

Canada's Innovation Underperformance

WHOSE POLICY PROBLEM IS IT?

Tijs Creutzberg





APPLIED PUBLIC POLICY RESEARCH
INFORMED BY ONTARIO'S REALITY

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Executive Summary

Canadian firms are regularly outperformed in terms of innovation. This is now conventional wisdom and governments have invested significant funds trying to remedy this failing with little impact. This paper argues that Canadian federalism is at least part of the problem. In light of the impending release of the federal government's Research and Development (R&D) Review Panel Report, a refocusing of our public investments is needed.

Government investment in innovation can be understood as either indirect or direct. Indirect investments focus on the framework conditions that enable innovation, including tax incentives, favourable tax rates, the regulatory environment, and support for research and post-secondary education. Direct supports include government programs that are generic (such as general support for commercialization), programs that focus on particular sectors (such as the Strategic Aerospace and Defence Initiative), or programs that focus on particular firms. The latter investments are dismissed in some circles as "picking winners."

The federal government makes enormous investments in indirect support for innovation, particularly through the Scientific Research and Experimental Development (SR&ED) Tax Incentive Program, which allows firms to write off part of their research costs. It represents a C\$ 4.7 Billion federal tax expenditure.

Direct support to clusters, sectors, industries and firms can be found in hundreds of overlapping and confusing federal and provincial programs delivered by multiple departments with, at times, contradictory and/or overlapping objectives. The result is confusing to industry.

This paper finds that Canada is an extreme outlier in weighting its investment in innovation so heavily toward tax incentives and away from direct support to sectors. This paper argues that these funds would be better used for direct supports to the innovation process and would produce more value-added, world-leading, commercialized products and services.

It also argues for a clearer division of policy roles whereby the federal government confines its support to maintaining the indirect and generic support for the innovation process, while provincial governments focus primarily on strategic investments. This refocusing would significantly simplify the program landscape and ensure greater emphasis is placed on direct investments that align with provincial strategic innovation objectives.

The paper also highlights the emerging global consensus around the need for innovation policies to be place-based, to support the existing comparative advantages of the community, and to take advantage of local and regional networks and knowledge. Taken together, these findings suggest that in addition to withdrawing from direct investments, the federal government should also reduce its expenditures on tax incentives and instead direct these funds to provincial governments to be used for direct incentives.

The federal and provincial governments should negotiate intergovernmental agreements, modeled after the agreements that emerged from the Growing Forward agricultural intergovernmental agreements. Growing Forward allowed the federal government to define overarching objectives and conditions for investments, but empowered provinces to direct funds to suit regional needs, embedded within regional networks, and in a manner consistent with provincial strategies.

Clarification of roles and responsibilities in this policy sector should be seen in the broader context of encouraging the federal government to focus its efforts and funds in areas where they will have the most impact, including reviewing competition policy to make companies more open to global competition and more likely to value and pursue innovation (Jenkins 2011).

CANADA'S INNOVATION UNDERPERFORMANCE

WHOSE POLICY PROBLEM IS IT?

Tijs Creutzberg

Given our track record and national aspirations to do better, clearly now is a good time to fundamentally rethink the way in which not just the federal, but also the provincial governments collectively support innovation.

IT IS ONE OF THE MOST consistently underperforming attributes of Canada's economy. So reliably underwhelming is Canada's innovation performance that new studies decrying this fact are anything but surprising. Whether it be the latest benchmarking report from Canada's Science, Technology and Innovation Council (STIC 2011), another 'D' grade on the Conference Board of Canada's periodic report cards (2008, 2010), or the assessment by the Council of Canadian Academies (CCA) scrutinizing the root causes of Canada's innovation performance (CCA 2009), the basic message has differed little from their predecessors decades prior (Britton and Gilmour 1978; Science Council of Canada 1979; Ontario Premier's Council 1989).

Such poor performance is not for want of policy attention. Innovation has been on the forefront of policy discussions for over twenty years now, and has resulted in a myriad of new initiatives and strategies from various governments, and departments—yet Canadian firms continue to underperform in innovation when benchmarked against rivals. All the more remarkable is the fact that Canada has one of the most generous tax incentive programs for Research and Development (R&D) among OECD countries and a sound research system of universities and public research organizations; neither of which appear to have brought Canada a comparative advantage in innovation.

So what is the problem? Research has identified a number of reasons for this underperformance and ultimately highlights that there are many factors at play. As summarized by the CCA, these include having: a relatively low number of innovative Canadian-based multinationals; more firms upstream in North American value chains specializing in primary and intermediate goods; business culture factors including comparatively low customer focus; and small and geographically fragmented markets which are less effective in driving innovation than larger and more competitive markets (CCA 2009).

There has, however, only been limited debate as to whether Canada's policy approach to supporting innovation is part of the problem. Canada, more so than its OECD peers, relies heavily upon the federal government's incentives to encourage business R&D, a policy that has been enhanced in recent years by a programmatic push to get more innovation results from investments in public research capacity.¹ Direct forms of support such as targeted R&D grants and subsidies have been sporadic at best, or limited to a few sectors such as aerospace.

Given our track record and national aspirations to do better, clearly now is a good time to fundamentally rethink the way in which not just the federal, but also the provincial governments collectively support innovation. Indeed, there is now sufficient support from various strains of research—and from Ontario's experiences—to suggest that Canada's primarily federal and indirect approach may be part of the problem. Evidence questioning whether tax credits are, on their own, sufficient to foster strong innovation

outcomes, along with recognition of the importance of the local and regional dynamics of innovation performance, both challenge the current policy approach. Another factor is the decentralized manner of Canada's innovation programming, which has resulted in considerable duplication and overlap in a number of innovation support areas, and which has introduced confusion among the very companies these policies are intended to support. Moreover, such duplication and overlap gives rise to important questions about the cost-effectiveness of Canada's collective effort.

All of this calls for, at the very least, a debate on how the federal and provincial governments are supporting innovation. To its credit, the federal government is currently re-examining how it is supporting R&D, under the direction of a Research and Development Review Panel, which is due to report this fall. This paper is a further contribution to this debate in the hope that some serious discussion can transpire that will inspire action for policy change.

To this end, this paper argues that a joint federal-provincial effort is required to reformulate Canada's innovation policy support so that it is not only more balanced in terms of the types of financial support for business innovation but that it also re-embraces a more direct approach to developing industrial capacity in emerging sectors. This paper also calls for a clearer division of policy roles to ensure maximum administrative and outcome effectiveness. Accordingly, it is argued that the federal government should focus on the indirect and generic support for the innovation process, while the provincial governments should concern themselves primarily with strategic investments.

INNOVATION SUPPORT IN CANADA

TO DESCRIBE CANADA'S APPROACH to innovation as indirect and mostly federal is in one sense, misleading, given the considerable breadth of policies from both federal and provincial levels of government that shape the country's innovation system. Though there has been no national innovation policy per se, over the years both federal and provincial governments have developed, in a largely uncoordinated manner, a broad mix of policies administered through an equally broad range of departments and agencies targeting directly or indirectly, one of the many facets of the innovation process. These departments and agencies range from those with direct mandates for innovation, such as Industry Canada and the Ontario Ministry of Research and Innovation, to those with no obvious responsibilities for innovation such as the federal Public Works and Government Services, whose Office of Small and Medium Sized Enterprise entered the innovation space in 2010 with the launch of a small procurement program for innovation.² The result is a myriad of policies and programs supporting: Canada's research capacity; university-industry partnerships; international collaboration support; entrepreneurship training; commercialization; innovation skills development; venture capital financing; innovation networks; and not least tax credits for firm expenditures on R&D. All of these policies and programs, to varying degrees, enhance the capabilities of, and incentives for, individual firms to bring new products, services, or processes to market.

An example of this breadth of support for innovation can be seen in the agricultural sector in Ontario, where one study identified seven federal and provincial departments administering 45 policies and programs that impact either value-added agriculture directly or innovation more generally (HAL Corporation 2009). This count does not include the additional and significant support for innovation that comes from the research system consisting of universities, colleges and government research organizations. Nor does it include the over 50 Ontario-based support organizations, such as business incubators, regional technology associations, or sector innovation organizations that offer more generic advisory support and related resources for companies on matters of innovation. Taken together, these policies, programs, and organizations point to a complex system of institutional infrastructure supporting innovation within the province.

Given this complexity, it is useful to categorize the breadth of policies and programs by the aspect of innovation that they target, be it directly or indirectly. Figure 1 breaks innovation supports into one of three groups: those that support innovation indirectly through framework conditions; those that directly support the innovation process generically; and those that directly support specific sectors and clusters with strategic investments.

- **Indirect support, framework conditions:** the specific regulatory and tax policies that shape the incentives for firms to invest in product and service development and support for research (given the role of the research system in supplying new knowledge and skilled labour). Examples include the Scientific Research and Experimental Development (SR&ED) Tax Incentive Program, the single largest R&D program in Canada.

Figure 1 Taxonomy of Innovation Support

INDIRECT	DIRECT	
Framework Conditions	Innovation Process	Sector or Cluster Specific
Regulations – product and environmental R&D tax incentives Research support	Cluster networking support Technology transfer programs Mentoring services for start-up companies	Targeted R&D grants & procurement programs Specialized infrastructure Locational subsidies

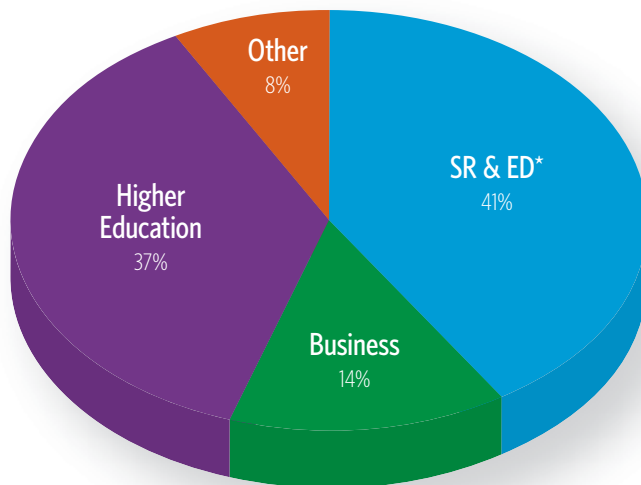
- **Direct support for innovation process:** Largely sector and technology neutral, this type of support can be directed at cluster networking, technology startups, collaboration, or at technology transfer from postsecondary institutions to industry. Examples include Ontario's Ministry of Research and Innovation's Ontario Network of Excellence Program, which funds regional innovation centers, and FedDev's Technology Development Program, which has recently launched a program to support collaborative innovation projects between public and private actors.

- Direct support specific to sector or cluster:** This support is targeted and often in the form of subsidies to firms in selected sectors or regions. Though such strategic investments are in some instance discretionary and ad hoc, as in the case of the 2008 bailout of the auto sector, they are typically administered through programs. The Strategic Aerospace and Defence Initiative (SADI) from industry Canada and the Agricultural Flexibility Fund from Agriculture and Agri-Foods Canada (AAFC) are examples of direct strategic support for sectors.

EMPHASIS OF CANADIAN INNOVATION SUPPORT

OF THESE THREE CATEGORIES, however, Canada's innovation system is heavily weighted toward the first, largely as a result of the Scientific Research and Experimental Development (SR&ED) Tax Incentive Program, the single largest R&D program in Canada. Administered by the Department of Finance Canada, this program is designed to lower the real costs and risks of conducting R&D, and supports over 20,000 companies each year at a cost of some C\$ 4.7 billion in foregone revenue (McKenna 2011).³ To put this in perspective, if treated as a federal Science and Technology (S&T) expenditure, this is equivalent to a quarter of the government's commitment to supporting R&D, and is three times the amount of direct support provided by the federal government to businesses (Figure 2).⁴

Figure 2 Federal Government Support for Science and Technology



Source: *Mobilizing Science & Technology to Canada's Advantage*. 2007.
 * Excludes S&T performed by government departments and agencies.

Finance Canada has now evaluated the SR&ED program on two occasions, once in 1997 and again in 2007, both of which found a positive impact. In 1997, drawing on data from the early 1990s, the Department of Finance Canada and Revenue Canada found that when assessed on the basis of the tax incentives' incremental impact on R&D spending, the program resulted in an additional R&D expenditure of 32 per cent. In terms of cost-effectiveness, the program amounted to C\$ 1.38 of additional R&D spending for every dollar of foregone federal tax revenue. In updating the econometric model to include R&D spillovers as well as additional costs, Parsons and Phillips, in their 2007 evaluation, found the net benefit to be C\$ 0.11 of additional R&D spending per dollar of foregone revenue. In both cases, these findings are consistent with other studies, many of which using US data, that show positive net benefits (Parsons and Phillips 2007; OECD 2007).

Research and Development tax incentives, compared to more direct forms of support such as grants and subsidies, also have the advantage of being non-discriminatory toward sector, technology, or region, and are more cost effective to administer (Canada. Department of Finance Canada and Revenue Canada 1997). Moreover, they are consistent with the dominant view in Canada, as articulated in the original 1983 policy principles for SR&ED, that “the private sector is in the best position to determine the amount and type of industrial research and development that it should undertake” (Canada. Department of Finance Canada and Revenue Canada 1997, 42). Indeed, this policy preference for neutrality is an important part of the rationale for Canada's current reliance on tax incentives (Madore 2006).

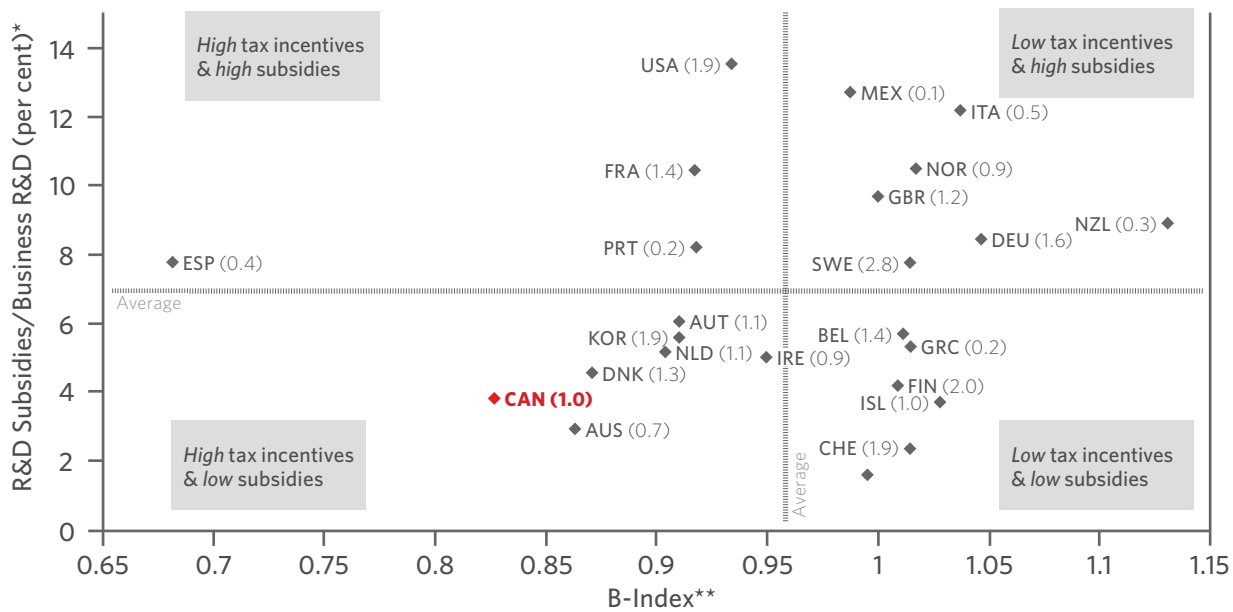
Given Canada's poor innovation performance, however, an important question is whether this emphasis on the indirect R&D tax incentives is in fact appropriate. Quite apart from recent claims that the SR&ED program is being abused by false claims,⁵ the fact remains that Canada has not sufficiently improved its business R&D performance over the nearly three decades that the federal government has maintained the SR&ED. All the more remarkable is that, in its current form, the SR&ED is the second most generous R&D tax incentive among OECD countries, after Spain (Warda 2005).

This fact is particularly notable in work by Jaumotte and Pain (2005) which shows Canada as an outlier in international comparisons of its mix of indirect R&D tax and more direct subsidization policies (Figure 3). Compared to Sweden and Germany, for example, both of which are low tax and high subsidy countries—and even the US, which maintains high tax incentives and high subsidies—Canada's high tax incentive, low subsidies approach coincides with below average business R&D intensities.^{6,7}

The fact remains that Canada has not sufficiently improved its business R&D performance over the nearly three decades that the federal government has maintained the SR&ED



Figure 3 The State of Tax and Subsidization Policies, 1996-2000, Average Per Annum



* The numbers in parenthesis are the average business R&D intensities in 1996-2000.

** The B-index is defined as one minus the rate of tax subsidy for R&D.

Source: OECD Main Science and Technology Indicators database on R&D subsidies ; OECD, STI/EAS Division for data on the B-index. Figure from Jaumotte and Pain, 2005; reproduced with authors' permission.

THE CASE FOR DIRECT SUPPORT

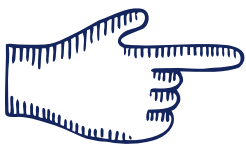
A recent study, which uses Canadian innovation survey data to look at innovation outputs (i.e. new products and services) as opposed to just inputs (i.e. business expenditures on R&D), warrants attention. In their examination of Canadian firms using the results of the 2005 Survey of Innovation, Berube and Mohnen (2009) compare the performance of those Canadian-based firms receiving tax credits but no R&D grants, with those that received both tax incentives and grants, thereby controlling for differences in national innovation systems. The authors found that firms that benefited from both policies were more innovative than firms that made use of only tax incentives. Moreover, not only were they more innovative, but Canadian firms using both types of programs also made more world-first innovations and were more successful in commercializing their innovations.⁸

In addressing the question of why direct support for R&D may yield different outcomes than tax incentives, David, Hall and Toole (2000) note that tax incentives are likely to favor projects that will generate greater profits in the short-run, as firms look to expand their R&D activities in response to tax offsets against earnings. The result is that longer-term R&D, which has the potential for higher social rates of return and spillover benefits, will be less favored by this policy instrument. In contrast, direct subsidies, which raise the rate of return for individual R&D projects (i.e. the private marginal rate

of return (MRR)), are often targeted by governments toward projects that are considered to offer higher social rates of return on investments in knowledge. Thus along with raising the private MRR, direct subsidies can lead to greater spillover benefits. Czarnitzki and Toole (2007) also show how direct support can be beneficial, finding that R&D subsidies are particularly good in helping mitigate uncertainty in the product market, a factor that is related to under-investing in R&D. As the authors' note, "while subsidies themselves do not reduce uncertainties, they can offset the incentive to delay investment in times of product market uncertainty by increasing the expected return to the firms' R&D investment" (Czarnitzki and Toole 2007, 179).

In short, this research suggests that Canada should re-evaluate its policy mix for supporting innovation and consider resourcing more direct forms of support than those currently provided. From a policy standpoint, direct forms of support have the advantage of being more strategic in supporting the development of innovation capacity, especially in emerging sectors and developing regions (Czarnitzki and Licht 2006). When strategic public investments are aligned with market forces and technology trends, they have been shown to have a significant impact in developing industrial and innovation capacity in new sectors. China, Taiwan, and Singapore, are all testaments to such aggressive strategic investing; they have reshaped the global geography of innovation in desirable knowledge intensive sectors such as semiconductors (Howell 2003; Leachman and Leachman 2004). Direct forms of support can also be better targeted toward creatively addressing innovation weaknesses specific to Canada as identified, for example, in the 2009 CCA report.

This more direct manner of investment is often disparaged as either "corporate welfare" (Taylor, 2008) or as a distortion of markets. However, such investments were pivotal in building capabilities in what became leading sectors in Ontario. While in essence it requires 'picking winners', it is about picking sectors and not technologies. This is an important distinction and one that is often lost amidst the confusion surrounding the term's use in ideological debates over industrial policy. Indeed, 'picking winners' was a term originally used in a paper by Nelson and Langlois (1983) in reference to the practice of government officials picking specific technologies to commercialize, a practice that was found to be the least successful form of government support identified in their research. As Rycroft and Kash (1992) point out, since then the term has been inaccurately used to disparage any direct government role in economic development, irrespective of the fact that governments have long played a critical role which, while not without failure, has also brought about major successes. In Ontario, examples include the development of a post-war petrochemical sector in Sarnia (Cobban 2008) and the emergence of a microchip industry in the Toronto region (Creutzberg, Wolfe, and Nelles 2006).



When strategic public investments are aligned with market forces and technology trends, they have been shown to have a significant impact in developing industrial and innovation capacity in new sectors.

THE IMPORTANCE OF REGIONS

Strategic investments can play a catalytic role in establishing new industries and developing a highly skilled labour pool. While these strategies are not necessarily repeatable in the current economy and political environment, the importance of strategic action remains undiminished. Today, however, the locus for strategic initiatives comes less from the federal level and more often from the regional or local level, if at all. One example of the role that regional governments can play was Quebec's successful strategic efforts to build an entertainment software industry with a generous multimedia labour tax credit in 1996. With that incentive in place, together with strategic recruiting efforts by the government, Quebec attracted one of the world's largest gaming companies to Montreal, UbiSoft, which has since grown its facility there into its largest studio with approximately 1700 employees. Along with having attracted talent from the US and Europe, UbiSoft has helped train a pool of talent with the latest skills in video game design, some of whom have moved on to create their own companies (HAL Corporation 2009). Here the dynamic is similar to previous eras of strategic intervention, whereby the initial strategic investment helps build and secure a critical mass of capabilities in people who often carry these skills with them to other companies within the region, in a process well documented in cluster literature (Saxenian 1994; Bramwell and Wolfe 2008).

A second illustrative local example is Sarnia. Subject to a number of external shocks including globalization of production, emerging petrochemical capacity in Asia Pacific and the Middle East, and an increasingly cost-competitive environment, Sarnia has witnessed plant closings and significant layoffs from companies such as Dow Chemical and Nova Chemicals. Another prominent challenge for the region's petrochemical firms is the accelerating global economic transformation driven by companies and consumers shifting to greener, cleaner and healthier products and services. With the promise of reducing both dependency on declining petroleum-based energy sources, and the ability to meet the challenges of a carbon-constrained economy, this transformation has significant potential to impact Sarnia's economy. To address these concerns, Sarnia companies—including LANXESS AG, which bought the original Polymer Corp facility—are being engaged by local leadership to take strategic action toward re-establishing their competitiveness to address the above challenges (Lee and Associates 2010). A key focal point for this local effort is to foster the development of a 'hybrid' cluster that responds to new market opportunities in areas of non-petroleum alternatives such as bioplastics and biopolyols but which makes use of existing industrial processes.

The pivotal role of regions is now increasingly well understood in the large body of research that has examined the successes of such places as the Raleigh-Durham region of North Carolina, Waterloo, Ontario, and Cambridge, UK. This research, as summarized by Bradford (2010), highlights several ways in which the particular attributes of a region can influence firm-level innovation, three of which are relevant here.⁹

The first is the local and regional geography itself, which has been described as "fundamental and not incidental, to the innovation process" (Asheim and Gertler 2005). It is fundamental to: the learning processes among innovation actors; the sharing of knowledge (Lam 2000); social assets that allow local / regional firms to take advantage

of specialized capabilities (Maskell and Malmberg 1999); the concentration of specialized skills (Wolfe and Lucas 2005); and access to supplier networks (Czarnitzki and Hottenrott 2009). In other words, geography, or rather proximity, facilitates access to key input factors that are important to a company's ability to innovate. Ultimately geography helps explain why firms seek to cluster in specific regions.

The second is place-based policy. Place-based policy emphasizes the need for governments to allow for and recognize the importance of geography in policy and programs related to regional development, especially innovation. As Bradford notes "public policy is crucial in creating places with the appropriate innovative milieu" (2010: 7). Indeed, many policy decisions from upper levels of government have a local or regional impacts whether it is recognized or not. Policy decisions often manifest themselves with a physical presence, be it in the form of a commercialization facility or a special research program. These investments, for example, will often preferentially benefit particular research institutions that are either closest to it or which have the necessary expertise to meet a research program's objectives. As a result, though federally-funded research organizations may not have a local mandate per se, they nonetheless have an economic impact and potential role in strengthening the local innovation economy particularly in the context of cluster development.

Important dimensions of place-based policies are local or regional innovation strategies. They are often developed by a coalition of local actors that look to mobilize resources and stakeholders, and coordinate investments toward transforming and adapting local industry to the competitive reality of global markets. Ensuring that governments align their interventions in support of these strategies is another aspect of place-based policies, a practice that is important for provincial and federal levels to recognize.

A third factor is how all three levels of government can make the collective decisions ultimately necessary if government policies are to be effective in supporting local innovation priorities and strategies. Given the complexity of the innovation system as a whole, with its national and regional aspects and multitude of departments and institutions, no one level of government has the necessary capacity to effectively support innovative regions. The decision-making process must therefore include whoever's authority, expertise or resources are needed to resolve a particular public problem related to cluster development. This is ultimately a process that includes more than one level of government and which can address cluster development issues that are both economic and social in nature. (Rosenfeld 2002; Bradford 2010). Making improvements to the vitality of the downtown core and to the transportation system can, for example, be essential to successfully drawing highly skilled people and innovative firms to the region.

In sum, the research analyzed above all points to a need for a more regionally and locally focused innovation policy approach than currently exists in Canada. There are examples of federal programs with some sensitivity to regional and local innovation dynamics but these are few in number.¹⁰



AN ENTANGLED INNOVATION POLICY MIX

Thus far, this paper has discussed two reasons why Canada should re-examine the manner in which it supports innovation. The final one is that the current approach of decentralized policy development related to innovation, which can span not just two but three levels of government, gives rise to the potential for policy and program duplication. Such overlap that can lead not only to inefficiencies, but also to confusion for the companies that policies are intended to serve. Much of the problematic overlap exists not so much in the support for framework conditions but in the generic and strategic support for innovation. As an example, consider again Canada's efforts to support value-added agriculture through innovation. These efforts are led by AAFC at the federal level and the Ontario Ministry of Agriculture, Food and Rural Affairs (OMAFRA) at the provincial level, both of which both provide a range of programming directed toward the agricultural sector from research funding to commercialization and networking to business start up support. Though these programs may be successes, they do overlap with more generic innovation support offered by all three levels of government. Take the case of Guelph, Ontario, which has recently committed itself to the development of the Guelph Agri-Innovation Cluster to build on existing strengths in the region's food, wellness, and agribusiness sectors. Companies in Guelph can benefit from eight commercialization support organizations, some of which are funded by the city, others by the province or federal government, or by both (HAL Corporation 2010). Of these eight, five are targeted at agriculture and three are more generic in their focus. Companies in the Guelph region also fall within the remit of Industry Canada's Community Future Program, whose local Community Futures Development Corporations (CFDC) offer loans and related support to companies. Canada Business, a Canada-wide program also from Industry Canada also has local offices that offer advisory and intelligence services in all manner of business, not least innovation. For companies on the ground, the policy landscape can be confusing, as was noted by a number of companies interviewed for various innovation related studies conducted by the author. It also raises the question of whether such jurisdictional overlap is impeding cost-effectiveness in the innovation space. As Mendelsohn, Hjartarson and Pearce (2010) argue in a call for a more efficient and effective Canadian federation, a number of policy areas, innovation included, could yield not only considerable savings but also improved policy outcomes if rationalized.

There are, of course, a number of reasonable explanations for this duplication. Foremost is that, owing to the prominence of innovation on political agendas at both the federal and provincial level, there are a wide range of departments that now endeavor to support innovation without much horizontal and multilevel coordination. Related to this is the fact that innovation is a multifaceted process that can be influenced by a broad mix of policies. The policy domains of training and education, research, industry, along with sector portfolios, such as natural resources, agriculture and environment, can all influence the many facets of innovation, such as knowledge generation and transfer, commercialization, partnerships and collaboration, and business strategy advice. This adds to the number of government organizations engaged in the innovation space.

Another reason is that the local level is increasingly active in supporting innovation by setting up innovation support initiatives and organizations, often with seed or operational funding drawn down from federal or provincial programs. The result is that in several localities there can be local, provincial or federal organizations with overlapping innovation support mandates, contributing to a multitude of local voices, and a crowded organizational landscape.

A SUBSIDIARITY APPROACH FOR INNOVATION POLICY

Is there a better way? Given the complexity of the innovation policy environment, this question is not easily answered. Yet, given Canada's performance to date, it is certainly not an unreasonable one to ask. To return to each of the critiques put forth thus far, the recommendations for Canada's innovation policy are as follows: to rebalance the policy emphasis toward more direct forms of innovation support; to align and support innovation policies and programs with place-based policies; and to rationalize programming efforts to mitigate overlap and inefficiencies.

And while these policy paths are at one level distinct and disparate, the principle of subsidiarity offers a mechanism to bring them together in a coherent manner. Subsidiarity is an organizing principle at the core of federal systems that holds that matters of governance ought to be handled by the smallest, lowest or least centralized competent authority (Halberstam 2008). Stated in another way, under subsidiarity, the central authority should play a subsidiary role, performing only those tasks which cannot be performed effectively at a more immediate or local level.

While now a common principle in European Union treaties, and one that has been directly relevant to the European Commission's Competitiveness and Innovation framework program (Lejour, Koskenlinna and Sluismans 2008), subsidiarity has had no such traction in Canada despite its potential as an organizing principle for innovation policy. The relevant question then is how much of Canada's innovation policy should be centralized?

Falk, Hölzl and Leo (2008) identify four criteria for determining the degree of policy centralization. The first is variation across regional preferences, whereby the greater the regional diversity, the stronger the case for decentralization. For larger jurisdictions, the case is stronger than for smaller ones. The second criterion is the extent to which economies of scale can be realized; the greater such economies, the stronger the rationale for centralizing a given policy especially if it can lead to creating critical mass.

Third is the degree to which policy externalities, or rather, unintended consequences, are created as a result of administering a policy at one level over another. Centralization of policy can be justified if it results in benefits to all regions, as is the case with research funding, or if it minimizes negative impacts, such as wasteful competition that could arise from location specific policies. The last criterion is that of policy learning,

which is promoted through decentralization, as when different regions experiment with different policies their experiences can then be shared.

In applying these four criteria to the three categories of innovation support presented earlier in this paper (Figure 4), one can begin to rationalize a new approach for supporting innovation that clarifies roles and addresses the critiques presented in this paper. To begin with the framework conditions, the federal level is undoubtedly the appropriate level for administering R&D tax policy and to support research given the administrative economies of scale achieved in both the positive policy externalities associated with research. For the provinces, the implication would be that they stop offering additional R&D tax credits to firms under the SR&ED program.¹¹ This change would deter the one-upmanship competition in R&D tax incentives that has happened in sectors such as digital media across Canadian provinces.¹²

Figure 4 Subsidiarity in an Innovation Policy Context

Criteria Category	CENTRALIZE		DECENTRALIZE		POLICY LOCUS
	Economies of Scale	Policy Externalities	Policy Learning	Diversity	
Indirect - Framework Conditions	Administrative	Maximizes positive spillovers	Minimal benefit	No benefit	Federal
Direct - Innovation Process	Administrative	Minimizes overlap / duplication	Minimal benefit	Some benefit: cluster networking	Federal
Direct - Sector/Cluster Specific	Some Administrative: for smaller regions	Minimizes interregional competition	Strong benefit	Strong benefit: place based policy	Provincial

Support for the innovation process includes policies and programs that target different facets of the innovation, would also benefit from centralization. In addition to achieving administrative economies of scale, primarily federal administration would help minimize duplication of, and overlap with, similar provincial policies and programs, which, as has been noted, can be significant. It could also help achieve greater consistency in innovation support across regions and help ensure that services are of a high quality.

For the third category, that of strategic support, the importance of local and regional differences and sector specialization, as previously discussed, validates a primary role for the provinces. The provinces, given their closer relationship with public and private innovation actors, and a closer understanding of industry capabilities, are better positioned to align strategic investments with both provincial and local strategies and build on existing strengths. In doing so, there is also an opportunity for policy learning, as provinces can share their experiences with different programs and policies.

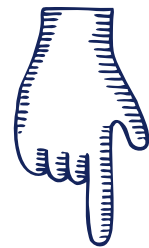
Moreover, giving the provinces jurisdiction over strategic support would help address the long-standing federal-provincial tension around dealing with regional development at the national scale in a country with notable regional disparities in wealth (Simeon 1979). At the root of this tension are opposing logics. From an economic standpoint, regional development requires that investments be concentrated in regions with the greatest potential to realize their benefits. This logic has only grown stronger in the global economy where knowledge, capabilities, and wealth consistently clusters in innovative milieus, and in the Canadian policy context where the federal Regional Development Areas (RDAs) themselves are now looking to innovation programming to support their broader economic development objectives (Bradford 2010). This economic reality is however at tension with the political logic through which regional development is viewed as a means of addressing regional disparities in wealth, equality and fairness. "Provinces," writes Savoie (1986), "have come to expect Ottawa to work toward a fair distribution of economic activity throughout the country, with some smaller provincial governments claiming that this is in fact the federal government's main responsibility." But when fairness determines investment decisions, the result is a dilution of critical mass which ultimately translates into lower investment impacts.

Shifting the policy locus of strategic support to the provincial level would not be without negative consequences. It could exacerbate uneven industrial capacity across the federation and, indeed, may stoke wasteful interprovincial competition as provinces vie to attract inward investment in the same emerging sectors. Yet both such consequences also manifest under the current policy approach. The inherent geographic clustering of knowledge economies, together with historical development patterns of industrialization in Canada, are realities that make regional asymmetries in capacity an unavoidable feature of Canadian federalism.

On balance, the benefits of having the provinces responsible for strategic investments are too important to ignore. With greater strategic resources at their disposal, the provinces would be better positioned to rapidly respond to emerging opportunities, to fund technology grant programs in keeping with strategic priorities and strengths, and to support local strategic initiatives that look to upper levels of government for resources to build specialized research infrastructure or enhance local cluster capabilities.

For strategic support to be a viable element of Canada's innovation policy, therefore, more R&D grant programs and strategic investment funds need to be established at the provincial level as part of a long-term commitment to a new approach for supporting innovation. While this could involve new funding, the alternative would be to reallocate resources from existing federal programs to provincially administered strategic funds. Reducing the SR&ED tax incentive program to levels that are comparable to other countries could make more funds available for strategic support, as could the transfer of all relevant direct innovation funding currently administered at the federal level, including innovation support activities from the Regional Development Agencies.

Short of a new cash transfer to the provinces, which is unlikely to garner much federal support in the current climate, there are proven policy models that can offer the needed flexibility to allocate federal funds to meet provincial strategic objectives. Recent federal-provincial-territorial agreements established for agriculture, for example, provide a possible template. In negotiating the current agreement, Growing Forward, which is a five year, C\$ 1.3 billion cost-shared program, each province was given the flexibility to determine how best to allocate the funding set aside for innovation in



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agriculture in the context of provincial needs and priorities. Ontario, for its part, used its funding to support the development of two science clusters and to strengthen its support for agri-tech innovation and commercialization organizations. Such a model gives primacy to provincial strategies while avoiding having the federal government acting directly as a regional player, which would only compound the overlap and duplication problem.

CONCLUSION

In their 2009 report, the Canadian Council of Academies writes that “[i]n broad terms, and over time, Canada has provided a progressively more encouraging environment for business innovation, at least in respect of those factors over which public policy has direct influence – for example, prudent fiscal and monetary policies, a trend of lower tax rates and support for university research” (2009, 9). By most measures of Canada’s innovation performance, however, this indirect and mostly federal framework approach has under-delivered. And unless Canada engages in some innovative thinking and action on this issue innovation performance from last three decades suggest that the country will continue on this underwhelming trajectory.

This paper provides an initial step toward rethinking Canada’s approach by arguing that the country needs to shift toward offering more direct forms of support that are better designed to address the fundamental weaknesses in Canada’s innovation performance. Increased direct forms of support, in concert with competitive framework conditions, would provide a more balanced policy environment that is more in tune with the strengths, weaknesses, and differences across Canadian industries.

Any commitment toward such a shift, should, however, coincide with a rationalization of innovation policy across federal and provincial levels so that ‘who does what’ reflects the principle of subsidiarity. By doing so, policies and related programming would be able to accommodate the place-based dimension of innovation, and strengthen the strategic focus of support that is essential to innovation-based economic development. The resulting potential for improved innovation performance could also coincide with improved cost effectiveness associated with a federally and provincially rationalized innovation policy that minimizes overlap and duplication. Only then will Canada be able to claim to have a viable national innovation policy. MC



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ENDNOTES

1. Canada's 2007 Science and Technology Strategy is the most recent articulation of the latter approach, framing research investments in terms of establishing an entrepreneurial, knowledge, and people advantage for Canada (Canada. Industry Canada 2007).
2. See Canadian Innovation Commercialization Program, <https://buyandsell.gc.ca/initiatives-and-programs/canadian-innovation-commercialization-program>.
3. This is an increase in foregone revenue of 57 per cent from 2006 levels of C\$3 billion cited in *Mobilizing Science and Technology to Canada's Advantage* (Canada. Industry Canada 2007).
4. These figures exclude R&D performed by government departments and agencies. Total federal S&T expenditures for 2005-06 amounted to C\$9.3 billion, including 5 billion for in-house S&T, and C\$2.7 billion for higher education.
5. According to one estimate, one third of the SR&ED cost is being wasted by misuse (McKenna 2011).
6. Business R&D intensity is defined as the ratio of Business Expenditures on R&D (BERD) to a country's Gross Expenditures on R&D (GERD).
7. This debate is unlikely to be settled anytime soon, not least because in comparative research, the impact of R&D incentives cannot readily be isolated from the broader innovation system of a given country (OECD 2007). Jaumotte and Pain (2005) put forth a similar finding, concluding that both tax incentives and direct subsidies are linked to higher innovation levels, but that the degree to which subsidies have an impact is more influenced by particular national conditions.
8. Specifically, they note that that 25 per cent of firms using tax incentives and R&D grants reported world first innovations compared to 17 per cent that used only tax incentives and that 81 per cent of the former reported having introduced at least one innovation in the past three years, compared to 72 per cent of the latter. And finally, some 61 per cent of those making use of both types of programs reported having earned revenue from their innovations compared to only 53 per cent of those that made use only of tax incentives (Berube and Mohnen, 2009).
9. Bradford (2010) identifies five themes of new regionalism: clusters and regional innovation systems; place based policy; socially sustainable development; multilevel governance; and policy learning and knowledge transfer.
10. Agriculture and Agri-Foods Canada's innovation programming under the federal-provincial and territorial agreement, *Growing Forward*, and the Industry Canada's Community Futures program are two such programs. The former aligns investments with provincial innovation priorities, and the latter supports local innovation among rural firms.
11. Ontario administers three such tax incentives: the Innovation Tax Credit, the R&D Super Allowance and the Business-Research Institute Tax Credit.
12. Seven of Canada's provinces now offer some form of additional R&D tax incentive support for digital media firms, most targeting labour costs, with refundable tax credits reaching 40 per cent of eligible labour expenditures (HAL Corporation 2008, 20).

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