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E-BRIEF

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NATIONAL PRIORITIES 2018: RAISING CANADA'S INNOVATION GAME

Canada's 2018 Innovation Policy Report Card

by
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- Fostering innovation in the Canadian economy takes a broad suite of policies that go beyond simply providing research and development tax credits.
- In this innovation policy report card, we compare 14 countries that represent a diverse group of advanced economies – diverse by size, access to large markets, geographical location, access to natural resources, and culture. Our intent is to isolate the importance of policy variables that promote innovation. It is apparent from our work that countries can use quite different levers to achieve equivalent outcomes.
- We find that Canada's innovation shortcomings stem from a lack of superior performance in any of the broad family of policies that literature and experience suggest are conducive to innovation outcomes and activity.

This E-Brief introduces a new innovation policy report card, comparing key policy indicators affecting innovation performance across 14 countries, focusing on the implications for Canada.

This report card aims specifically to be useful to policymakers who seek to raise Canadians' living standards through applying a pro-innovation lens to a suite of public policies. Given that a country's innovation performance is likely affected by a broad range of policies, such a holistic approach can help avoid a situation in which innovation is promoted through some policies on the one hand, but unwittingly held back by other policies on the other hand.

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We compare 14 countries that represent a diverse group of advanced economies – diverse by size, access to large markets, geographical location, access to natural resources, and culture. Our intent is to isolate the importance of policy variables operating under these different conditions. There is no implication that a "one size fits all" suite of policies that would achieve the same impact across different countries actually exists. Indeed, it is apparent from our work that countries can use quite different levers to achieve equivalent outcomes.

The key takeaway from this report card is that Canada's innovation shortcomings, already recorded in many existing public and private reports,[1] stem from a lack of superior performance in any of the broad family of policies that literature and experience suggest are conducive to innovation outcomes and activity.

Why a New Report Card?

Our report card differs from those already in existence that compare countries' innovation activities and performance, and is designed to be more useful to policymakers, in three important respects:

First, it focuses exclusively on policies or outcomes that are well within the capacity of governments to provide or make happen. Other report cards or rankings often conflate innovation outcomes, activity and policy indicators.

Second, the indicators used in the report card are rooted in the findings of an earlier C.D. Howe Institute paper that explored what is missing in Canada's approach to innovation policy (Schwanen 2017). That *Commentary* argued that the traditional role of governments in supporting basic building blocks (e.g., education, fundamental research) and pro-innovation framework policies (e.g., regulation, competition), needs to be complemented by greater attention to:

- innovators themselves;
- the catalytic role of entrepreneurship and design in spreading innovation;
- innovation in the public sector;
- the social acceptance of innovation; and
- policies that occupy an effective middle ground between indiscriminate support to innovation-related activities, on the one hand, and attempts at "picking winners," on the other. For example, innovation marketplaces aimed at matching the demand and supply of solutions to important public problems, should be part of an optimal policy mix.

Third, the weights we construct and assign to the indicators that make up the report card are chosen to produce an overall ranking that corresponds as much as possible with the ranking of outcomes and activities one associates with successful innovation policy: high productivity and standards of living, business research and development activity, and business growth and venture capital activity (Table 1, for details see online Technical Appendix). This determination clearly involved more art than science, and we should make clear that we did test various possible weighting schemes for our indicators, before landing on the one reported in Table 3. However, as explained in the online Technical Appendix, our weighting scheme outperforms more mechanistically-derived weights, and indeed the grade that other innovation report cards give to Canada, in explaining our innovation outcomes.

1 These were reviewed in Schwanen (2017), pp. 3-5. See also Table 1.

Table 1: Indicators of Innovation-related Outcomes and Activity

	Labour Productivity (2015, US$ per hours worked at current PPP)	Actual Individual Consumption (2015, US$ per capita at current PPP)	Business Expenditures on Research & Development as % of GDP	Venture and Growth Capital Raised as % of GDP (2012-2015)	Employer Enterprise Birth Rate	Overall
Australia	9	2	10	2	9	10
Canada	11	4	14	6	11	14
Denmark	2	6	8	13	3	3
Finland	8	7	7	10	7	6
France	6	9	9	4	4	9
Germany	5	3	5	9	13	7
Ireland	1	12	12	5	12	13
Israel	13	13	1	1	2	1
Japan	12	11	3	14	14	11
Neth.	4	8	11	12	8	5
S. Korea	14	14	2	7	5	12
Sweden	7	10	4	11	6	4
UK	10	5	12	8	1	8
USA	3	1	6	3	10	2

Sources: Please consult the Sources and Descriptions at link. The Overall ranking is based on a weighted average of the underlying values of the five indicators, with all indicators scaled to fall on the interval [0, 1]. Variables are equally weighted, with the exception of Business expenditures on R&D, which has twice the weight of other innovation indicators.

The point of this report card is not to conclude, as so many have done already, that Canada has a sub-par performance with respect to these outcomes and activities. Rather, the aim is to understand where the country stands with respect to different policy levers affecting innovation, and how these policies might impact Canada's innovation performance.

Major Elements of the Report Card

As mentioned, the report card ranks key Canadian policies affecting innovation, against those of 13 other countries. All the countries in our set are advanced economies, whose businesses compete against Canadian producers in key markets. Subsequent editions of the report card may expand the number of comparator countries.

The indicators that make up the report card are grouped under eight categories:

- Human capital, Excellence and Attractiveness to Knowledge Workers
- Access to Markets and Competition Regime
- Efficiency and Transparency in Public Sector and Regulated Infrastructure
- Fiscal Regime
- Regulatory Environment
- Intellectual Property Rules
- Policies Promoting Acceptance of Innovation
- Government Direct and Indirect Support for Innovation

For details about the indicators that make up each heading and their weight, see Table 3.

Key Results

The rankings of each country under each category, as well as their overall ranking, can be found in Table 2. Here we will only discuss Canada's rankings for each broad category.

It is worth keeping in mind that the indicators used here date, for the most part, from the two to five years ago. These past policies very likely still impact Canada's current innovation performance. At the same time, since innovation policy is being addressed afresh by the current federal government, the description below may apply to policies that have already been discarded or substantially overhauled. But, the analysis tells us what is and is not likely to work.

Regarding the Human Capital, Excellence and Attractiveness to Knowledge Workers variables, Canada scores relatively highly on participation in post-secondary schooling, international test scores, quality of management schools, openness to immigration, immigrants' economic outcomes, and personal freedom indicators. It scores relatively poorly on overall adult literacy and numeracy scores, on the literacy of managers, on international rankings of universities' innovation focus and research excellence, and on the number of foreign students it attracts. Overall, Canada gets a middle-of-the road ranking of 8 under this category.

Table 2: International Ranking of Policies Affecting Innovation

	Human Capital, Excellence, Attractiveness to Knowledge Workers	Access to Markets and Competition Regime	Efficiency and Transparency in Public Sector and Regulated Infrastructure	Fiscal Regime	Regulatory Environment	Intellectual Property Regime	Policies Promoting Acceptance of Innovation	Governments' Direct and Indirect Support for Innovation	Overall
Australia	6	12	13	6	4	12	2	14	10
Canada	8	13	6	11	11	14	11	13	13
Denmark	1	7	3	7	12	3	6	7	1
Finland	2	10	2	10	6	8	3	4	3
France	10	2	12	12	13	11	9	6	11
Germany	12	3	8	8	7	5	5	5	8
Ireland	13	9	10	4	14	7	7	10	12
Israel	7	14	14	5	9	13	10	1	5
Japan	14	11	7	13	3	2	13	11	14
Neth.	4	1	5	1	5	9	1	12	6
S. Korea	9	8	11	9	2	4	14	3	9
Sweden	3	6	1	2	8	10	4	8	7
UK	5	4	4	3	1	6	8	9	2
USA	11	5	9	14	10	1	12	2	4

Sources: Please consult the Sources and Descriptions at link.

Regarding the Access to Markets and Competition Regime variables, Canada scores relatively highly in terms of foreign market access, now that the Comprehensive Economic and Trade Agreement with the European Union has entered into provisional application. It also benefits from most of its key trade partners rigorously enforcing IP rights (in contrast, at least, to depending on markets in which IP is easily stolen). However, it scores relatively low on international rankings of openness to foreign direct investment, state-owned enterprises governance, scope and enforcement of its competition policy, and perception of banking competition. Overall, Canada ranks second last among our 14 countries on market access and competition.

With respect to Efficiency and Transparency in Public Sector and Regulated Infrastructure, Canada ranks relatively highly in terms of efficient provision of basic government services, although only middle of the pack in terms of efficient provision of infrastructure, perception of corruption, and openness of government. It ranks low in terms of perception of the contestability of public services, meaning there is relatively little openness to competition in public service delivery. Nevertheless, Canada gets its best ranking – 6 – under this government efficiency and openness rubric.

Canada's Fiscal Regime registers a mediocre relative performance across income, personal, corporate, property, and international taxes. In some areas, it is complexity that impedes Canada's performance. Canada's consumption tax system performs better than some of the comparator countries, but this alone is not enough to improve Canada's rank. Australia, for example, has more competitive regimes for property, individual and international taxes, while having a similarly competitive consumption tax regime.[2] And all told, Canada relies more extensively than most others on income instead of consumption taxes, though its treatment of philanthropic donations is roughly on par with the best. Canada earns only 11th place in terms of its fiscal regime.

Canada's Regulatory Environment also appears to be somewhat less conducive to innovation than those in most comparator countries. Canadian regulators score above average in following a number of regulatory governance practices recommended by the OECD. As well, Canada's workplace regulations are not as much of a barrier to innovation as those in many other countries. Nevertheless, on regulations governing IT safety standards, or the price of medicines, which we use as examples of specific regulations for which there are internationally comparable data, and on the use of regulatory sandboxes, Canada ranks in the middle of the pack at best. Federal and provincial regulations and policies also work at cross-purposes in many areas, particularly in Canada, due to the decentralized nature of the federation. Canada ranks 11th on this score.

Regarding the Intellectual Property Regime, Canada scored below most of its peers in participation in international IP agreements, as of 2016, in providing for patent term restoration in the event of regulatory delays, in its enforcement of intellectual property rights and in facilitating technology transfer between innovators and industry. Canada provides for relatively generous limitations and exceptions to copyrights and related rights, which is a plus in our ranking. At the same time, unlike other countries including the United States, the government does not appear to participate in patent pools that aim at favoring commercialization of IP. All told, Canada comes out last of 14 countries in terms of its IP regime.

2 These observations stem from an analysis of the components of a single index, the Tax Foundation's International Tax Competitiveness Index, which tracks in large part the discussion of tax policy conducive to innovation in our 2017 overview *Commentary* (Schwanen 2017).

Policies Promoting Acceptance of Innovation makes its appearance in this report card as an attempt to illustrate whether those who might be negatively affected by innovation would be more or less likely to oppose pro-innovation policies. Canada's 11th place on that score is attributable to the fact that a number of other countries that do well on innovation outcomes nevertheless also have more generous income security systems and even stronger pension systems than Canada, which also registered a low score on a survey of perception of social mobility.

The quantity and quality of Government Direct and Indirect Support for Innovation clearly makes a major difference to innovation outcomes. Canada's low rank in our report card for this important rubric relates to a number of factors that collectively denote a less focused, and at the same time less nimble, approach to innovation funding and policy than in a number of comparator countries. These factors range from a signal reliance historically on research and development tax credits in preference to direct funding, to a lack of arm's length mechanisms such as innovation marketplaces in the United States or Israel that facilitate the application of new technology to specific users and, in general, a lack of focus to government support (that is, more of a "spray and pray" approach). Other factors include lower R&D performed by governments and relatively low military capabilities, the latter being often associated with innovative industry.

Discussion and Conclusion

What accounts for Canada's acknowledged inferior innovation performance, as measured by statistics such as productivity or business spending on research and development? Based on this report card, a range of policies are certainly involved in this outcome. Canada's strengths – and there are many – seem to be overshadowed by relatively low performance in many policy areas that likely influence innovation, ranging from access to markets and competition, to regulation, taxes, intellectual property rights, and governments' own often diffuse support for research and development. Canadian governments can do better – often by not closing, with one hand, a door they have opened to innovation with the other.

What strikes us most in the report card is that, apart from Ireland, Canada is the only country to not register in the top three ranking of the main categories of indicators. This is not an artifact of any plausible difference in the weighting scheme for the different indicators. Every country other than Canada, no matter how poorly they perform on some counts, has one or more category in which they place well into the top tier of countries.

To the extent innovators and those who invest in them are attracted by a unique policy proposition, and in the spirit of what fostered its athletes' success in recent Olympic Games, Canada's policy goal should now be to "own the podium" in some of these important policy categories, rather than be middling at best in all of them.

Table 3: Components of Composite Categories	
Indicator (*indicators with negative influence in italics*)	**Weight (%)**
Human Capital, Excellence, Attractiveness to Knowledge Workers	**24.1**
• Post-secondary participation rate	1.3
• PISA scores (math, Science, Reading)	0.6
• Compulsory school time spent on arts subjects	0.6
• Adult literacy and numeracy scores	0.6
• Literacy of managers	0.6
• Number in top 100 most innovative universities ranking, per capita	5.1
• Overall excellence in university research	1.3
• Quality of management schools	1.3
• Number of arts and design schools in top 100, per capita	1.3
• Adaptation of training to business needs	1.3
• Youth enrollment in work-based technical and vocational training	1.3
• Ease of employing foreign skilled workers	1.3
• Number of foreign students	1.3
• Openness to immigration	1.3
• Unemployment rate for immigrants compared to native-born	1.3
• Freedom of information	1.3
• Personal Freedom	1.3
• Gender balance in traditionally underrepresented occupations	1.3
Access to Markets and Competition Regime	**12.7**
• Size of own GDP	2.5
• Access to markets through trade agreement	1.3
• *Trade partners' services trade restrictions*	0.6
• Trade partners' enforcement of IP rights	0.6
• *Public ownership of goods production*	0.6
• Governance of State-owned enterprises	0.6
• *Sectors exempt from antitrust*	0.6
• *Barriers to Foreign Direct Investment*	0.6
• Conduciveness of competition policy to competition	2.5
• Competition enforcement	2.5

Table 3: Continued	
Indicator (*indicators with negative influence in italics*)	**Weight (%)**
Efficiency and Transparency in Public Sector and Regulated Infrastructure	**5.1**
• Closeness to the Frontier of efficiency in core government services	1.9
• *Significance of the public sector in the delivery of public services*	0.6
• Ratio of Infrastructure efficiency to extent of Government Ownership/Intervention	1.3
• *Perception of corruption*	0.6
• Open government	0.6
Fiscal Regime	**8.9**
• International Tax Competitiveness Index	3.8
• Overall reliance on consumption vs. income taxation	3.8
• Tax treatment of philanthropic donations	1.3
Regulatory Environment	**7.6**
• Good regulatory policy and governance	1.3
• *Overlapping regulatory authorities*	1.3
• Acceptance of regulatory sandboxes	1.3
• Example of regulatory best practices: IT safety standards	0.6
• *Example of price control over innovative products: medicines*	0.6
• Efficiency of banking and financial supervision	0.6
• Competition regulation in the banking sector	0.6
• Flexibility of Workplace regulation	0.6
• Ease of business entry and exit	0.6
Intellectual Property Rules	**7.6**
• Extent of patent term restoration	1.3
• Enforcement of IP rights	1.3
• Participation in international IP agreements	1.3
• Significant scope of limitations and exceptions to copyrights and related rights	1.3
• Government participation in patent pools	1.3
• Formal technology transfer framework	1.3

Table 3: Continued

Indicator (*indicators with negative influence in italics*)	Weight (%)
Policies Promoting Acceptance of Innovation	**6.3**
• Reduction in inequality through tax and transfer system	0.6
• Effectiveness of social dialogue	1.3
• *Barriers to upward mobility*	1.3
• Income support in between jobs	0.6
• Retirement security	2.5
Government Direct and Indirect Support for Innovation	**27.8**
• Government funding for R&D as % of GDP	1.3
• Government direct R&D as a share of GDP	1.3
• Collaborative R&D tax credits	0.6
• Government direct military and aerospace R&D expenditures	0.6
• Leading-edge military equipment per capita	3.8
• Effectiveness of public procurement	0.6
• Thematic concentration of public funding for innovation	6.3
• Balance between direct funding and tax credits	5.1
• *Influence of economic stakeholders over public administration*	1.3
• Support for emerging dynamic sectors	1.3
• Quality of government research institutions	0.6
• Government-sponsored innovation marketplaces	5.1

Source: Authors' calculations.

References

Schwanen, Daniel. 2017. *Innovation Policy in Canada: A Holistic Approach*. Commentary 497. Toronto: C.D. Howe Institute. December 14.

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