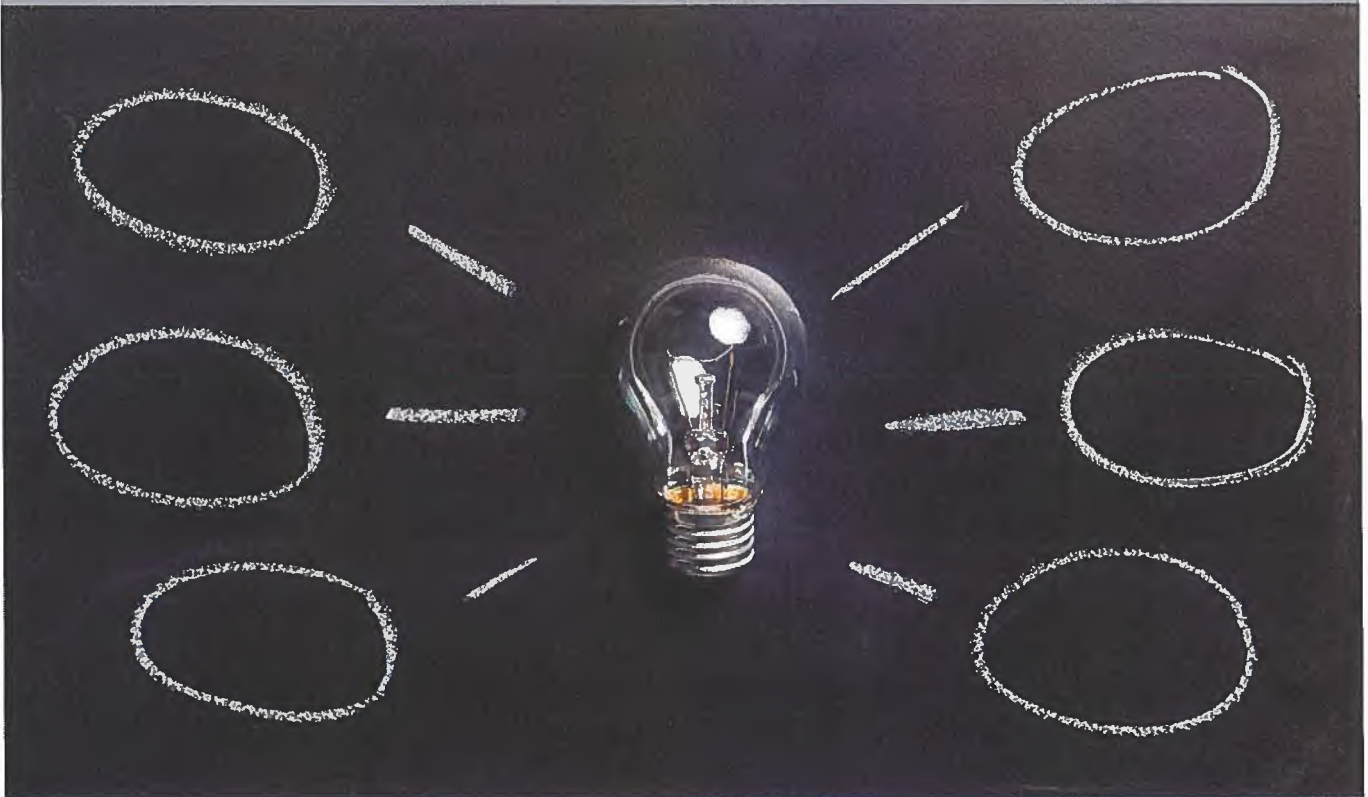


Innovation, Science and
Economic Development Canada

Innovation, Sciences et
Développement économique Canada

INSIGHTS

2018, VOLUME 1 // STRATEGY AND INNOVATION POLICY SECTOR



CHIEF SCIENCE ADVISOR

RESULTS AND DELIVERY

SUPPORT TO BUSINESS INNOVATION

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RECENT DEVELOPMENTS OF INTEREST TO ISED

THE BANK OF CANADA RELEASED ITS LATEST MONETARY POLICY REPORT

- ❖ The July 2018 edition of the Bank of Canada's *Monetary Policy Report* expects global economic growth to moderate slightly from 3.8% this year to 3.5% in 2019 and 3.4% the following year.
- ❖ The global outlook faces considerable risk in the form of escalating trade tensions between the US and some of its largest trading partners, which has heightened concerns about a more pronounced shift away from a multi-lateral, rules-based trading system.
- ❖ The US economy is showing considerable strength in 2018, with real GDP growth forecast at 3.1%, as results for the first half of the year came in stronger than anticipated.
- ❖ In China, economic growth is projected to moderate from 6.5% this year to 6.0% by 2020, as the economy continues its gradual transition towards a greater focus on consumers and the service sector as the main drivers of growth.
- ❖ Canadian real GDP growth is expected to moderate from the 3.0% realized last year to average around 2.0% during 2018 – 2020, as the composition of growth appears to be shifting to a scenario where a smaller contribution is expected from household spending, whereas exports and business investment are likely to become more significant.
- ❖ Among the risks to its outlook, the Bank of Canada identifies the ongoing shift toward protectionist global trade policies as an important source of uncertainty that could adversely affect the competitiveness of Canada's economy.

THE OECD PUBLISHED ITS *ECONOMIC SURVEY OF CANADA*

- ❖ Canada attained high scores on most dimensions of the OECD's Better Life Index, as well-being is high in the country, supported by good health, strong education and skills, and a high degree of environmental quality.
- ❖ Canada's economy has recovered from the recent period of weakness attributed to the 2014 energy price slump. In particular, the completion of structural adjustments helped commodity-producing industries rebound and begin contributing to economic growth in mid-2016.
- ❖ Employment growth has been strong, leading the unemployment rate to match record lows for extended periods of time; however, labour market strength has been slow to translate into wage growth.

-
- ❖ Economic growth is forecast to slow from the 3.0% reported in 2017 to a more sustainable pace in the 2%-range over the next two years, as private consumption slows in response to the removal of some monetary policy stimulus, the appreciation of house prices eases, and job growth moderates. This aligns with the views expressed by OECD's Secretary General, who suggested that the global economy has yet to attain "strong, self-sustaining growth", as "the current recovery is still being supported by very accommodative monetary policy, and increasingly by fiscal easing".
 - ❖ Canada faces longer-term structural challenges associated with an ageing population and weak productivity growth. The competitiveness of Canada's economy could also be undermined by US trade policy uncertainty, which could reduce business investment and exports, while US tax reforms may dampen the relative attractiveness of investing in Canada.

THE BROOKINGS INSTITUTE AND MARTIN PROSPERITY INSTITUTE PUBLISHED A REPORT ENTITLED *CANADA'S ADVANCED INDUSTRIES: A PATH TO PROSPERITY*

- ❖ Despite its many strengths, Canada's economy faces serious structural challenges including an ageing population and slowing output growth.
- ❖ In response, Canada needs to focus on expanding a particularly high-value subset of advanced industries that conduct large amounts of R&D, and employ a disproportionate share of science, technology, engineering, and mathematics (STEM) workers.
- ❖ Advanced industries only accounted for around 11% of national employment in 2015; however, this relatively small share of jobs generated 17% of Canada's GDP, 61% of national exports and 78% of R&D.
- ❖ The positive impacts of these industries are disseminated across the rest of the economy because advanced industries tend to have long supply chains, and they often seed new technologies and innovations that help drive productivity growth.
- ❖ Although the advanced industry sector in Canada is well-positioned to compete for global market share, it lags its US counterpart in terms of productivity growth.

A New Approach to Support Business Innovation: a Summary of Findings from the Horizontal Review of Business Innovation Programs

HIGHLIGHTS

- To deliver on its Budget 2017 commitment to simplify federal support for innovation, the government established Innovation Canada as a new platform within Innovation Science and Economic Development Canada (ISED) that seeks to coordinate and simplify business innovation programming.
- Key to this effort was the launch of the Horizontal Review of Business Innovation programs, which focused on establishing a more strategic, client-centric, and better coordinated business innovation support system.
- Budget 2018 delivered a new framework for supporting innovation by consolidating programs, increasing focus on enhancing support for high-growth firms, and by committing \$2.6 billion in extra funding for business innovation.

BACKGROUND

Each year, over 70,000 new firms enter the Canadian economy; however, few of them mature into the high-growth firms that are important for net new job creation.¹ Canada's Innovation and Skills Plan (ISP), announced in Budget 2017, sets out to better support these firms with a multi-faceted investment plan focused on ensuring that Canadian innovators have access to the talent, technologies and capital they need to scale-up.

¹ Herman, D (2013). *Employment, Innovation and Growth - Analyzing the Health of Canada's Economic Ecosystem*. DEEP Centre: <http://deepcentre.com/wordpress/wp-content/uploads/2013/04/DEEP-Centre-Employment-Innovation-Growth-April-2013.pdf>

In addition, the ISP also seeks to simplify government support for innovation, and ensure that support programs are client-focused. The need for program simplification was one of the top issues identified by stakeholders in the extensive consultation process led by Innovation, Science and Economic Development (ISED) Canada prior to the creation of the ISP.

To deliver on the commitment of program simplification, the Government created Innovation Canada, a new platform within ISED that seeks to coordinate and simplify business innovation programming. Key to this effort was the launch of the Horizontal Review of Business Innovation programs, which was formally operationalized by the Treasury Board Secretariat (TBS), but strongly supported by the ISED Portfolio through the leadership of Innovation Canada. The review focused on establishing a more strategic, client-centric, and better coordinated business innovation support system.

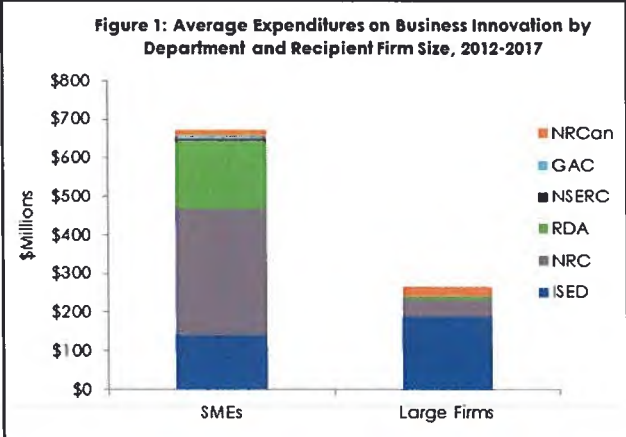
Innovation programs under review consisted of those providing funding or services to support the implementation of a new product, process, marketing method, or organizational method within a business or organization. In total, the review identified 92 programs in over 20 departments and agencies that supported businesses at all stages of technology-readiness, either through direct financing in the form of grants and contributions, and/or through technological or business development services.² Programs that deliver support to businesses through intermediary organizations were also included.

This collection of programs included more than 64 that were delivered via the ISED Portfolio, notably through Regional Development Agencies (RDAs), the National Research Council of Canada (NRC), Sustainable Development Technology Canada (SDTC), the Canadian Space Agency, and the Granting Councils. These programs represent roughly 80% of total direct spending on business innovation by the Federal Government.

KEY FINDINGS

During the period of June 2017 to January 2018, ISED and TBS worked closely to assess the findings from the Review and finalize the recommendations that were put forward for consideration in the development of Budget 2018. The following is a short summary of key findings that underlie the recommendations, as well as the ultimate changes to programs and policies noted in Budget 2018:

- As companies grow, the availability of funding diminishes.** Innovation programs have largely focused on supporting small- and medium-sized companies (SMEs). Prior to the launch of the ISP, support for large firms was primarily provided through ISED programs and directed targeting exclusively the aerospace, defence, and automotive sectors³ (Figure 1).



² The inventory of Federal innovation programs assessed in the review can be found at: <https://www.canada.ca/en/treasury-board-secretariat/corporate/reports/inventory-federal-business-innovation-clean-technology-programs.html>.

³ The consolidation of these programs into a fund open to all sectors (the Strategic Innovation Fund) has provided a new funding mechanism for the delivery of enhanced support to larger, growing firms.

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- **Services that support market expansion mainly target firms that are ready to export.** The Trade Commissioner Service (TCS) helps firms expand internationally; however, these services have largely targeted firms that are export ready. Small firms in emerging high-technology sectors, for example, also require support since they tend to rely on larger foreign markets to obtain their first customers and further develop their technologies and products.
 - **Support for regional innovation ecosystems needs to be simplified.** Innovation programs deliver a large amount of support through intermediary organizations. These organizations typically seek funding through a number of different departments and agencies, which creates inefficiencies on account of multiple reporting requirements.
 - **More support is needed for international innovation activities.** Innovation programs offer support for two types of international innovation activities: bilateral collaborative R&D projects, and international business development (including travel, trade fairs, market research, and legal fees associated with exporting). A better coordination of support for these two international activities could help high-growth firms take advantage of international growth opportunities. For instance, support for international R&D could allow firms in the early stages of product development to establish new market linkages, while support for international business development might build on these connections to drive international expansion.
 - **Support for national innovation networks needs to be simplified.** A number of programs provide funding to national innovation networks, centres, or hubs that, in turn, facilitate the commercialization of academic research, de-risk private-sector investment in R&D, and/or help generate investment in high-growth firms. A simplified mechanism for supporting these national-level organizations would clarify where stakeholders should seek funding, and ensure that Government investment is focused on the highest impact initiatives.

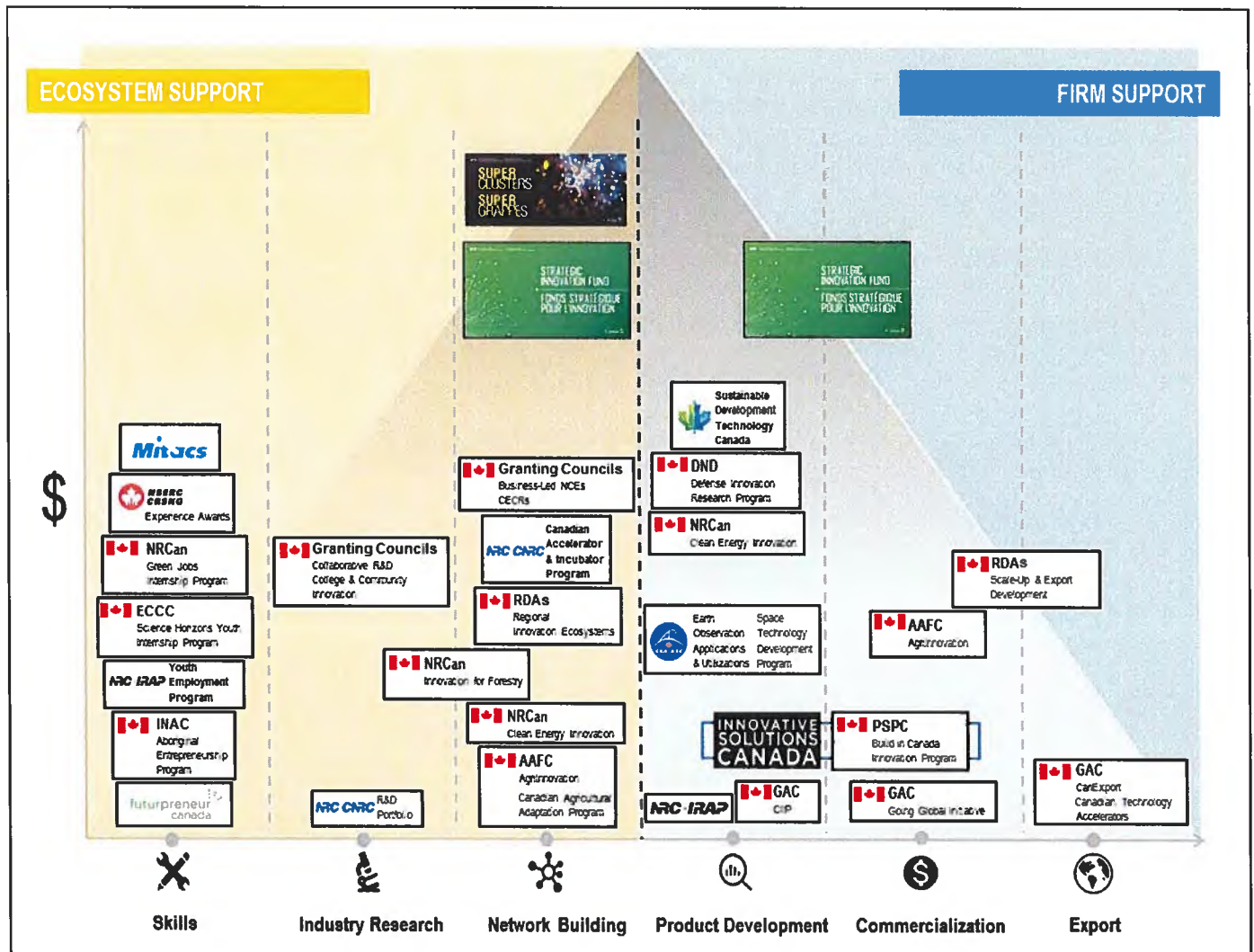
A COORDINATED, SIMPLIFIED SUITE OF INNOVATION PROGRAMS

Regional and sector-specific programs were seen as operating in isolation, and the funding available for investment in growing firms was limited. As a first step to improve this situation, ambitious new initiatives were introduced as part of the ISP to establish a new framework for building a coherent system of innovation support. Specifically, ISP initiatives like the Strategic Innovation Fund and the Innovation Superclusters Initiative have established a new continuum of innovation support by providing large-scale support for innovative, high-potential firms (**Figure 2**).

By embracing new models of collaboration across departments and agencies, programs that offer smaller-scale investments to support a large number of businesses now provide a strong foundation of support to increase the impact of large-scale investments. Creating a business innovation support system that strategically targets firms at each stage in their growth paths requires ongoing improvements to data and information sharing across government, similar to the system implemented with the launch of the Accelerated Growth Service within Innovation Canada. To ensure that businesses are able to access the programs that best address their specific needs, Innovation Canada has launched a new online platform that allows businesses to find appropriate funding or suitable services.⁴

⁴ The Innovation Canada web platform can be found here: <http://innovation.canada.ca/>

Figure 2: An Illustration of Programs Supporting Innovation. Data collected in the review has allowed programs to be categorized by recipient type, stage of innovation supported, and level of investment provided. Programs on the right side of the pyramid offer direct support to firms and are arranged by stage of technology development. Programs on the left side provide indirect support to firms by supporting innovation ecosystems. Programs are arranged vertically by the level of investment offered. According to this framework, programs at the bottom of the pyramid provide a key foundation of support that will improve the impact of large-scale investments through the Strategic Innovation Fund and Innovation Superclusters Initiative.



The Horizontal Review played a prominent role in the development of some of the program and policy initiatives announced in Budget 2018, which included the proposed consolidation of programs by two-thirds (from 92 to 35), an increased focus on enhancing support for high-growth firms, and the commitment of an extra \$2.6 billion in funding for business innovation. In particular, the consolidation of programs announced in Budget 2018 established four core platforms in the innovation system to streamline and enhance support to businesses at the R&D-to-commercialization stages of technology development, and to better support high-growth firms. The four core platforms are the IRAP, the TCS, the RDAs, and the Strategic Innovation Fund (SIF), and each of them supports a particular stage of technology development and growth (Figure 3):

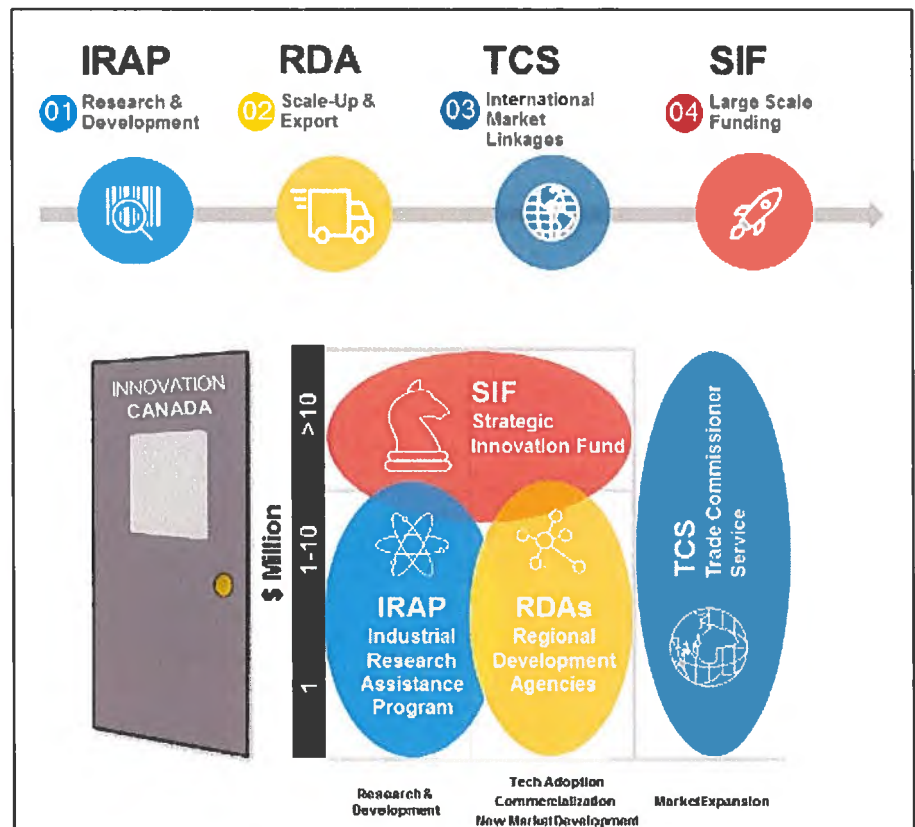
Platform 1: IRAP - Research and Development. IRAP funding and services will be refocused on R&D projects requiring up to \$10 million in funding. Increasing the funding threshold will better support SMEs in capital-intensive sectors such as life sciences, health technology, and clean technology.

Platform 2: RDA - Scale-up and market expansion. The RDAs will enhance the impact of the IRAP and TCS programs by funding new technology adoption, commercialization, and market expansion. Additionally, close collaboration between the RDAs and the TCS will better support the growth of Canadian goods and services. The RDAs will also become the main platform for funding regional innovation ecosystems (e.g., regional accelerators, incubators, innovation centres, and networks).

Platform 3: TCS - International market development. The TCS will become a key platform for supporting international business development and market expansion. Close collaboration between IRAP, the RDAs, and the TCS in the delivery of support to SMEs in emerging technology areas will enable these firms to grow by establishing linkages to international markets.

Platform 4: SIF - Large-scale, transformative initiatives. SIF support will be focused on high-impact investments over \$10 million in high-potential firms. It will also provide funding for large-scale, business-led, national networks, on a competitive basis, and provide a mechanism to facilitate the growth of new clusters in emerging technology areas.

Figure 3: The Four Innovation Support Platforms. Budget 2018 established four core platforms for supporting innovation to target different stages of technology development.



IMPLICATIONS FOR ISED

These reforms to business innovation programming have led to the creation of a simplified suite of programs that will allow the Government to mitigate some of the uncertainty associated with business investment in R&D, better support the growth of innovative firms that are expanding globally and investing in job creation, and help grow the value of Canadian goods and services. Furthermore, by establishing Innovation Canada as the single window through which to obtain enhanced access to government support, businesses will be able to better navigate the potential funding sources available to them. Improved access to innovation support, combined with a more effective program delivery strategy, will allow the government to meet the targets of the ISP and better position Canada as a globally competitive innovation economy.

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Results and Delivery at ISED

HIGHLIGHTS

- Budget 2016 introduced a new Results and Delivery approach to ensure that the government delivers on its commitments, and makes evidence-based decisions anchored in meaningful data and indicators.
- Subsequently, Budget 2017 introduced the Innovation and Skills Plan (ISP) in support of the government priority of *Jobs and Innovation*.
- The ISP Charter, which was developed by the Innovation Science and Economic Development Results and Delivery Unit (ISED-RDU), measures progress in three pillars: People and Skills; Research, Technology and Commercialization; and, Companies – Investment, Scale-Up and Clean Growth.
- The ISED-RDU provides support to all sectors within ISED and its portfolio to assist them with the implementation of the government's new results and delivery approach.

BACKGROUND

Budget 2016 introduced the new Results and Delivery approach, a government-wide initiative whereby "a new culture of measurement and reporting would be put in place, along with the tools to deliver on priorities, to align resources to programs and activities that deliver real value to Canadians and provide meaningful information to Canadians and Parliament." As part of this new approach, the government established a Cabinet Committee on Agenda, Results and Communication (ARC), which is chaired by the Prime Minister.

To lead this new Results Agenda, the government established the Privy Council Office Results and Delivery Unit to work with departments and agencies in monitoring and reporting on the implementation of related activities. It requested that all federal Deputies identify a Chief Results and Delivery Officer who would be responsible for creating a results and delivery culture within the federal public service in order to support this new government-wide initiative.

The new results and delivery approach has three components: (1) the formation of a delivery unit, (2) data collection for setting targets and trajectories, and (3) the establishment of routines.

It leverages and extends the principles of 'best-in-class' performance measurement to focus efforts on delivering key priorities.⁵

Specific departments were selected to lead in the development of a charter, which would outline the objectives, indicators, and delivery chains that would be used to measure progress in attaining government-established targets for each Government of Canada priority (see the Annex for the list of priorities). ISED was identified as the lead department for the Government's innovation agenda, in support of the whole of government priority of *Economic Growth through Innovation*.

⁵ Barber, M., Kihn, P., & Moffit, A. (2011, February). Deliverology: From idea to implementation. Retrieved March 12, 2018, from <https://www.mckinsey.com/industries/public-sector/our-insights/deliverology-from-idea-to-implementation>

INNOVATION AND SKILLS PLAN CHARTER

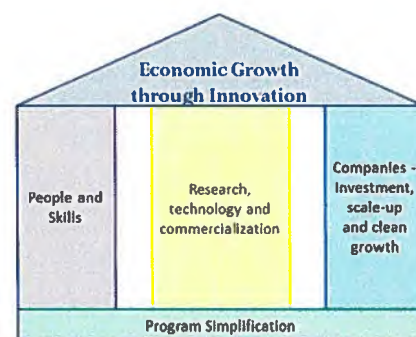
Budget 2017 introduced the government's Innovation and Skills Plan (ISP), which seeks to transform Canada into a world-leading innovation economy that creates jobs and grows the middle class. Following the budget announcement, extensive consultations were held, which resulted in the identification of three pillars for the ISP to report on the progress of the ISP themes, as well as the overall Government of Canada priority of economic growth through innovation:

- People and Skills
- Research, Technology and Commercialization
- Companies - Investment, Scale-up and Clean Growth

In addition to the three pillars, an overarching need for program simplification to better-support Canadian innovators was also highlighted in the consultations and its progress will also be reported in the ISP Charter.

Targets were established to identify opportunities for impact and pressure points across Canada's innovation system. Successfully achieving these targets will help maintain and improve living standards, expand access to higher education, and create opportunities for high-quality, high-wage and meaningful employment, thereby improving economic performance and strengthening the middle class in Canada. The next section will provide a short rationale for the pillars with examples of key targets identified.

Figure 1: Objective and Pillars of the ISP Charter



PEOPLE AND SKILLS

Everyone interacts with technology and science in some form on a daily basis, from automobiles to digital commerce and currencies. This is why the first pillar, People and Skills, focusses on developing the most skilled, talented, creative and diverse workforce in the world. In recognition of the need for specialists in technology fields in order to remain innovative and competitive, the government has set a goal to *increase the number of professional, science and tech-related jobs in the Canadian economy as a share of total employment to 40 percent (or by 2 million jobs) by 2025*. Similarly, to ensure that children possess the right skills to succeed in a digital economy, the government set a target to *make coding and other digital skills training available to students across Canada's K-12 system by 2025*.

The People and Skills pillar also recognizes that diversity can lead to a competitive advantage. Over the last 40 years, the rising number of women in the workforce has accounted for about one-third of the total growth in Canada's real gross domestic product (GDP) per capita⁶. In 2014, however, only 15.7%⁷ of all small and medium-sized enterprises were majority owned by women. The government seeks to improve this underrepresentation by setting a target to *double the number of small- and medium-sized enterprises (SMEs) that are majority owned by women to approximately 340,000 by 2025*.

⁶ Government of Canada. (2018). *Budget 2018*. <https://www.budget.gc.ca/2018/docs/plan/intro-en.html?wbdisable=true>

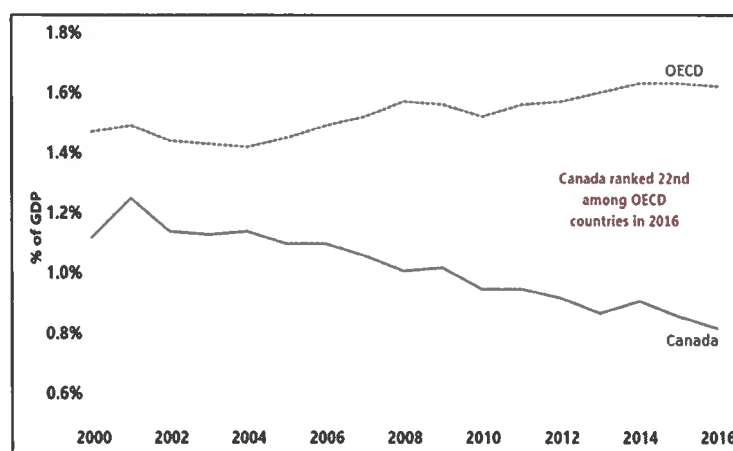
⁷ Statistics Canada, Survey on Financing and Growth of Small and Medium Enterprises, 2014.

RESEARCH, TECHNOLOGY AND COMMERCIALIZATION

Continuous efforts to foster research and collaboration will be required in order to provide innovative solutions that will contribute to making Canada a global innovation leader. As such, the objective of the second pillar, which focuses on Research, Technology and Commercialization, is to develop and adopt world-leading discoveries and innovation while promoting scientific excellence. The strategy to achieve this result will include federal investments to support and help *growing up to five world-leading superclusters by 2025*, which will in turn grow the economy, create quality jobs, and attract more investment.

Another key objective of this pillar is to *increase Canadian business expenditures in research and development (R&D)*, as a percentage of GDP, in order to keep pace with other developed countries. Figure 2 demonstrates that this is an area where Canada has consistently underperformed relative to its OECD counterparts. Focusing efforts on increasing such investments would help to increase productivity, and ultimately contribute to raising living standards.

Figure 2: Business Expenditures on R&D (BERD), as % of GDP



Source: OECD. [Main Science and Technology Indicators \(MSTI\)](#)

COMPANIES

The third pillar, which focuses on Companies, strives to build Canada's reputation as a world-leading destination for global companies, and as a place where Canadian entrepreneurs can grow SMEs into world-class enterprises, capable of competing and thriving in global markets. To this end, the government has set a target to *double the number of high-growth firms in Canada to 28,000 by 2025*, as these firms tend to create a large number of jobs and are more inclined to innovate and export⁸. If successful, this would contribute to the achievement of other key targets in the ISP Charter, for instance, to *increase Canada's exports of goods, services and clean technologies by 2025*. The government has also set a target to *double R&D investment by foreign controlled global firms in Canada by 2025* as part of this pillar, to help foster

⁸ Mason, Colin & Brown, Ross & Hart, Mark & Anyadike-Danes, Michael. (2015). High growth firms, jobs and peripheral regions: The case of Scotland. *Cambridge Journal of Regions, Economy and Society*. 8. 10.1093/cjres/rsu032.

innovative technologies and improve Canada's competitiveness in foreign markets. This is motivated by evidence showing that multinational corporations have the potential to serve as catalysts for further innovation and productivity⁹ gains.

More broadly, quantitative short-, medium- and long-term indicators were identified to track progress on ISP Charter targets. While some of these indicators support targets that have not been extensively measured in the past, others were selected to track the shifting nature of innovation and the way it is understood, both domestically and abroad.

ISED program performance data, as collected through Performance Information Profiles (PIPs), as well as other internal and external data sources, will be used to report against the ISP Charter. In some cases, it may be necessary to develop new datasets by combining multiple data sources or expanding upon those that are currently available in order to fully report on progress towards ISP Charter targets. Work to address these issues is ongoing within the ISED-RDU, in collaboration with others within the Department and ISED portfolio.

WHAT IT MEANS FOR ISED

While the ISED-RDU was first tasked with drafting the ISP Charter, which was ratified by Cabinet¹⁰ on August 22, 2017, it has three main areas of responsibility within ISED: **strategy and coordination**, **research and data**, and **reporting and results**.

- **Strategy and Coordination:** the ISED-RDU has an ongoing responsibility to provide leadership and guidance to all sectors within ISED and its portfolio, in addition to Ministers and Deputy Ministers, in implementing the new approach to results delivery. It also supports the implementation of the Results and Delivery agenda by tracking key programs and results, and presenting progress updates on ISP Charter priority areas at various Cabinet meetings and other government committees.
- **Research and Data:** the ISED-RDU, in collaboration with the Corporate Management Sector (CMS) and Audit and Evaluation Branch (AEB), assists program and policy officials in the development of targets, indicators, metrics and benchmarks for measuring and reporting on results in alignment with the ISP Charter, the Departmental Results Framework, and the Performance Information Profiles (PIPs). In addition, the RDU is coordinating and advising on the creation of an Integrated ISED Data Strategy, a coordinated and cohesive departmental approach that includes building a space where data from the various programs within the ISED portfolio could be brought together and linked so as to increase business intelligence and inform results and delivery objectives. The Integrated ISED Data Strategy will also look to leverage new and existing ways to manage data efficiently, and explore the use of modern data analysis and visualization tools.
- **Reporting and Results:** lastly, the ISED-RDU is responsible for ongoing reporting on government-wide priorities to the general public. Specifically, broader government priorities tied to the mandate commitments of specific Ministers are communicated through the [Mandate Letter Tracker](#), while the [ISP Results Portal](#) presents developments that are specific to the ISP Charter targets. The ISED-RDU also plays a critical role in supporting the delivery of portfolio commitments by providing advice and guidance on results and delivery components in Budget Proposals and Memoranda to Cabinet and, in more detail, during the Treasury Board Submissions phase, where data strategies are developed for indicators set out in these documents.

⁹ Ben Hamida, L. & Piscitello, L. (2013). The impact of foreign R&D activities on the MNC's performance at home: evidence from the case of Swiss manufacturing firms. *Revue d'économie industrielle*, no 143,(3), 11-33. <https://www.cairn.info/revue-revue-d-economie-industrielle-2013-3-page-11.htm>

Connect with the ISED-RDU

Interested in finding out more about the RDU and the ISP Charter, and how they might impact your work? Contact the team at ic.resultsanddeliveryunit-unitedelivraisondesresultats.ic@canada.ca.

If you are a data analyst or someone interested in data science and analytics within the ISED portfolio, the ISED-RDU is also the lead for the ISED Data Scientist Community of Practice (CoP). This group meets every alternate Monday to share information and discuss ongoing projects, challenges and best practices. More information can be found on the CoP's [wiki page](#)

ANNEX: 12 GOVERNMENT-WIDE PRIORITIES BY THEME

Inclusive and Sustainable Economic Growth	Social Inclusion and Diversity	Open and Transparent Government	Safer and Stronger Canada at Home and in the World
<ul style="list-style-type: none">• Strong Middle Class• Jobs and Innovation• Exports and Investment• Environment and Climate Change• Sustainable Infrastructure• Healthy Canadians	<ul style="list-style-type: none">• Diverse and Inclusive Canada• Indigenous Peoples	<ul style="list-style-type: none">• Government Services and Operations• Fair and Open Government	<ul style="list-style-type: none">• Canada in the World• Safety and Security

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The Role of Canada's New Chief Science Advisor

HIGHLIGHTS

- In 2017, the federal government established the position of Chief Science Advisor to strengthen Canadian science and improve the incorporation of scientific analyses into government decision-making processes.
- Subsequently, Dr. Mona Nemer was appointed as Canada's first Chief Science Advisor for a three-year term.
- The Chief Science Advisor's mandate is to advise the Prime Minister, the Minister of Science, and Cabinet on issues pertaining to science, and to bring clarity to government processes and policies that support and promote Canadian science.

MEET CANADA'S NEW CHIEF SCIENCE ADVISOR

In September 2017, Prime Minister Justin Trudeau and Minister of Science Kirsty Duncan introduced Canada's new top scientist to Canadians. The impetus for this decision dates back to 2015, when science became one of the focal points of the federal election. In response, the Liberal Party proposed the creation of a chief science advisor as one of their campaign promises, which was tasked to the Minister of Science in her mandate letter. The establishment of this position was not only hailed by domestic and international media and the scientific community^{11, 12, 13}, it also received a warm welcome from Canadians who sent nearly 1,000 letters and notes of support.



September 26, 2017: announcement of Canada's new Chief Science Advisor

Dr. Mona Nemer, an eminent cardiovascular researcher, was selected as Canada's first

Chief Science Advisor. To date, her research, which focuses on the mechanisms

"Dr. Nemer brings a wealth of expertise to the role. Her advice will be invaluable and inform decisions made at the highest levels. I look forward to working with her to promote a culture of scientific excellence in Canada."
— The Rt. Hon. Justin Trudeau, Prime Minister of Canada

¹¹ Chief Science Advisor's Appointment – National Observer Coverage: <https://www.nationalobserver.com/2017/09/26/news/trudeau-government-names-mona-nemer-chief-scientist>

¹² Chief Science Advisor's Appointment – Globe and Mail Coverage: <https://www.theglobeandmail.com/news/national/mona-nemer-named-canadas-new-science-advisor/article36401427/>

¹³ Chief Science Advisor's Appointment – Science Magazine Coverage: <http://www.sciencemag.org/news/2017/09/canada-names-new-chief-science-adviser>

of heart failure and congenital heart diseases, has resulted in over 200 publications. Dr. Nemer has also contributed to the science landscape by training over 100 students from various countries.

Before being appointed Chief Science Advisor, Dr. Nemer was a Professor at the University of Ottawa, where she served as Vice-President of Research and Director of the Molecular Genetics and Cardiac Regeneration Laboratory. She is a member of the Order of Canada, a fellow of the Academy of Sciences of the Royal Society of Canada, a fellow of the American Association for the Advancement of Science, a member of the American Academy of Arts and Sciences, a knight of the Ordre national du Québec, and a knight of the French Republic's Ordre national du Mérite. She has also been awarded honorary doctorates from universities in France and Finland.

As Chief Science Advisor, Dr. Nemer is tasked with helping to ensure that government science is fully available to the public, scientists are able to speak freely about their work, and relevant scientific analyses are considered when the government makes decisions. Her other key functions include assessing and recommending ways to improve the existing science advisory capacity within the federal government, provide better support for quality federal science, and raise the profile of Canadian science at home and abroad in order to increase science literacy and promote scientific collaboration.¹⁴

"A respect for science and for Canada's remarkable scientists is a core value for our government... Canada's new Chief Science Advisor [...] will provide us with the evidence we need to make decisions about what matters most to Canadians: their health and safety, their families and communities, their jobs, environment and future prosperity."
— *The Honourable Kirsty Duncan, Minister of Science*

Dr. Nemer accepted the position of Chief Science Advisor because of the opportunity it provides to advance Canadian science. However, her ultimate measure of success will be the continuation of the position after her term is complete. It is vital that the office becomes widely regarded as relevant and indispensable to the work of the federal government, so that another Chief Science Advisor is appointed after her.

INITIAL ACTIVITIES OF THE CHIEF SCIENCE ADVISOR

Much of Dr. Nemer's first few months in office were spent extensively engaging with the research and scientific community (within and outside of government), visiting government research facilities, and establishing working relationships with Cabinet ministers and deputy ministers. She also met with academic and civil society groups representing institutions and organizations across the country, as well as her territorial and provincial counterparts, and international colleagues within the science advisory systems of the United States, France, the United Kingdom, New Zealand, and Australia.

Her activities, observations and work priorities¹⁵ are described in the 100-day letter available on her website. Among them was the development of whole-of-government scientific integrity guidelines, which Dr. Nemer, together with the Treasury Board Secretariat and the Professional Institute of the Public Service, has already completed in record time. Other priorities include:

- Recommending guidelines to strengthen the communication framework for government scientists to ensure that they can freely communicate their research.
- Assisting in the development of an open science framework to facilitate public access to federal government science.



Minister Justin Trudeau and Dr. Mona Nemer on April 3rd, 2018

¹⁴ [Chief Science Advisor's Mandate; https://pm.gc.ca/eng/news/2017/09/26/chief-science-advisor](https://pm.gc.ca/eng/news/2017/09/26/chief-science-advisor)

¹⁵ [Chief Science Advisor's 100-day letter; http://www.ic.gc.ca/eic/site/052.nsf/eng/00007.html](http://www.ic.gc.ca/eic/site/052.nsf/eng/00007.html)

- Reviewing and recommending relevant improvements to existing science advisory mechanisms and processes used in government decision-making.
- Providing advice on the governance and management of major science infrastructure.
- Supporting the government's Impact Assessment process.

A COLLABORATIVE EFFORT

The Office of the Chief Science Advisor is an independent office working collaboratively with departments across the federal government. Even though the position was created less than one year ago, public servants from all levels of the federal government have been keen on engaging Dr. Nemer and her office on files of mutual interest.

There has been an appetite for science advice from both science-based departments and departments where science has not been historically prominent. For example, in February, the Science and Fisheries ministers asked Dr. Nemer to lead a panel assessment on the role of science in decision-making processes within aquaculture. The panel's report is scheduled for public release in the fall of 2018.

You can follow the Chief Science Advisor on social media:

Twitter: @ChiefSciCan and @SciChefCan

Instagram: monanemerscience



The Chief Science Advisor and staff, six months after the office was established

Going forward, Dr. Nemer intends to carry out her mandate to the fullest extent possible in an open and transparent manner. She believes that scientists have an important role to play, both within and outside of the lab, and is very optimistic that working together with the science community, decision makers, and policy specialists will allow Canadian science to continue to flourish while Canadians harness its full benefits.

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Direct and Indirect Support to Business R&D

HIGHLIGHTS

- Canada utilizes both indirect (e.g., tax credits) and direct (e.g., grants) support mechanisms to encourage firms to engage in research and development (R&D); however, the ideal mix of these two forms of support remains unclear.
- Findings from a recent study¹⁶ indicate that, given equal financial support, firms using both tax credits and grants outperform their counterparts that use tax credits alone, both in terms of growth and innovation measures.
- The report supports a stepwise approach to increase the level of direct support available to firms, aligned with recent policy development (e.g., the Innovation and Skills Plan).

BACKGROUND

Governments widely use public incentives to encourage firms to perform more research and development (R&D) by providing support in two forms: direct support (e.g. subsidies or grants) and indirect support (e.g. tax breaks). Although both types of support provide incentives for firms to undertake R&D, their potential applications differ in important ways. Direct support can target strategic fields of research, and could be more effective for young firms in need of immediate financing. By contrast, indirect support is typically less expensive to implement, and is expected to help firms increasing the scope and scale of their R&D projects.

Historically, Canada has relied more on indirect incentives than most other G7 countries (Figure 1); it is provided predominately through the Scientific Research and Experimental Development (SR&ED) tax credit. Most non-capital expenditures on R&D are eligible for the SR&ED tax incentive; therefore, the vast majority of firms receiving direct support in Canada are also recipients of indirect support in the form of SR&ED tax credits. This essentially means that nearly all R&D performing firms in Canada fall into one of two categories: those receiving both direct and indirect support (i.e. dual support firms), and those that receive only indirect support.

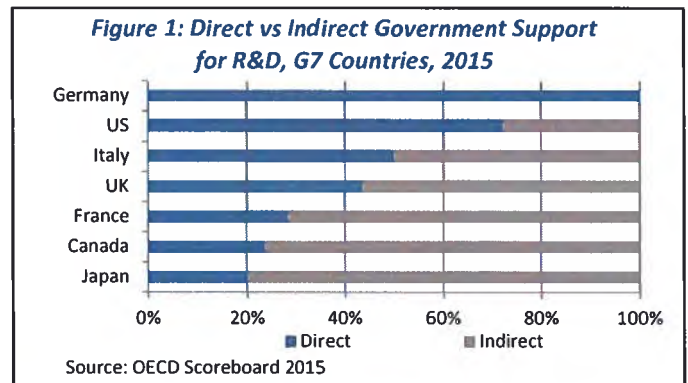
Box 1: Examples of Support Programs in Canada

<i>Indirect Support</i>	<i>Direct Support</i>
<ul style="list-style-type: none">• Scientific Research and Experimental Development Tax Incentive	<ul style="list-style-type: none">• Sustainable Development Technology Canada• Industrial Research Assistance Program

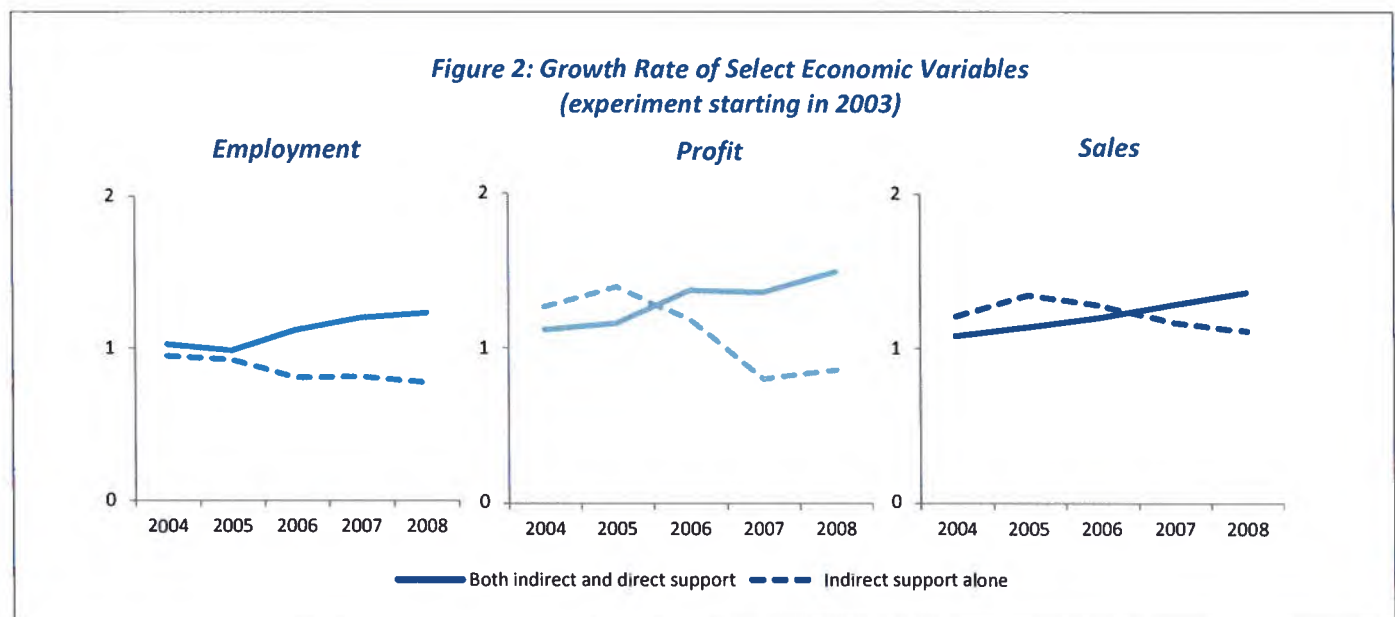
¹⁶ Bérubé, C., and P. Therrien. (2017). *Direct and Indirect Support to Business R&D*.

Existing evidence on public support for R&D suggests that both forms of support are effective in terms of improving firm outcomes. However, there is limited evidence as to whether one form of support is more effective than the other, leaving the ideal mix of direct and indirect incentives an open question. This article summarizes the findings of Bérubé and Therrien (2017) as it compares the growth and R&D performances of firms receiving both direct and indirect support (dual support firms) to those receiving a similar amount of funding from indirect support alone.¹⁷

ECONOMIC GROWTH COMPARISON



The study reveals that, for the same total amount of financial support, dual support firms outperformed their counterparts that only obtained tax credits in terms of employment, sales, and profit growth in the years following the financial support. Specifically, with respect to employment, dual support firms registered higher growth than firms that received only indirect support immediately in the following year (2004). Meanwhile, dual support firms began outpacing their counterparts in terms of profit growth after two years (2005), and in terms of sales growth in the year after that (2006) (Figure 2). Figure 2 shows experiments starting in 2003 with results after one year (2004), three years (2006), and five years (2007). Similar results are found with experiments starting in 2004, 2005, 2006, and 2007.

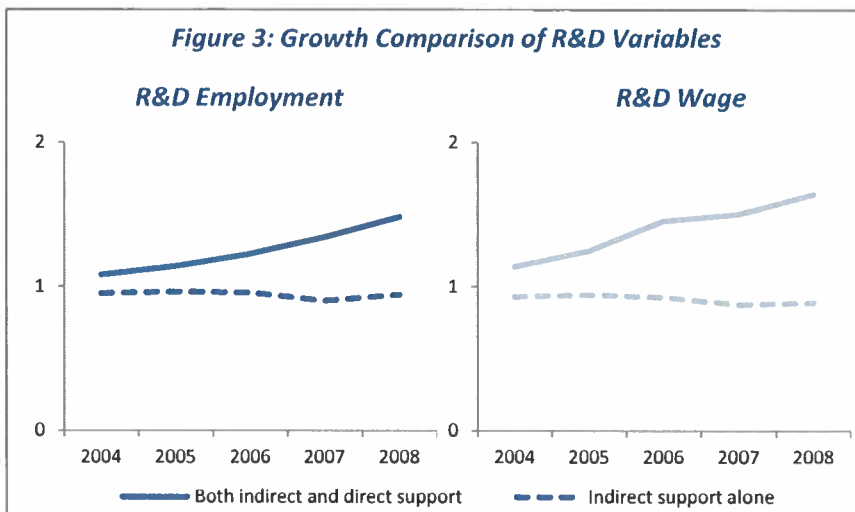


The impacts of these support mechanisms on R&D performance are also measured in terms of complementary inputs (R&D employment and associated wages). In both cases, dual support firms realized stronger growth than those firms that received only indirect support in the first year following the provision of support (2004) (Figure 3). Subsequently, R&D employment and wage growth increased steadily over the 2004 – 2008 period at dual support firms, whereas firms receiving

¹⁷ See the Annex for a quick overview of the methodology.

indirect support alone saw no improvement in either indicator. This resulted in the emergence of a growth rate premium, or gap, in favour of dual support firms.

Note that the strong increase in R&D wages at dual support firms may be a partial reflection of a potential drawback of R&D support. Although direct support is intended to increase the volume of R&D investment, it is unclear whether the positive wage growth is an indication of an actual improvement in the quality of R&D talent within the firm. For example, the direct support could have been used to simply increase the wages of existing R&D personnel whose abilities may not have improved, as opposed to directing these new funds towards the hiring of more skilled workers.

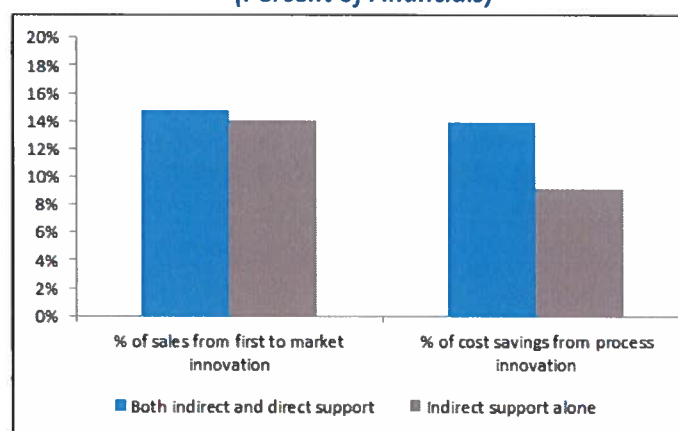


INNOVATION PERFORMANCE COMPARISON

For the sub-sample of R&D performing firms included in Innovation surveys, it was possible to test whether the results found on economic performance also stand for innovation performance. Indeed, dual support firms are more likely to be the first to introduce a product innovation in their market, according to the Survey of Innovation and Business Strategies 2009 (Figure 4).

In terms of financial variables, dual support firms enjoyed a higher level of cost savings from process innovations relative to firms receiving only indirect support. However, there was no statistical difference between the two groups for the share of innovative sales from first-to-market innovations (Figure 4, Panel 2). Given that the latter can be seen as a commercialization measure, it might be possible that a longer time frame is needed to see a significant difference between the two groups.

Figure 4: Growth Comparison of Innovation Performance (Percent of Financials)



IMPLICATIONS FOR ISED

The results presented in this article show that, after controlling for the amount of federal R&D support received, firms benefitting from both direct support and tax incentives performed better in terms of employment, sales and R&D expenditure growth than firms claiming only tax credits. Our results also show that firms benefitting from both direct support and tax incentives had higher innovative performance than those claiming only tax incentives. These findings might be interpreted in different ways; on one side, grant programs might provide firms with additional support through expert technical or management advice, which has been shown to increase firm performance. Direct R&D support could also

send a positive signal to external funders by reducing the information asymmetry and help the firm get additional external funding from financial institutions, including venture capital funds. Another possible interpretation of the results could be related to low availability of direct support funding where program managers were able to choose high-quality, novel projects with high commercialization potential. Note finally that dual support firms were simply better-managed, making them more likely to succeed even in the absence of support.

Regardless of how the data are interpreted, the results demonstrate that there are significant differences in how firms perform depending on whether they receive both direct and indirect support for R&D, or tax-credits alone. These findings support gradual increases in the level of direct R&D incentives offered, with continued monitoring to ensure that the growth premium associated with dual support indeed continues. This is well aligned with the Government of Canada Innovation and Skill Plan focusing on direct support to innovation with a special emphasis on continuous evaluation of program and policy impacts.

ANNEX

This research leverages several Statistics Canada surveys and administrative databases. Specifically, the Research and Development in Canadian Industry (RDCI) database is used to identify the amount of support received by firms via direct grants, as well as their eligibility for SR&ED tax credits. These data were combined with information on firm characteristics obtained from the Business Registry (BR), firm financials from the General Index of Financial Information (GIFI), and innovation outcomes from the 2009 Survey of Innovation and Business Strategies (SIBS) and the 2005 Survey of Innovation (SOI).

Using the data to simply compare firms receiving both direct and indirect support to those receiving only indirect support could be misleading, as these firm groups may differ in potentially important ways. In particular, firms receiving both forms of support tend to receive more overall funding, have more employees, and operate in more R&D intensive industries. To control for these and other differences, the analysis establishes treatment (indirect + direct support) and control (indirect only) groups that are otherwise similar across several dimensions including employment, region, industry, sales, profits, R&D, and overall government support to R&D. After creating well-matched treatment and control groups, the analysis assesses whether there are statistical differences in economic growth and innovation measures following the provision of support.

REFERENCES

Bérubé, C., and P. Therrien. (2017). *Direct and Indirect Support to Business R&D*.

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INSIGHTS DATA TABLE

Monthly Economic Indicators							
		Month-over-month growth (at monthly rates)			Q-o-q growth	Year-over-year growth	
	Reference Period	Latest month	Prev. month	2 Months before	2018Q2	2017	2016
Mfg sales (current \$)	Jun '18	1.1	1.5	-1.0	2.5	6.1	1.2
Mfg sales (constant \$)	Jun '18	0.7	0.9	-1.7	0.4	3.7	1.5
Retail trade (current \$)	Jun '18	-0.2	2.2	-1.0	1.0	7.1	5.2
Retail trade (chained \$)	Jun '18	-0.3	2.2	-1.2	0.9	5.7	0.4
Real GDP	Jun '18	0.0	0.5	0.1	0.8	3.3	1.4
-Services	Jun '18	0.1	0.5	0.1	0.7	2.7	2.2
-Manufacturing	Jun '18	0.3	-0.4	0.2	0.3	3.1	0.6
Exports (bop) (current \$)	Jun '18	4.1	-0.3	1.9	6.0	5.4	-0.7
Imports (bop) (current \$)	Jun '18	-0.2	2.0	-3.0	3.2	4.8	-0.2
All-items CPI	Jul '18	0.5	0.1	0.1	0.8	1.6	1.4
All-items CPI excluding food and energy	Jul '18	0.5	0.2	0.1	0.5	1.6	1.9
LFS employment (Δ in 000s)	Aug '18	-51.6	54.1	31.8	23.2	427.3	222.2
Unemployment rate (%)	Aug '18	6.0	5.8	6.0	5.9	6.3	7.0
US employment (Δ in 000s) (CPS)	Aug '18	-423.0	389.0	120.0	398.0	1,788.0	2,098.0
US unemployment rate (%)	Aug '18	3.9	3.9	4.0	3.9	4.4	4.9
Financial Indicators							
		Monthly average				Annual average	
	Reference period	Current value	Latest full month	Prev. month	2 Months before	2017	2016
Bank rate (%)	Sep 12 '18	1.75	1.50	1.50	1.50	0.96	0.75
Exchange rate	Sep 12 '18	130.1	130.4	131.3	131.3	129.8	132.6
Quarterly Economic Indicators							
		Quarter-over-quarter growth (at annual rates)			Year-over-year growth		
	Reference period	Latest quarter	Prev. quarter	2 Quarters before	2017	2016	
Real GDP	2018Q2	2.9	1.4	1.7	3.0	1.4	
Final consumption expenditure	2018Q2	2.4	1.5	2.5	3.1	2.3	
Gross fixed capital formation	2018Q2	0.9	2.5	9.5	2.8	-3.0	
-Machinery & equipment	2018Q2	1.4	16.4	14.5	6.0	-6.0	
Exports	2018Q2	12.3	2.4	3.9	1.1	1.0	
Imports	2018Q2	6.5	4.2	7.7	3.6	-1.0	
Final domestic demand	2018Q2	2.1	1.7	4.1	3.0	1.1	
Labour productivity	2018Q2	2.7	-1.1	0.9	1.9	0.6	
Unit labour cost	2018Q2	-1.6	2.9	5.4	0.2	-0.1	
Industrial capacity utilization (%)	2018Q2	85.5	83.7	83.9	82.5	80.2	
Real US GDP	2018Q2	4.2	2.2	2.3	2.2	1.6	