

ECONOMIC VIEWPOINT

Public Policy to Promote Innovation in Canada: Lessons Learned from the World's Leading Countries

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Highlights

- ▶ Canada lags the G7 and much of the OECD in innovation and productivity and has for some time. This has been the leading cause of stagnation in real GDP per capita over the past decade and is putting Canada's high standard of living at risk.
- ▶ We live in an age of disruption. But Canada's patchwork of innovation policies has proven ineffective at closing the innovation gap with other countries. And even though the federal government has focused on innovation since 2015, it has failed to close or even maintain the gap with Canada's international peers. At best, it has merely slowed the decline.
- ▶ Research shows that the prevalence of small- and medium-sized enterprises (SMEs) in Canada is a key part of the explanation. Canadian SMEs are less productive than both larger companies and their US counterparts. And since SMEs in Canada make up a much larger share of domestic employment than in the US, their lower productivity is borne out at the national level.
- ▶ But while Canada is in line with other advanced economies in launching start-ups, where it falls short is in growing them to scale through supporting the commercialization of their innovations. In this context, one area where public policy can improve seems to be refocusing support toward fast-growing businesses. Current policy provides a disincentive for businesses to scale up, while not sufficiently assisting those growth-oriented companies that want to expand.
- ▶ Canada's innovation policy needs to be expanded to support growth, commercialization and early-stage investment in addition to research and development. In this regard, lessons can be learned from countries that are getting innovation policy right, including the US, Israel and South Korea. They have individually demonstrated leadership in policy areas such as legal and regulatory frameworks, human capital, innovation ecosystems, risk taking and leveraging comparative advantages.
- ▶ Lessons from other countries demonstrate that policy needs to attract and retain top research talent, accelerate the development of innovation networks, fund research in a targeted way that solves real-world problems, create a tax environment that rewards growth over size, and underpin an investment environment that would make Canada the envy of the world. Policy also needs to be supported by a long-term vision that is stable and independent of politics.
- ▶ All levels of government have roles to play in supporting Canadian firms in the creation and adoption of disruptive innovations. This isn't the next government's problem but one that needs to be addressed now. The living standards of all Canadians today and in the future depend on it.

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NOTE TO READERS: The letters k, M and B are used in texts and tables to refer to thousands, millions and billions respectively.

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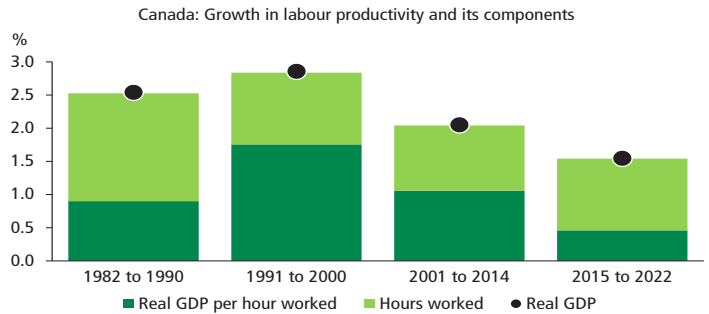
Innovation is the fundamental driver of productivity growth, which in turn leads to higher incomes and living standards. But Canada has been an innovation laggard for many years. This has been reflected in its moribund growth in productivity and real GDP per capita relative to its advanced economy peers. So, what are other countries doing right that we're not? And what can governments of all levels do to start closing the gap between Canada and the world's most innovative countries?

Why Canadians Are Concerned about Innovation and Productivity

Real GDP per capita has been a hot topic of conversation in Canada recently. Since this indicator is one of the broadest measures of living standards, Canada's underperformance relative to its advanced economy peers has rightly generated a lot of concern (graph 1). Not only is real GDP per capita lower, but the gap has been widening over the past decade. And while population growth is a contributing factor to this weakness, [our research](#) has shown that the primary driver is Canada's moribund productivity growth (graph 2). And the problem has only worsened through 2023.

Canadians are working hard, putting in more hours on average every week than most of Canada's G7 peers, and new childcare subsidies across the country should help to boost employment rates for mothers of young children. However, output and employment have shifted away from highly productive industries like mining and oil and gas extraction, toward lower productivity sectors such as accommodation and food services; arts, entertainment and recreation; and public administration. These are sectors that have experienced minimal labour productivity growth since 2015. And while low-for-long oil prices and uncertainty around the energy transition are largely to blame for falling investment in the Canadian energy sector, other sectors haven't stepped up to fill the gap.

GRAPH 2
Productivity Growth Is the Primary Source of Weak Real GDP Growth



Sources: Statistics Canada and Desjardins Economic Studies

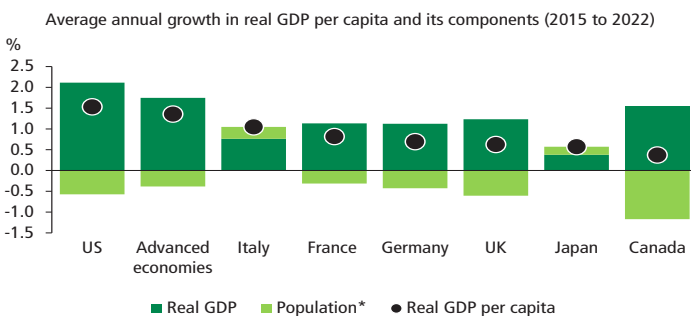
How Do Productivity, Innovation and Investment in Canada Compare to Other Countries?

Innovation plays a crucial role in driving productivity increases through new ideas, processes, technologies, products and services. Moreover, the creativity and "out-of-the-box thinking" needed to generate innovation can lead to increased collaboration, employee engagement and motivation. This can lead to higher productivity since the same inputs of capital and labour can generate greater output of goods and services. Finding ways to produce an equivalent level of output by using less of those inputs accomplishes the same thing.

So how does Canada stack up when compared to other countries? Not well. According to the OECD, Canada's productivity (measured as real GDP per hour worked) has been lagging most other G7 countries for some time, and the gap with the most productive countries—the US, Germany and France—is growing (graph 3).

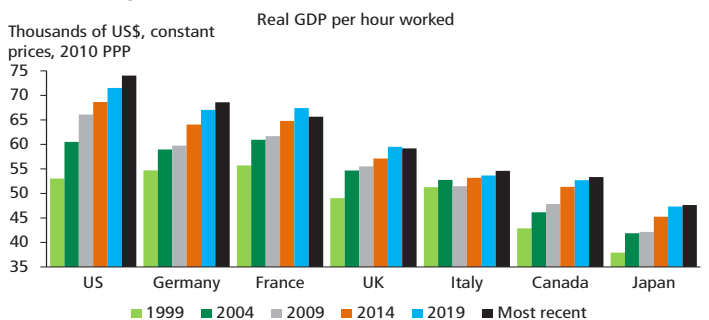
These moribund productivity numbers are mirrored by Canada's relatively lacklustre performance on innovation. According to the [Bloomberg Innovation Index](#), Canada didn't quite crack

GRAPH 1
Canada Has Had Extremely Low Real GDP per Capita Growth since 2014



*Positive population growth contributes negatively to growth in real GDP per capita
Sources: International Monetary Fund and Desjardins Economic Studies

GRAPH 3
Canada Has Consistently Lagged behind Its Peers in Labour Productivity



PPP: Purchasing power parity
Sources: Organisation for Economic Co-operation and Development and Desjardins Economic Studies

the top 20 most innovative countries in 2021, falling behind all other G7 countries as well as China, Australia, South Korea, Israel, and every Scandinavian country (graph 4). While Canada ranks fifth among the 60 countries examined in terms of patent activity, it falls in the bottom half of this group for manufacturing value-added and tertiary education. Canada also lags behind the most innovative countries in researcher concentration and high-tech density.

The Good, the Bad and the Ugly of Innovation Policy in Canada

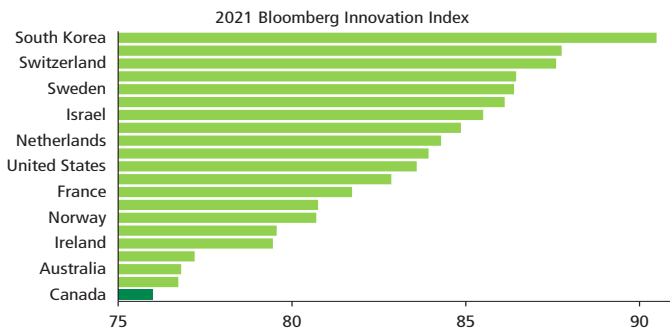
For decades, economists and policymakers have puzzled over how Canada can close the productivity gap with other countries, and particularly its neighbour to the south. [Drummond \(2011\)](#) catalogued the many policy changes which had tried and failed to move the needle on productivity in Canada up to that point. These included cutting corporate income taxes, engaging in international trade agreements, providing and expanding R&D tax credits, etc. The review of these largely ineffective policies led to the conclusion that it may not be a macroeconomic policy problem at all but rather something specific to firm-level behaviour. Some have suggested this may reflect a culture of risk aversion that is accompanied by low export activity and weak R&D spending ([Deloitte, 2012](#)).

In that context, research has found that both R&D spending and R&D productivity increase with firm size ([Knott and Vieregger, 2018](#)). And according [Statistics Canada \(2014\)](#), Canada's high share of SMEs helps explain much of its relatively low aggregate business-sector productivity. SMEs in Canada account for a higher share of total employment than in the US. They also have less than half the level of productivity of large firms, whereas in the US small businesses are only one-third less productive than their larger counterparts. Together, these two factors account for most of Canada's productivity gap with the US.

So what explains this SME productivity gap? In part, Canada has a problem scaling up companies. [Deloitte \(2012\)](#) concluded that while Canadians start firms at a rate similar to the rest of the OECD, growth in those firms tends to stagnate after 5 years of activity instead of accelerating like in other countries such as the US, Israel and Sweden. To overcome this 'failure to launch,' a multitude of policies have been recommended. These include everything from providing incentives for companies that are growing (as opposed to those that are small) and improving Canada's immigration system to creating more clusters and encouraging venture capital investment.

Government grants, loans and tax incentives help provide the funding needed to encourage R&D. However, research shows that while government tax credits and direct subsidies for R&D work, their impact is marginal. Hence, investment in R&D in Canada has been falling as a share of GDP for much of the 21st century (graph 6 on page 4). In contrast, it's risen in the US over the same period. Part of this may reflect the fact that tax incentives disproportionately target SMEs in Canada, which tend to produce fewer innovations per dollar of R&D spending ([Globerman, 2023](#)). One example is the Scientific Research and Experimental Development (SR&ED) Investment Tax Credit—which is expected to reach nearly \$4 billion in 2023. Analysis by [Lester \(2022\)](#) suggests that rebalancing this measure to focus more on larger firms would improve the impact of the measure on spurring R&D investment. (In [Budget 2022](#), the

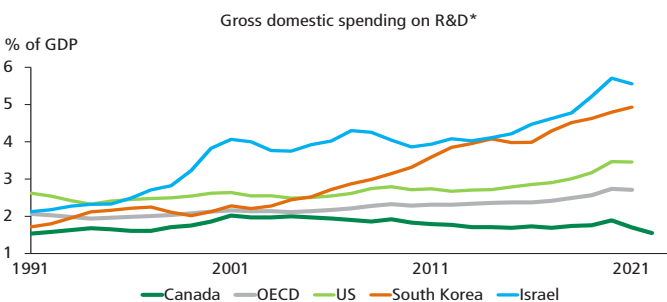
GRAPH 4
Canada Ranks Lower than Most Advanced Economies in Innovation



Sources: Bloomberg and Desjardins Economic Studies

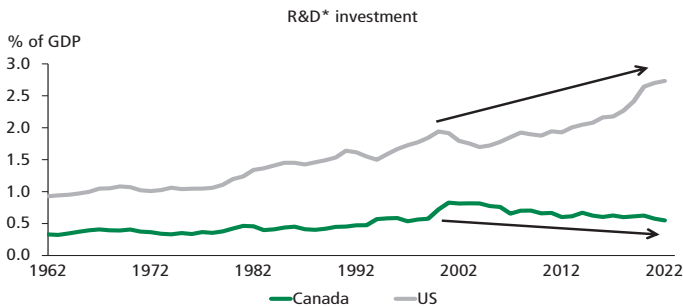
Canada's poor track record on innovation is often attributed to, at least in part, its lack of spending on research and development (R&D). According to data from the OECD, other than a short blip in 2020, Canada's spending on R&D as a share of GDP has been on a downward trajectory for the past two decades. Canada now has the second lowest level of R&D spending to GDP in the G7, followed only by Italy. And when considered in a longer historical context, the general downward trend in Canadian R&D investment stands in stark contrast to the OECD average and global outperformers in innovation and productivity (graph 5). The latter group includes Israel, Korea, and the United States, in that order.

GRAPH 5
Israel Leads the OECD in GDP Share of R&D Spending



* R&D: Research and development
Sources: Organisation for Economic Cooperation and Development (OECD) and Desjardins Economic Studies

GRAPH 6
R&D Investment in Canada Has Been Falling Behind



* R&D: Research and development
Sources: Finance Canada, Statistics Canada and Desjardins Economic Studies

federal government announced its intention to review the SR&ED program, but no substantive action has been taken to date.) Additionally, government subsidies tend to be bureaucratic and often accompanied by unrelated conditions to qualify. A recent example includes, but is not limited to, requiring companies to meet certain labour conditions to be eligible for a full [investment tax credit for clean technologies](#).

In Canada, nearly half of all patents for innovations created here end up in foreign hands ([Policy Options, 2019](#)). Many of these have been supported by public funds—from government grants or tax breaks, or because they were developed by publicly-funded universities. The loss of Canada’s best ideas is alarming. However, impeding the sale of intellectual property (IP) to international companies could be counterproductive to promoting more research and development in Canada. Instead, the federal government’s Intellectual Property Strategy, launched in 2018, should be evaluated and updated to expand strategies that support entities so they can file their IP in Canada and scale up here rather than sell to foreign companies.

In this context, an alternative to SR&ED and other R&D tax credits, which are tax breaks based on R&D spending, is what’s called a patent box. A patent box is a corporate tax regime whereby the taxes are reduced on profits earned on IP. Widely practiced across Europe and also in Quebec, the aim is to encourage and attract local R&D investment by providing a tax advantage ([Tax Foundation, 2023](#)). However, their effectiveness has come into question, with research suggesting that patent boxes are more likely to lead to international profit shifting to minimize global tax liabilities than encourage additional R&D investment and innovation ([NBER, 2018](#)). In addition, patent boxes make the corporate income tax system more complex, leading some researchers to suggest a more beneficial approach would be to lower the statutory corporate income tax rate instead ([Wilkie, 2021](#)).

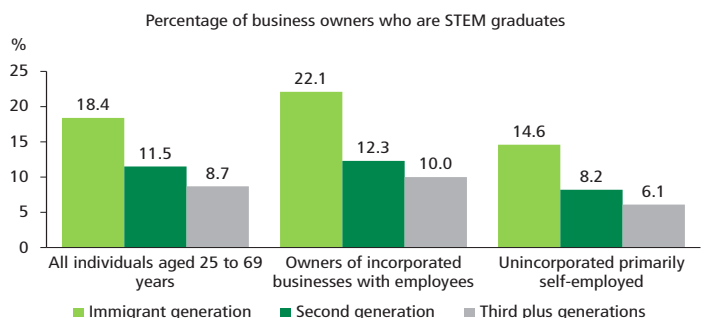
Research has found that higher taxes have a negative impact on innovation (as measured by patenting) and entrepreneurship

(typically measured by business start-ups). And there’s evidence that high marginal tax rates in Canada have encouraged out-migration of companies and individuals which are geographically mobile ([Globerman, 2023](#)). Interestingly, while productivity and real compensation growth are highly correlated in the United States, it is much less so in Canada. [Stansbury et al. \(2022\)](#) considered that this might be related to the fact that Canada is a smaller, more internationally open economy, and therefore some benefits of successful Canadian innovations may be reaped abroad. They find evidence that this is the case when looking at US states, as these are similarly small, open economies. Overall, this speaks to the importance of fostering a tax-friendly environment to not only grow innovative firms, but to keep them located in Canada as well.

Innovation is highly correlated with an education in the STEM fields. Governments can continue to promote education as well as retraining in these fields to ensure a pipeline of skilled workers who can drive innovation. In addition, prioritising immigration applicants with these skills, as well as international students studying in Canada, will further broaden the skilled worker base. (See our recent reports on how [immigration](#) leads to long-term economic success and the contribution of [international students](#).) New immigrants are not only more likely to work in science, technology, engineering and math (STEM) fields than workers born in Canada, but they are also more likely to start new businesses and engage in international trade (graph 7).

Public policy also plays a role in facilitating knowledge-sharing, collaboration, exchange of ideas and partnerships between academia, industry and government. These reduce so-called ‘systems failures,’ which are created by the inefficient sharing of information and high search costs. Policies supporting sandboxes or pilot programs allow innovators to test their ideas in a controlled manner. Examples include innovation clusters and public-private partnerships. Earlier this year, the OECD’s [SME and Entrepreneurship Outlook \(2023\)](#) observed that “clusters are often needed to create proximity and agglomeration benefits.”

GRAPH 7
Immigrant STEM Graduates Are More Likely to Own Businesses



Sources: Statistics Canada and Desjardins Economic Studies

Since 2018, the Government of Canada has invested nearly \$2 billion in [Global Innovation Clusters](#) (GICs or superclusters). These are focused on five specific areas: Digital Technology, Protein Industries, Advanced Manufacturing, Scale AI, and Ocean. Each of these clusters is located in regions which already had some critical mass of academic and entrepreneurial agglomeration that was intended to be leveraged for greater impact. Importantly, while the superclusters were launched in the same period, they don't have the same sector maturity. Next Generation Manufacturing (NGen), which is the organization leading the Global Innovation Cluster for Advanced Manufacturing, is the largest and most mature, while the Protein Industries and Ocean superclusters are more aspirational.

Overall, these have been slow to bear fruit. In 2020, the Parliamentary Budget Officer (PBO) conducted a preliminary analysis of the GICs and determined that the plan was slow to roll out, was overly ambitious in its expectation for boosting real GDP and employment and lacked quantifiable performance indicators ([PBO, 2020](#)). Supporters have pointed out that creating these innovation ecosystems is a long-term investment, and participating in them involved a change in mindset for researchers, companies and investors. Consequently, the success of the superclusters initiative won't be known for many years ([University Affairs, 2022](#)). Unfortunately, this makes the success or failure of the GICs difficult to assess in real time.

In contrast to the approach taken by the federal government, [Asselin and Speer \(2020\)](#) argued that Canada needs a more mission/challenge-driven industrial policy led by a Defense Advanced Research Projects Agency (DARPA)-type institution to address national needs in a shifting post-COVID geopolitical landscape. They argue that "... a modern industrial strategy would aim to build a comprehensive policy program around the most dynamic and productive parts of the economy, in order to build the scale necessary to compete in the intangibles economy." The authors argue that it should focus on areas of clear comparative advantage, such as agri-food, energy and renewables, health care and life sciences and advanced manufacturing. Arguably, GICs do focus on areas of comparative advantage to a large degree. However, their scattershot approach to project funding doesn't embrace the mission/challenge-driven approach followed by DARPA.

R&D is only one aspect of the innovation value chain. Analysis by [Plant \(2023\)](#) found that Canadian firms are being kept smaller and slower growing by maintaining the focus of government policies on R&D as opposed to scaling up. The recently announced Canada Investment Corporation (CIC) is meant to address this gap. Funded to the tune of \$2.6 billion over four years starting in 2023, the CIC is intended to work with the private sector by providing targeted support to Canadian businesses to help them innovate, commercialize and grow. In the same vein as DARPA, it is being promoted as an

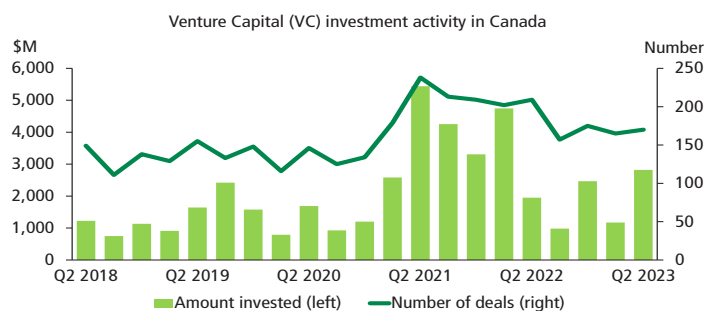
"operationally independent" and "outcome-driven organization" ([Government of Canada, 2023](#)). But much like GICs, the effectiveness of the CIC will only be known with certainty well into the future.

Policies promoting venture capital (VC) could also reduce financial barriers and attract foreign investment. Canadian growth-oriented SMEs face financing barriers that their American counterparts don't. Policy suggestions for helping to close this gap include "re-structuring the fee payment schedule on Canada Small Business Financing (CSBF) loans such that fees can accumulate over the loan's life and are repaid by a balloon payment at maturity." Another is a national co-investment fund that would invest alongside angel investors to leverage their investment and expertise ([Nitani and Nusrat, 2023](#)).

Other policies to promote VC investment range from reducing regulatory barriers and tax burdens to supporting networks and encouraging less equity-market fragmentation ([OECD, 2003](#)). At the same time, venture capital policy needs to be more consistent, accountable and transparent. It has to avoid program stickiness and allowing for experimentation to identify policies that improve the flow of capital to innovation firms ([Rémillard, 2017](#)). And in the absence of a national securities regulator, provinces also have an important role to play along with the federal government.

There is no time like the present to introduce policies to attract more investment to Canada. According to the Canadian Venture Capital and Private Equity Association ([CVCA, 2023](#)), investment in Canadian VC has fallen considerably as interest rates have risen substantially (graph 8). However, it remains robust compared to pre-COVID levels, demonstrating the resilience of the sector in the face of higher borrowing costs.

GRAPH 8
VC Investment Is Higher than Pre-COVID despite Rate Hikes



Sources: Canadian Venture Capital and Private Equity Association (CVCA) and Desjardins Economic Studies

What Are Other Countries Getting Right on Innovation?

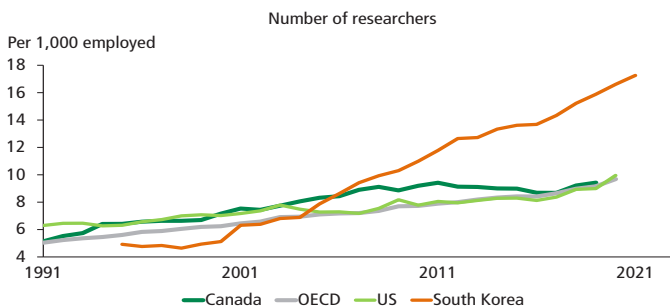
So, what sets other countries apart relative to Canada? Looking first to Israel, there are a few takeaways that stand out. The first is the push to attract high-skilled immigrants and foster an entrepreneurial, risk-taking culture. In Israel's case, inflows of high-skilled immigrants were particularly pronounced in the 1990s following the collapse of the Soviet Union. However, much like the technology sectors in other countries, Israel has been struggling with shortages of high-skilled labour more recently, in part because of a lack of diversity. Another lesson is the importance of sustained levels of public R&D investment, and of pairing this investment with programs designed to boost basic research and leverage economic strengths. Finally, it's important to focus public innovation support on areas of comparative advantage. In Israel's case, this is technology-intensive military services. For example, "the Israeli cybersecurity industry – making up 65% of all financial transactions conducted by software-related startups from 2017 to 2022 – is largely a byproduct of military crossover" ([Tomoshige and Glanz, 2022](#)).

South Korea's path to becoming a global innovation leader was based on a different approach. A focus on picking winners and protecting them from foreign competition while they move up the manufacturing and innovation value chain helped accelerate the transition starting in the 1960s. But even as its economy has become more open, South Korea has retained its innovation advantage. This in part reflects the close collaboration between government, industry and academia. Through the development of regional innovation centers, industry R&D and production infrastructure were brought together with local and national universities and research facilities. Importantly, this helped to facilitate the movement of talent between industry and academia at a pace that's unprecedented in other countries (graph 9). "The South Korean government's systematic approach has been the crucial factor in creating an innovative economy adept at turning ideas from laboratories into products and industries." ([Dayton, 2020](#)) The Asian nation's innovation outperformance also reflects public support for constructing ecosystems around solving

specific problems or developing specific industries, along with some tolerance for early but instructive failure.

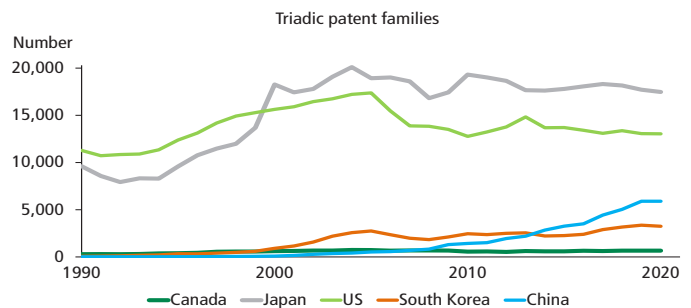
Finally, we have Canada's perennial innovation comparator, the United States. Market size is often cited as an important reason for the high level of US productivity, as companies have world-leading access to capital, labour, and consumer markets. This supports the development of larger companies, which are known to be generally more productive than SMEs and shows up in the enormous number of patents filed (graph 10). The number of graduate engineers is also seen as a key productivity driver. Investment in R&D, as well as tools and technology more generally, by both the private and public sectors is notable as well ([NBER, 2017](#)). The role of public R&D in the US was thoroughly discussed in Mariana Mazzucato's 2013 book, *The Entrepreneurial State*. Innovations such as the internet and the global positioning system (GPS) were developed by government agencies such as DARPA and ultimately made available for use by US and, eventually, foreign companies. DARPA's approach to R&D funding has been particularly successful, identifying a problem and then funding research intended to address it until viable solutions are found. According to [Mazzucato and Dibb \(2019\)](#), the conditions needed to support the success of this type of mission-driven model include: being bold and inspirational with wide social relevance; setting a clear direction that is targeted, measurable and time-bound; being ambitious but realistic; encouraging cross-disciplinary, cross-sectoral and cross-actor innovation; and selecting missions that are achievable by more than a single path or technology. Other programs that are widely viewed as a success in the US are the [Small Business Innovation Research and Small Business Technology Transfer](#) programs. These programs require federal agencies with annual R&D budgets of over \$100 million to allocate 3.2% of that budget to fund small businesses. This provides a first customer and potential use case for innovations that can support further commercialization and appeal to investors.

GRAPH 9
South Korea Leads to OECD in Share of Researchers Employed



Sources: Organisation for Economic Cooperation and Development (OECD) and Desjardins Economic Studies

GRAPH 10
Large Markets Like Japan and the US Dominate Patenting



Sources: Organisation for Economic Cooperation and Development (OECD) and Desjardins Economic Studies

So, the big takeaways from this survey of select, highly-innovative countries are:

1. *Establish a regulatory and legal framework that can promote innovation* by providing clarity and reducing barriers to entry. This helps minimize ‘market failures.’ Strong and enforceable intellectual property rights frameworks provide companies with the legal protection to commercialize their new products. By protecting their ability to profit from their ideas, companies are more likely to take the risks needed to innovate.
2. *Invest in human capital.* Developing, attracting and retaining top researchers is paramount to innovation success. This requires funding research conducted by post-secondary institutions, including basic research; easing restrictions on admissions of top international researchers and students; and providing financial support for students in STEM fields.
3. *Encourage researchers to have a close relationship with industry,* ensuring innovative ideas don’t just remain in the ivory tower. Free movement of researchers between industry and academia, as well as government, helps break down silos, encourages collaboration, and ensures expertise is developed and maintained. That also increases the likelihood that innovation will be practical and, ultimately, commercialized. This ‘clustering’ helps support network effects that promote innovation.
4. *Leverage a country’s comparative advantages,* whether it’s size (in the case of the US), sector concentration (in the case of Israel), etc., and target funding toward solving problems. Governments have an additional role to play by giving contracts to startups in the hope of helping to spur domestic innovation. Similarly, larger firms can also collaborate more with smaller, innovative companies.
5. *Foster a culture of risk taking.* The US is famous for this. Meanwhile, Israel and South Korea are countries that are constantly under threat and, hence, are known to view risk differently than in other developed markets. Indeed, as the pandemic has exemplified, it seems a sense of urgency is needed for innovation success. In other small economies like Sweden, a global mindset and concrete support for international commercialization have supported its world-leading innovation capacity.

Conclusion

Canada is less innovative and productive than its international peers and has been for some time. Despite policies introduced to help address this flagging performance, the gap has continued to grow. While the federal government has put innovation near the top of its agenda, the outcomes from the scattershot policies introduced since 2015 are widely considered to have fallen short. At best, the public policy environment looks to be slowing the pace at which Canada is falling behind as opposed to halting it or turning it around.

At the core, policies should create an environment that enables and promotes innovation. The innovation gap is fundamentally a systems problem. It requires a long-term vision and coordination between different initiatives and levels of government over a long period of time. Lessons from other countries demonstrate that policy needs to attract and retain top research talent, accelerate the development of innovation networks, fund research in a targeted way that solves real-world problems, create a tax environment that rewards growth over size, and underpin an investment environment that would make Canada the envy of the world.

The patchwork of policies currently being employed clearly aren’t working. All levels of government have roles to play in supporting Canadian firms in the creation and adoption of disruptive innovations. This isn’t the next government’s problem but one that needs to be addressed now. The living standards of all Canadians today and in the future depend on it.