



Who Are Canada's Key Mechanical Engineering Patent Holders?

A Comparative Analysis With U.S. Holders

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Key findings

- Patent ownership in mechanical engineering is not significantly different between Canada and the United States. On average across eight technology classes, the top 10 Canadian patent holders account for 17.5 per cent of total patents compared with 16.8 per cent in the U.S., a 0.7 percentage point gap that is not statistically significant.
- Most mechanical engineering fields are industry-driven in both Canada and the United States. In areas such as handling, transport, thermal processes, and mechanical elements, the top 10 patent holders are exclusively private companies in both countries, reflecting commercially oriented innovation systems in these areas.
- Patent ownership concentration varies widely across mechanical engineering technologies. Canada's top 10 patent holders account for only 4.1 per cent of patents in handling technologies but 45.8 per cent in engines, pumps, and turbines. This variation indicates uneven commercialization potential across technology areas under mechanical engineering.
- The field of engines, pumps, and turbines shows the highest concentration in Canada compared with the United States. Canada's top 10 patent holders capture 45.8 per cent of patents in this field versus 32.9 per cent in the United States.
- Canada shows higher concentration than the U.S. in special machines. Canada's top 10 patent holders account for 21.1 per cent of patents in this field compared with 10.2 per cent in the United States.



Comparing mechanical engineering patent holders

We identify Canada's top 10 patent¹ holders across eight technology classes in mechanical engineering and compare the patent ownership concentration with that of the United States.² Drawing on the analysis of 30,446 patent families for Canada and 733,511 for the U.S., we examine both the share of total patents held by leading organizations and the types of entities involved—private companies, universities, government agencies, and individuals. By offering a granular view of who is driving innovation in Canada, it complements the findings of *Intellectual Property in Canada: Technology Specialization and Competitive Advantage*, which mapped Canada's inventive strengths and weaknesses but did not identify the actors behind them. It offers two key insights:

- the degree of ownership concentration
- the commercialization potential of Canada's innovation system.

Because the U.S. operates at a vastly larger absolute scale of patenting, its commercialization potential is generally higher regardless of concentration levels. Therefore, when Canada exhibits higher concentration than the U.S. in a given field, this should not be interpreted as the U.S. being at a disadvantage.

Rather, it signals that Canada may have a stronger competitive footing within that specific technology class. In this context, the relationship between concentration and commercialization capacity is more meaningful for Canada than for the U.S., as concentration can help compensate for its smaller overall patenting base.

For policy-makers, this data helps identify key organizations for targeted support, whether through intellectual property policy or investment incentives.³ For innovators, it clarifies the competitive landscape and reveals potential partners for collaboration or licensing. From a national innovation system perspective, patents held by private companies are especially valuable, as they are more likely to be commercialized and scaled. Ultimately, this evidence-based approach informs innovation policy aimed at strengthening Canada's global competitiveness. See Exhibit 1 for a description on how to read the tables.

1 For ease of reference and simplicity, we use "patents" to refer to "patent families". A patent family is a collection of patents that are considered to cover a single invention. We focus on patent families instead of patents because individual patents inflate patent counts for companies as they file patents for strategic/litigation reasons other than simply disclosing a novel product or process.

2 While it is obvious that Canada and the U.S. differ considerably in economic size and overall patenting activity, this analysis does not aim to compare the absolute number of patents held by organizations in each country. Instead, it focuses on the share of total patents held by the top 10 patent holders and the composition of those organizations. These indicators are normalized and unaffected by the size differences between the two economies, allowing for meaningful insights into ownership concentration and commercialization potential.

3 While high market concentration can raise valid concerns about reduced competitiveness or monopolistic behaviour—particularly in consumer-facing sectors such as grocery retail or airlines—this dynamic differs in innovation-driven sectors. In these sectors, competition is global, and technological leadership is often determined by the ability to scale, attract talent, and invest in R&D.

Exhibit 1

Guide to reading tables

Name of the organization used in the patent application

Legal status of the entity: company, government, university, hospital, individual

Collection of patents corresponding to a single invention

Canada**United States**

Organization name	Type	Patent families	Share, per cent
Organization A			
Organization B			
Organization C			
Organization D			
Organization E			
Organization F			
Organization G			
Organization H			
Organization I			
Subtotal		N1	P1
General total		N2	P2

Organization name	Type	Patent families	Share, per cent
Organization A			
Organization B			
Organization C			
Organization D			
Organization E			
Organization F			
Organization G			
Organization H			
Organization I			
Subtotal		N3	P3
General total		N4	P4

Total number of active patent families owned by the top 10 Canada-based assignees in a particular technology field

Percentage of total number of active patent families owned by Canada-based assignees in a particular technology field

Total number of active patent families owned by U.S.-based assignees in a particular technology field

Percentage of total number of active patent families owned by U.S.-based assignees in a particular technology field

Total number of active patent families owned by Canada-based assignees in a particular technology field

Percentage of patent families owned by the top 10 Canada-based assignees in a particular technology field

Patent families owned by the top 10 U.S.-based assignees in a particular technology field

Percentage of patent families owned by the top 10 U.S.-based assignees in a particular technology field

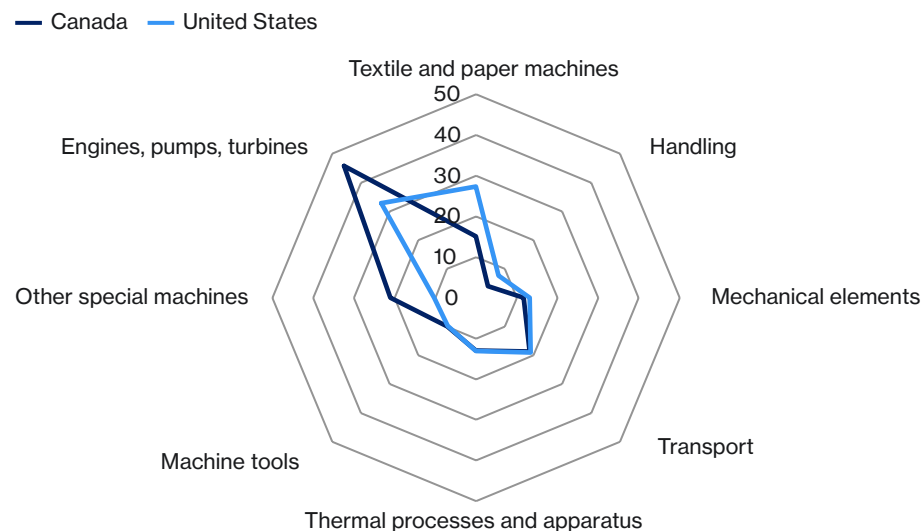
Source: Signal49 Research.

Across mechanical engineering technologies, Canada and the U.S. exhibit broadly similar levels of patent ownership concentration. (See Chart 1.) Canada shows higher concentration in a few areas, notably engines, pumps and turbines, and other special machines, where leading Canadian firms hold a larger share of total patents. Conversely, the U.S. displays higher concentration in textile and paper machines.

Chart 1

Concentration of patent family ownership in Canada is similar to that in the United States

(percentage of patent families owned by the top 10 organizations in respective countries)



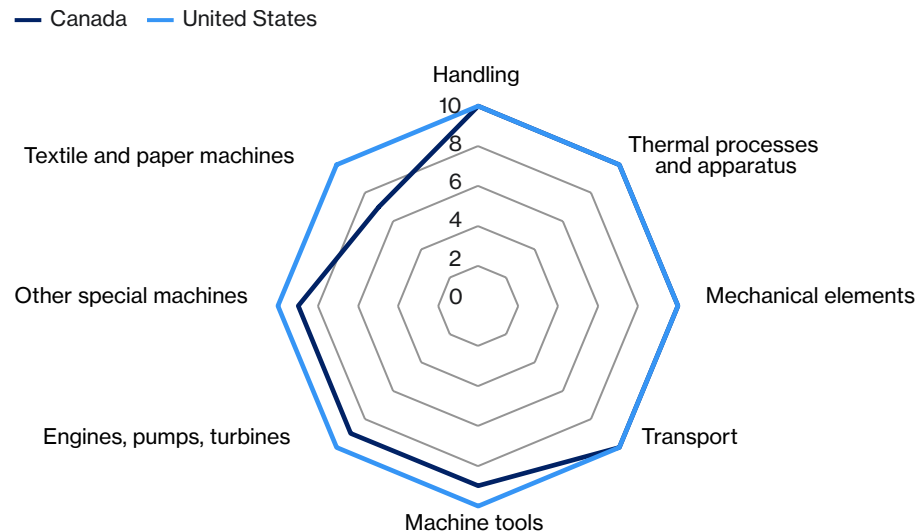
Source: Signal49 Research's analysis of the European Patent Office's PATSTAT Global patent dataset, 2024.

The private sector is dominant in both countries, with companies comprising the majority of top assignees across all mechanical engineering technologies. (See Chart 2.) This means that, despite some differences in the degree of public sector participation, innovation in mechanical engineering remains primarily industry-driven in both countries.

Chart 2

Private sector ownership of patent families in Canada is similar to that in the United States

(number of private companies in the top 10 organizations in respective countries)



Source: Signal49 Research's analysis of the European Patent Office's PATSTAT Global patent dataset, 2024.

Handling

- Canada's top 10 patent holders account for 4.1 per cent of handling technology patents, compared with 7.8 per cent in the U.S., indicating lower concentration in Canada, which may limit commercialization and scale-up in this field. (See Table 1.)
- In both countries, the top 10 patent holders are dominated by private companies, reflecting industry-driven innovation in this field.

Table 1

V3 Companies is the largest patent holder related to handling in Canada

Canada			
Organization name	Type	Patent families	Share, per cent
V3 Companies	Company	28	0.67
Alcan International	Company	21	0.51
CNH Industrial Canada	Company	19	0.46
Glopak	Company	17	0.41
Labatt Brewing Company	Company	16	0.37
ATS Automation Tooling Systems	Company	15	0.37
IPL Inc.	Company	14	0.34
Mpac-Langen	Company	14	0.34
Vanrx Pharmsystems	Company	13	0.30
Du Pont Canada	Company	12	0.29
Subtotal	n.a.	168	4.07
General total	n.a.	4,137	100

Source: Signal49 Research's analysis of the European Patent Office's *PATSTAT Global patent dataset*, 2024.



United States			
Organization name	Type	Patent families	Share, per cent
Otis Elevator Company	Company	2,127	2.17
Xerox	Company	1,072	1.09
Procter & Gamble Company	Company	1,022	1.04
Illinois Tool Works	Company	784	0.80
Kodak	Company	580	0.59
Mead Corporation	Company	492	0.50
Graphic Packaging International	Company	403	0.41
Pitney Bowes	Company	402	0.41
Coca-Cola Company	Company	390	0.40
IBM	Company	383	0.39
Subtotal	n.a.	7,655	7.80
General total	n.a.	98,091	100.00

Machine tools

- Canada's top 10 patent holders account for 10.0 per cent of machine tools patents, compared with 9.8 per cent in the U.S., indicating similar concentration in both countries. (See Table 2.)

Table 2

Magna is the largest patent holder related to machine tools in Canada

Canada			
Organization name	Type	Patent families	Share, per cent
Magna	Company	73	2.12
Pratt & Whitney Canada	Company	51	1.49
Alcan International	Company	48	1.42
Lee Valley Tools	Company	46	1.36
Novelis	Company	26	0.77
Ford Motor Canada	Company	22	0.65
Maxtech Manufacturing	Company	20	0.58
Forintek Canada Corporation	Company	20	0.58
National Research Council	Government	19	0.54
Shell Canada	Company	17	0.49
Subtotal	n.a.	342	10.00
General total	n.a.	3,419	100.00

Source: Signal49 Research's analysis of the European Patent Office's *PATSTAT Global patent dataset*, 2024.

- In both countries, the top 10 patent holders are dominated by companies, with Canada including one government organization.

United States			
Organization name	Type	Patent families	Share, per cent
GE	Company	1,322	1.61
Black & Decker	Company	1,297	1.58
Illinois Tool Works	Company	1,127	1.37
Boeing Company	Company	911	1.11
Kennametal	Company	738	0.90
IBM	Company	566	0.69
Gillette Company	Company	543	0.66
Applied Materials	Company	542	0.66
Lincoln Global	Company	490	0.60
United Technologies Corporation (Utc)	Company	468	0.57
Subtotal	n.a.	8,006	9.75
General total	n.a.	82,237	100.00

Mechanical elements

- Canada's top 10 patent holders account for 11.8 per cent of mechanical elements patents, compared with 13.2 per cent in the U.S., indicating lower concentration in Canada, which may limit commercialization and scale-up in this field. (See Table 3.)
- In both countries, the top 10 patent holders are dominated by private companies, reflecting an industry-driven innovation landscape.



Table 3

Litens Automotive Partnership is the largest patent holder related to mechanical elements in Canada

Canada			
Organization name	Type	Patent families	Share, per cent
Litens Automotive Partnership	Company	114	3.34
Pratt & Whitney Canada	Company	101	2.95
Bombardier	Company	32	0.92
Siemens Canada	Company	30	0.87
Ford Motor Canada	Company	29	0.83
Schlumberger Canada	Company	23	0.68
Dana Canada Corporation	Company	22	0.63
Ventra Group	Company	18	0.53
Linamar Corporation	Company	18	0.51
Velan	Company	16	0.48
Subtotal	n.a.	403	11.74
General total	n.a.	3,428	100

Source: Signal49 Research's analysis of the European Patent Office's *PATSTAT Global patent dataset*, 2024.

United States			
Organization name	Type	Patent families	Share, per cent
GM	Company	3,457	3.58
Ford	Company	1,435	1.48
Eaton Corporation	Company	1,377	1.42
Borg-Warner Corporation	Company	1,143	1.18
Caterpillar	Company	1,078	1.11
GE	Company	963	1.00
Illinois Tool Works	Company	955	0.99
John Deere	Company	917	0.95
Dana Corporation	Company	769	0.79
Boeing Company	Company	669	0.69
Subtotal	n.a.	12,762	13.19
General total	n.a.	96,702	100.00

Thermal processes and apparatus

- Canada's top 10 patent holders account for 13.0 per cent of thermal process and apparatus patents, compared with 13.1 per cent in the U.S., indicating similar concentration in both countries. (See Table 4.)
- In both countries, the top 10 patent holders are dominated by private companies, reflecting an industry-driven innovation landscape in this field.

Table 4

Dana Canada Corporation is the largest patent holder related to thermal processes and apparatus in Canada

Canada			
Organization name	Type	Patent families	Share, per cent
Dana Canada Corporation	Company	108	5.07
Pratt & Whitney Canada	Company	29	1.35
Long Manufacturing	Company	26	1.22
E.H. Price	Company	19	0.91
Hatch	Company	18	0.85
Nortek Air Solutions Canada	Company	18	0.82
Thermal Energy International	Company	17	0.77
Novelis	Company	15	0.70
Alcan International	Company	14	0.67
MICLAU - S.R.I. Inc.	Company	14	0.63
Subtotal	n.a.	278	12.98
General total	n.a.	2,138	100

United States			
Organization name	Type	Patent families	Share, per cent
Carrier Corporation	Company	1,571	3.81
GE	Company	852	2.07
Honeywell International	Company	528	1.28
Whirlpool Corporation	Company	443	1.08
Johnson Controls Technology Company	Company	392	0.95
Haier US Appliance Solutions	Company	375	0.91
Westinghouse	Company	357	0.87
Modine Company	Company	311	0.75
Babcock & Wilcox Company	Company	300	0.73
Lennox Industries	Company	275	0.67
Subtotal	n.a.	5,406	13.12
General total	n.a.	41,196	100.00

Source: Signal49 Research's analysis of the European Patent Office's *PATSTAT Global patent dataset*, 2024.

Textile and paper machines

- Canada's top 10 patent holders account for 15.1 per cent of textile and paper machine patents, compared with 28.3 per cent in the U.S., indicating lower concentration in Canada, which may limit commercialization and scale-up in this field. (See Table 5.)
- In both countries, the top 10 patent holders are dominated by private companies, with Canada also including one government entity, one not-for-profit organization, and one university.

Table 5

Pulp and Paper Research Institute is the largest patent holder related to textile and paper machines in Canada

Canada			
Organization name	Type	Patent families	Share, per cent
Pulp and Paper Research Institute	Government	41	3.31
Elcorsy	Company	24	1.95
Carding Specialists	Company	24	1.91
FPInnovations	Non-profit	20	1.61
Domtar	Company	20	1.59
Astenjohnson	Company	13	1.07
Creo	Company	13	1.01
NCR Corporation	Company	12	0.93
University of New Brunswick	University	11	0.89
V3 Companies	Company	10	0.84
Subtotal	n.a.	188	15.10
General total	n.a.	1,247	100

Source: Signal49 Research's analysis of the European Patent Office's *PATSTAT Global patent dataset*, 2024.

United States			
Organization name	Type	Patent families	Share, per cent
HP	Company	2,704	5.09
Kodak	Company	2,443	4.60
Xerox	Company	2,217	4.17
HP	Company	1,552	2.92
Dupont	Company	1,508	2.84
Kimberly-Clark Corporation	Company	1,086	2.05
IBM	Company	927	1.75
Procter & Gamble Company	Company	903	1.70
Lexmark International	Company	605	1.14
Singer Company	Company	549	1.03
Subtotal	n.a.	14,497	27.29
General total	n.a.	53,122	100.00

Transport

- Canada's top 10 patent holders account for 19.0 per cent of transport technology patents, compared with 19.1 per cent in the U.S., indicating similar concentration in both countries. (See Table 6.)
- In both countries, the top 10 patent holders are dominated by private companies, reflecting an industry-driven innovation landscape in this field.

Table 6

Magna is the largest patent holder related to transport in Canada

Canada			
Organization name	Type	Patent families	Share, per cent
Magna	Company	403	6.31
Bombardier	Company	318	4.98
Pratt & Whitney Canada	Company	116	1.81
Soucy International	Company	94	1.48
National Steel Car	Company	78	1.22
Ford Motor Canada	Company	52	0.82
Decoma E.s.e.	Company	49	0.77
Multimatic	Company	32	0.50
Camso	Company	27	0.42
Safran Landing Systems Canada	Company	24	0.38
Subtotal	n.a.	1,194	18.69
General total	n.a.	6,387	100.00

Source: Signal49 Research's analysis of the European Patent Office's *PATSTAT Global patent dataset*, 2024.



United States			
Organization name	Type	Patent families	Share, per cent
Ford	Company	9,808	6.60
GM	Company	6,630	4.47
Boeing Company	Company	3,544	2.38
Goodyear Tire & Rubber Company	Company	1,475	0.99
Delphi Technologies	Company	1,245	0.84
John Deere	Company	1,231	0.83
Lear Corporation	Company	1,206	0.81
Toyota North America	Company	1,090	0.73
GE	Company	1,073	0.72
Caterpillar	Company	1,035	0.70
Subtotal	n.a.	28,338	19.07
General total	n.a.	148,625	100.00

Other special machines

- Canada's top 10 patent holders account for 21.1 per cent of patents in other special machines, compared with 10.2 per cent in the U.S., indicating higher concentration in Canada, which gives Canada a stronger chance to compete in this field. (See Table 7.)
- In both countries, the top 10 patent holders are dominated by private companies, with each list also including one government entity.

Table 7

Husky Injection Molding System is the largest patent holder related to other special machines in Canada

Canada				United States			
Organization name	Type	Patent families	Share, per cent	Organization name	Type	Patent families	Share, per cent
Husky Injection Molding System	Company	352	5.62	John Deere	Company	3,105	2.54
CNH Industrial	Company	316	5.04	Government of the United States of America	Government	1,836	1.50
Mold-Masters	Company	196	3.13	Boeing Company	Company	1,287	1.05
MacDon Industries	Company	191	3.04	CNH Industrial America	Company	1,242	1.02
Bourgault Industries	Company	64	1.03	Corning	Company	1,157	0.95
Government of Canada	Government	53	0.85	GE	Company	1,118	0.92
Magna	Company	48	0.77	Goodyear Tire & Rubber Company	Company	805	0.66
Du Pont Canada	Company	42	0.67	Dupont	Company	786	0.64
Crystal Spring Colony Farm	Company	30	0.49	Dow Chemical Company	Company	593	0.49
V3 Companies	Company	25	0.40	HP	Company	573	0.47
Subtotal	n.a.	1,319	21.05	Subtotal	n.a.	12,503	10.24
General total	n.a.	6,268	100	General total	n.a.	122,185	100.00

Source: Signal49 Research's analysis of the European Patent Office's PATSTAT Global patent dataset, 2024.

Engines, pumps, turbines

- Canada's top 10 patent holders account for 45.8 per cent of engines, pumps, and turbines patents, compared with 32.9 per cent in the U.S., indicating higher concentration in Canada, which gives Canada a stronger chance to compete in this field. (See Table 8.)

- In both countries, the top 10 patent holders are dominated by private companies, with Canada also including one government entity.

Table 8

Pratt & Whitney Canada is the largest patent holder related to engines, pumps, turbines in Canada

Canada				United States			
Organization name	Type	Patent families	Share, per cent	Organization name	Type	Patent families	Share, per cent
Pratt & Whitney Canada	Company	1,017	29.72	GE	Company	9,215	10.09
Siemens Canada	Company	195	5.69	Ford	Company	5,139	5.62
Atomic Energy of Canada	Government	98	2.86	United Technologies Corporation (Utc)	Company	4,477	4.90
Westport Power	Company	81	2.38	GM	Company	3,316	3.63
Schlumberger Canada	Company	46	1.35	Westinghouse	Company	1,964	2.15
Ford Motor Canada	Company	38	1.10	Caterpillar	Company	1,929	2.11
Litens Automotive Partnership	Company	28	0.82	Raytheon Technologies Corporation	Company	1,277	1.40
Bombardier	Company	25	0.74	Borg-Warner Corporation	Company	936	1.02
Magna	Company	23	0.67	Delphi Technologies	Company	912	1.00
Stackpole International	Company	15	0.43	Honeywell International	Company	864	0.95
Subtotal	n.a.	1,567	45.77	Subtotal	n.a.	30,029	32.87
General total	n.a.	3,423	100	General total	n.a.	91,354	100.00

Source: Signal49 Research's analysis of the European Patent Office's *PATSTAT Global patent dataset*, 2024.

Appendix A

Methodology

About the research

This data briefing investigates the concentration of patent ownership in Canada's innovation system by identifying the top 10 patent holders in mechanical engineering and eight technology classes and comparing their share of total patents with that of their U.S. counterparts. (See Table 1.)

Table 1
Technical descriptions of technology areas in mechanical engineering

Code	Technology	Description
25	Handling	Comprises elevators, cranes or robots, but also packaging devices.
26	Machine tools	Referring to turning, boring, grinding, soldering, or cutting with a focus on metals.
27	Engines, pumps, turbines	This field covers non-electrical engines for all types of applications. In quantitative terms, applications for automobiles dominate.
28	Textile and paper machines	The fields 27 and 28 cover machines for specific production purposes. Textile and food machines represent the most relevant part of these machines and are classified separately.
29	Other special machines	Areas not covered in fields 26, 27, 28 such as 3D printing.
30	Thermal processes and apparatus	Steam generation, combustion, heating, refrigeration, cooling or heat exchange.
31	Mechanical elements	Fluid-circuit elements, joints, shafts, couplings, valves, pipe-line systems or mechanical control devices. The focus is on engineering elements of machines such as joints or couplings.
32	Transport	All types of transport technology and applications with dominance of automotive technology.

Source: Schmoch.

The central research question is:

How does the concentration of patent ownership within Canada compare with that of the United States across major technology classes, and what do these differences imply for each country's commercialization potential and innovation leadership?

Although Canada and the U.S. differ greatly in the overall scale of their innovation systems, comparing how concentrated patent ownership is within each country provides useful insight. The purpose of this comparison is not to evaluate which country has more patents overall, but to understand the structure of patent ownership inside each national system. Firms ultimately compete globally, but they must first develop scale, capabilities, and market presence in their domestic markets. By examining concentration within Canada and within the U.S.—across the same technology classes—we can assess whether Canada has sufficiently large innovation actors in each domain to support domestic commercialization and, eventually, global competitiveness.

By analyzing both the distribution of patents and the types of entities involved—private firms, universities, government agencies, and individuals—we peer into the structural dynamics of Canada's innovation ecosystem. A higher concentration of patents among top holders typically signals stronger commercialization capacity, which is increasingly recognized as a key determinant of invention value.¹ In contrast, a more diffuse ownership structure may reflect barriers to scaling and market deployment, particularly when patents are held by actors with limited commercialization capabilities.² This research builds on previous work³ mapping Canada's technological strengths by adding a critical layer of analysis—identifying who holds the patents and what that means for Canada's global competitiveness.

Observations in these analyses are on patent families (i.e., European Patent Office worldwide bibliographic data [DOCDB]). A simple patent family is “a collection of patent documents that are considered to cover a single invention. The technical content covered by the applications is identical. Members of a simple patent family have the same priorities.”⁴

Detailed methodology

Determining the location of patent holders

Patent holder location in this analysis is determined based on the address provided in patent applications, meaning that branch offices or subsidiaries of multinational companies located in Canada are treated as Canada-based entities. This geographic or jurisdictional designation reflects where the inventive activity originated from, rather than the nationality of the company or the location of its global headquarters. As described below, the PATSTAT Global Database supports this kind of geographic analysis since it removes instances where multiple patents are granted in different jurisdictions for the same patent.

Determining the governmental status of patent holders

We report patent holder names exactly as they appear in patent applications. In cases where multiple government agencies are listed as assignees, we did not aggregate them under a single government category. For example, although the National Research Council is an agency of the Government of Canada, it appears as a separate legal entity in the patent database. We made this choice to reflect how distinct government bodies claim intellectual property rights domestically and internationally. Because patents can be jointly owned in some rare cases, assigning each patent to all listed assignees means that counts within a technology class may sum to more than 100 per cent. This does not affect the underlying interpretation but should be kept in mind when reading concentration figures.

1 Arora and others, “Invention value, inventive capability and the large firm advantage”; and Athreye and others, “Small firms and patenting revisited.”

2 Statistics Canada, “Size counts”; and Hsu and others, “Benchmarking U.S. university patent value and commercialization efforts.”

3 Sonmez, *Intellectual Property in Canada*.

4 European Patent Office, “DOCDB simple patent family.”

Data source

We used PATSTAT Global Database 2024 autumn edition, the same source used in the companion impact paper. PATSTAT enables comprehensive tracking of simple patent families, linking related filings across jurisdictions to eliminate double-counting and provide a consolidated view of inventions. Crucially, PATSTAT includes organizational-level ownership data, allowing us to identify the top patent holders within each technology class and assess their relative concentration. This approach supports a more accurate and jurisdictionally grounded understanding of innovation leadership in Canada.

However, this database comes with a few limitations that affect how the results can be interpreted. First, PATSTAT has an inherent 18-month publication lag, meaning that 2022 is the most recent year with full coverage, 2023 is only partially observed, and records for 2024–25 remain incomplete. Because our analysis relies primarily on fully observed years and focuses on structural patterns rather than exact patent totals, the core findings remain valid; the main implication is simply that point estimates for the latest years may shift modestly downward as the database is updated. Second, PATSTAT links related patents from different countries into families to avoid duplication, and the European Patent Office (EPO) provides detailed coverage information in its *Data Catalogue PATSTAT Global*.⁵ However, EPO also notes that ownership data is accurate only to the extent that national offices share change-of-ownership records with it.

Assessing patent ownership concentration for technology classes

Patent ownership concentration

To test the difference between the share of patents held by the top 10 organizations in Canada and the U.S., we employed a two-proportion z-test:

1. Sample parameters

- n_1, n_2 : These represent the total number of patent families (i.e., the sample sizes) within the specific technology field for Canada (n_1) and the United States (n_2).
- x_1, x_2 : These denote the number of patent families held by the top 10 organizations in Canada (x_1) and in the United States (x_2).
- $\hat{p}_1, \hat{p}_2$: These are the observed sample proportions (or shares) of patent families held by the top 10 organizations in each country. The sample proportion is calculated as:

$$\hat{p} = \frac{x}{n}$$

2. Pooled proportion ($\bar{p}$)

The pooled proportion represents the estimated common proportion under the null hypothesis that the two population proportions are equal ($H_0: p_1 = p_2$). It is calculated as:

This value combines the observed “counts” from both samples and expresses them as a single weighted average.

$$\bar{p} = \frac{x_1 + x_2}{n_1 + n_2}$$

3. Standard error (SE)

The estimated standard error of the difference between the two independent proportions:

$$SE = \sqrt{\bar{p}(1 - \bar{p})\left(\frac{1}{n_1} + \frac{1}{n_2}\right)}$$

4. Test statistic (z)

The z-score measures the number of standard errors the observed difference ($\hat{p}_1 - \hat{p}_2$) is from zero:

$$z = \frac{\hat{p}_1 - \hat{p}_2}{SE}$$

The z-score quantifies the number of standard deviations the observed difference lies from the null hypothesis (i.e., no difference in proportions), where an absolute value exceeding 1.96 indicates that the difference between the Canadian and U.S. shares is statistically significant at the 95 per cent confidence level.

⁵ European Patent Office, *Data Catalogue PATSTAT Global*.

Private company dominance rule in the composition of top patent holders

To assess who drives patenting activity within each field, we classify a technology area as private sector–dominated in Canada when seven or more of the top 10 patent holders are private companies. Only when four or more non-private organizations (government entities, universities, or hospitals) appear in the top 10 do we describe the public sector as playing a major role.

Statistical testing for the concentration across eight technology classes

To evaluate whether the concentration of patent ownership among the top 10 holders differs meaningfully between Canada and the U.S., we conducted a paired sample t-test across eight technology classes. This statistical test is appropriate because the data is paired by technology class—each class has a corresponding concentration value for both countries.

Statistical framework

- Null hypothesis (H_0): There is no difference in the average share of patents held by the top 10 organizations between Canada and the U.S. across technology classes.
- Alternative hypothesis (H_1): There is a statistically significant difference in the average top 10 patent holder share between the two countries.

Procedure

1. For each of the eight technology classes, we calculated the share of total patents held by the top 10 organizations in both Canada and the United States.
2. We then computed the difference in concentration for each class (Canadian share minus U.S. share).
3. A paired t-test was applied to determine whether the mean of these differences is statistically significantly different from zero.

Results

- Mean difference: 0.76 percentage points
Canadian top 10 holders have a slightly higher average concentration than their U.S. counterparts)
- p-value: 0.795
(Not statistically significant)

Appendix B

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