

## Economic and Social Reports

# Intellectual property in the context of firms' exit strategies: The role of patents



by Chahreddine Abbes, Amélie Lafrance-Cooke, and  
Nicholas Johnston

Release date: June 25, 2025



Statistics  
Canada

Statistique  
Canada

Canada

---

## How to obtain more information

For information about this product or the wide range of services and data available from Statistics Canada, visit our website, [www.statcan.gc.ca](http://www.statcan.gc.ca).

You can also contact us by

**Email at** [infostats@statcan.gc.ca](mailto:infostats@statcan.gc.ca)

**Telephone**, from Monday to Friday, 8:30 a.m. to 4:30 p.m., at the following numbers:

- Statistical Information Service 1-800-263-1136
- National telecommunications device for the hearing impaired 1-800-363-7629
- Fax line 1-514-283-9350

## Standards of service to the public

Statistics Canada is committed to serving its clients in a prompt, reliable and courteous manner. To this end, the Agency has developed standards of service which its employees observe in serving its clients. To obtain a copy of these service standards, please contact Statistics Canada toll-free at 1-800-263-1136. The service standards are also published on [www.statcan.gc.ca](http://www.statcan.gc.ca) under “Contact us” > “[Standards of service to the public.](#)”

## Note of appreciation

Canada owes the success of its statistical system to a long-standing partnership between Statistics Canada, the citizens of Canada, its businesses, governments and other institutions. Accurate and timely statistical information could not be produced without their continued co-operation and goodwill.

Published by authority of the Minister responsible for Statistics Canada

© His Majesty the King in Right of Canada, as represented by the Minister of Industry, 2025

Use of this publication is governed by the Statistics Canada [Open Licence Agreement](#).

An [HTML version](#) is also available.

*Cette publication est aussi disponible en français.*

---

# Intellectual property in the context of firms' exit strategies: The role of patents

by *Chahreddine Abbes*, *Amélie Lafrance-Cooke* , and *Nicholas Johnston*

DOI: <https://doi.org/10.25318/36280001202500600005-eng>

## Abstract

By focusing on exits, their characteristics, patenting behaviour and the possible reasons behind exits, the paper provides a first attempt to answer the following question: What is the role of patents in firms' exit strategies?

While most exits can be the direct result of small and medium-sized enterprises' failure to compete in a private market for various reasons, when exits involve intellectual property (IP), the situation may require thorough analysis because IP may play a double role. It can be a valuable asset to attract investors, and secure financing, therefore improving firms' odds of survival and delaying exit (patent survival effect). On the other hand, IP can also be a very attractive asset for incumbents to acquire, accelerating exit from the market through mergers and acquisitions (patent trigger effect).

Using data from Statistics Canada's Canadian Patent Research Database and National Accounts Longitudinal Microdata File, this paper provides a detailed analysis of the role played by patents in the context of exits.

The paper finds that firms that patent are more likely to be larger, to perform research and development, export their products, and be alive seven years after entry relative to businesses that do not patent. Furthermore, while the patent survival effect is estimated at a statistically significant 4.5%, the trigger effect was positive but not significant when regressing a fully specified model.

## Authors

Chahreddine Abbes and Nicolas Johnston are with Innovation, Science and Economic Development Canada. Amélie Lafrance-Cooke is with the Economic and Social Analysis and Modelling Division, Analytical Studies and Modelling Branch, at Statistics Canada.

## Acknowledgments

The authors would like to thank Danny Leung, Teodora Cosac, Jiang Beryl Li, Parisa Pourkarimi, Ryan Macdonald and Philippe Kabore for their helpful comments.

## Introduction

In his book *Capitalism, Socialism and Democracy*, Joseph Schumpeter (1942) introduced the “gale of creation destruction” as the incessant product and process innovation mechanism by which new production units replace outdated ones. This restructuring process is behind not only long-term economic growth, but also economic fluctuation and market adjustments. When explaining the power of productivity, Schumpeter argued that innovation is the driving force behind long-term economic growth and that the creation of new industries cannot go forward without destroying the pre-existing order. Unable to compete, firms and business sectors are forced to disappear to make room for new and modern activities capable of better serving the changing needs of markets. According to Caballero and Hammour (1994), in the long run, the process of creative destruction is responsible for 50% of productivity growth.

While most exits consist of start-ups and small and medium-sized enterprises (SMEs) that failed to compete in a private market for various reasons, when the exit involves intellectual property (IP) rights, those rights may have different roles in triggering an exit or delaying it. In fact, the same way an IP right can be a great asset to attract investors and secure financing delaying therefore any exit, it can also be perceived as a great asset to seek in merger and acquisition (M&A) transactions, therefore accelerating businesses' exit from the market.

In today's knowledge-based economy, IP rights, such as patents, trademarks, copyrights and industrial designs, are designed to secure exclusivity over the exploitation of innovations, creative designs and business methods, preventing anyone else from exploiting the inventions without the IP right owner's permission.<sup>1</sup> Perceived as assets, IP rights are used in more complex business strategies to secure financing from venture capitalists, used defensively as a bargaining chip to negotiate favourable cross-licensing terms, or used offensively to prevent entry, protect market share or to fight alleged infringers. (Hall et al. 2014, Gallini 2012, and Eckert & Langinier 2011). A patent, one of the most used forms of IP rights, can be defined as an IP right granted by the government to an inventor to exclude others from making, using or selling their invention without authorization.

When assessing the patenting activity of Canadian firms in the United States, the Impact Center (2017) reached the conclusion that, in 2016, 58% of grants to Canadian inventors were assigned to companies domiciled in other countries, up from 45% in 2005. The study argues that Canada is earning a return through the commercialization of less than half of the patents granted to Canadian inventors in the United States. Therefore, it is important to understand that Canada's critical issue is not about turning inventions into innovations: it is more about retaining the economic and social benefits from its innovation activities.<sup>2</sup> In other words, studying exit strategies makes a contribution to this literature.

Greenspoon and Rodrigues (2017) show that despite a decrease in research and development (R&D) spending in Canada over the period from 2000 to 2014, the total number of grants to Canadians has increased significantly. However, with respect to Canadians' ability to commercialize their IP, using data on Patent Cooperation Treaty (PCT) applications by Canadian residents and grants to Canadian assignees, the authors reached the conclusion that Canadian “assignees” own the rights to less than four-fifths of all patents that Canadians invent. The authors argue that many Canadian inventions end up being owned by foreign companies, and the gap between patent applications by Canadian inventors and patents assigned to Canadians has been increasing over time, from 9% in 2000 to 22% in 2014.

Over the last two decades, researchers' and policy makers' understanding of firm exits has evolved considerably from treating exits as a homogenous event when firms terminate their business activities as

---

1 For more details, visit [http://www.global-innovation.net/innovation/Innovation\\_Definitions.pdf](http://www.global-innovation.net/innovation/Innovation_Definitions.pdf).

2 The Impact Center (2017), “Canada Patent Puzzle”

a result of their lack of efficiency and market selection, to a more heterogeneous event. This event can be associated with the form of exit (bankruptcy, voluntary liquidation and M&A), the motivations behind the exit (multiple stakeholders may have different motivations), and the different contexts in which the exit took place (economic recessions, business cycles and institutional contexts).

As stated by Cefis et al. (2022), an exit can also be the result of an M&A business transaction. Considered as a positive or profitable way of exiting the market, in comparison with neutral exit (voluntary liquidation or closure) or bankruptcy, business owners may end up selling off their business for various reasons. For example, small and innovative firms may perceive M&A as a harvest strategy to cash in the profit or gain as their businesses start growing as a result of a breakthrough innovation or IP filings and become an attractive target for large firms. When the acquisition involves an acquiree with IP rights, that fact may be the main reason behind such acquisition. In addition, when the acquirer is a foreign company, many researchers and decision makers may see it as IP leakage.

By focusing on exits, M&A and patenting activity, this paper provides a first assessment of the role of patents in firms' exit decisions. Using data from the Canadian Patent Research Database (CPRD) and the National Accounts Longitudinal Microdata File (NALMF) to track exits for cohorts of new firms, the paper explores the following questions: What is the role of patents in firms' exit decision? And more specifically: To what extent does owning patents contribute to firm survival (patent survival effect) or to exiting the market via M&A (patent trigger effect)?

The rest of the paper is structured as follows: Section I describes the data and methodology used, Section II provides descriptive statistics and empirical analysis on the impact of patents in the context of an exit, and the last section provides some concluding remarks.

## Data and methodology

The data source used in this study is the CPRD.<sup>3</sup> This database was created by linking the European Patent Office Worldwide Patent Statistical Database (PATSTAT)<sup>4</sup> to Statistics Canada's administrative data on firms. PATSTAT provides data on the patent applications of Canadian-resident businesses in Canada and also at IP offices around the world. For the purposes of this study, the CPRD is linked to Statistics Canada's NALMF, which contains information on firms' characteristics, such as sales, employment, R&D expenditures, tangible and intangible assets, and export activities.

To identify exits, the paper focuses on the period from 2001 to 2019 to select a sample of businesses that respond to the following criteria:

- The business entered the market between 2002 and 2012 (entrants).
- The business has employed at least one person and has assets in each of the first three years.
- The business is not in public administration (North American Industry Classification System [NAICS] code 91).

3. See Abbes et al. (2022a) and Abbes et al. (2022b) for more information about the CPRD.

4. See [European Patent Office Worldwide Patent Statistical Database](#).

An equation is estimated to determine the probability that the business is active seven years after entry. To be considered active, a business must have revenue, assets and employ at least one worker. Specifically, the study estimates the following:

$$Active_{i,t+7} = \left\{ \begin{array}{l} 1 \text{ if } \alpha_0 X_{i,3} + \alpha_1 patent_{i,3} + \varepsilon_{i,t+7} > 0, \\ 0 \text{ otherwise} \end{array} \right\} \quad (1)$$

Equation (1) represents a probit regression where the dependent variable, *Active*, takes the value of 1 if business *i* has employees, revenues and assets seven years after entry, and 0 otherwise. *X* is a vector of categorical variables indicating average employment size in the first three years (based on annual average of monthly PD7 employment), whether it generated revenue or profit in the first three years, whether the firm is an exporter or an R&D performer, the year of entry, province and a set of industry categorical variables at the two-digit NAICS level. Of particular interest are the impacts of filing a patent (*patent*) in the first three years.

As discussed in more detail below, the empirical analysis also extends Equation (1) by examining the impact of patents on exits, distinguishing between a “true” exit or an M&A.<sup>5</sup>

## Empirical analysis

### Descriptive statistics

By comparing Canadian businesses based on their patenting activity, data show that, while 58.1% of businesses that patent were alive seven years after entry,<sup>6</sup> this share is estimated at 54.8% for businesses that do not patent (Table 1). The difference is even more significant between these two groups of businesses in terms of having R&D spending—76.8% of businesses that patent relative to 2.2% of those that do not— and having export activity—25.1% of business that patent relative to 1.9% of business that do not. In addition, a higher share of larger businesses is found among businesses that patent. For example, 6.0% of businesses that patent have more than 100 employees, compared with 0.2% for businesses that do not patent.

5 Through labour tracking in the NALMF, it is possible to identify businesses that participated in potential M&As. These activities cannot be determined with certainty and remain a proxy measure of M&A.

6 In Canada, patent applications get published 18 months from filing, and it may take 3 to 5 years for the patent to be granted. Thus, a seven-year threshold is used to capture the effect of patents on firms' ability to survive or exit the market.

**Table 1**  
**Characteristics of businesses based on their patenting status**

	Patent applicants	Non-patent applicants	All businesses
	percent		
Alive seven years after entry	58.1	54.8	54.9
R&D performer	76.8	2.2	2.4
Has positive revenues	97.9	98.6	98.6
Has positive profits	36.9	75.5	75.4
Exporter	25.1	1.9	2.0
5 employees and under	68.0	85.0	84.9
6 to 20 employees	18.1	12.3	12.3
21 to 100 employees	7.9	2.5	2.5
More than 100 employees	6.0	0.2	0.3

**Note:** R&D stands for research and development.

**Source:** Statistics Canada, Canadian Patent Research Database; National Accounts Longitudinal Microdata File

It is worth noting that, despite the fact that businesses that patent tend to be larger relative to businesses that do not patent, a larger share of businesses that do not patent have positive profits. This finding can be attributed to a certain extent to the fact that businesses that patent tend to do more R&D investment than businesses that do not patent, especially when both categories of businesses seem to have similar proportions in terms of revenue.

Table 2 is an extension of Table 1, which examines differences in characteristics across the outcome variable of interest, that is, whether the business is alive or has exited, and the type of exit (i.e., a true exit or an exit by M&A) seven years after entry. On average, over a seven-year period, 41.9% of businesses that patent exited, of which 3.3% were because of an M&A. Similar shares are observed for businesses that performed R&D, with a slightly higher proportion being alive (61.0%). More than two-thirds (64.4%) of businesses that export remain alive after seven years. The probability of remaining alive after seven years increased with firm size, with little difference between businesses with 21 to 100 employees (68.5%) and the largest size class (68.7%). Notably, 4 out of 10 exits among large businesses are through an M&A.

**Table 2**  
**Comparative analysis between businesses based on their outcome**

	Alive	Exit	True exit	Merger and acquisition
	percent			
Patent applicants	58.1	41.9	38.6	3.3
Non-patent applicants	54.8	45.2	44.3	0.9
R&D performer	61.0	39.0	35.8	3.1
Has positive revenues	55.5	44.5	43.6	0.9
Has positive profits	59.6	40.4	39.6	0.9
Exporter	64.4	35.6	32.1	3.6
5 employees and under	52.8	47.2	46.9	0.3
6 to 20 employees	65.9	34.1	31.0	3.1
21 to 100 employees	68.5	31.5	23.6	7.9
More than 100 employees	68.7	31.3	17.3	14.0

**Note:** R&D stands for research and development.

**Source:** Statistics Canada, Canadian Patent Research Database; National Accounts Longitudinal Microdata File

## Inferential analysis: Econometric models

### Patent survival effect

A basic form of a probit model was used to regress the probability of a business being alive seven years from entry as a function of businesses' patenting status. The results show that patenting is more likely to increase the probability of a business being alive seven years after entry by 3.3% (Table 3, Basic model). The correlation is positive and statistically significant.

**Table 3**  
**Marginal impact on survival seven years after entry**

	Basic model		Full model	
	coefficient	p-value	coefficient	p-value
Patent	0.033	0.013	0.045	0.002
R&D performer	...	...	0.070	0.000
Has positive revenues	...	...	0.406	0.000
Has positive profits	...	...	0.184	0.000
Exporter	...	...	0.045	0.000
<b>Firm size categories</b>				
<b>(5 employees and under omitted)</b>				
6 to 20 employees	...	...	0.133	0.000
21 to 100 employees	...	...	0.160	0.000
More than 100 employees	...	...	0.112	0.000

... not applicable

**Note:** R&D stands for research and development. Province, industry and cohort dummy variables are included.

**Sources:** Statistics Canada, Canadian Patent Research Database; National Accounts Longitudinal Microdata File

By improving the specification of the probit model to include various categorical explanatory variables, such as revenue, profit, R&D, firm size, exporter status, provinces, industry, and year of entry, results from the probit model show that the marginal effect of patents is still positive and significant, and has increased to 4.5% (Table 3, Full model). Having a patent is likely to delay exit by increasing the probability for a business to be alive seven years after entry by 4.5%. Furthermore, both performing R&D and being an exporter were found to have a similar effect on the probability of a business to be alive seven years from entry, estimated at 7% for those performing R&D and 4.5% for exporters. Also, generating revenue and making profits were found to have a significant positive effect on businesses' survival probability. These two attributes are essential to business survival.

With respect to firm size, data show that businesses with more than five employees are more likely to survive seven years after entry, compared with businesses in the smallest size category. For instance, medium-sized businesses with 21 to 100 employees are 13.3% more likely to survive than businesses with fewer than five employees.

Overall, results from the probit regressions show that patents matter, although the relationship studied here is not causal. Nevertheless, the results show that patents have a significant survival effect on Canadian businesses by increasing the probability of a business to be alive by 4.5% seven years after entry, delaying therefore firm exit from the market.

## Patent trigger effect

Considering the fact that businesses can cease to exist under previous format or status but continue to operate under a different name or different management as a result of an M&A, an exit can be treated as “false exit.” A false exit occurs when a business ceases to exist under its previous format or status when it gets acquired by a different entity and continues its operations under different management, which can be triggered by patents. To assess the potential impact of patents on false exits, when the outcome variable to be predicted is nominal and has more than two categories with no given rank, a multinomial logistic regression is more appropriate.

An outcome variable has been defined as three categories with no given rank:

1. alive seven years from entry
2. exit the market (or true exit)
3. exit through M&A.

Using this new outcome variable in Equation (1) will help delineate the effect of M&As and the patent trigger effect on the probability of firms to survive or exit the market.

Starting with a reduced form of a multinomial logistic model that uses “exit the market” as a base outcome and regressing it on patenting status, the results show that, relative to exit, patents increase the probability of staying alive seven years from entry by 19.6% (Table 4, Base model). In contrast, relative to exit, patents increase the probability of exit through M&A by 145.2% (trigger effect). Both effects are statistically significant.

**Table 4**  
**Marginal impact on survival seven years after entry, exit and exit from mergers and acquisitions, multinomial logistic model**

Base outcome is exit the market	Base model				Full model			
	Alive seven years after entry		Exit by mergers and acquisitions		Alive seven years after entry		Exit by mergers and acquisitions	
	coefficient	p-value	coefficient	p-value	coefficient	p-value	coefficient	p-value
Constant	0.214	0.000	-3.924	0.000	-2.302	0.000	-6.819	0.000
Patent	0.196	0.000	1.452	0.000	0.192	0.002	0.129	0.453
R&D performer	...	...	...	...	0.340	0.000	0.655	0.000
Has positive revenues	...	...	...	...	2.085	0.000	1.968	0.000
Has positive profits	...	...	...	...	0.759	0.000	0.290	0.000
Exporter	...	...	...	...	0.216	0.000	0.106	0.189
<b>Firm size categories</b>								
<b>(5 employees and under omitted)</b>								
6 to 20 employees	...	...	...	...	0.662	0.000	2.686	0.000
21 to 100 employees	...	...	...	...	1.002	0.000	3.871	0.000
More than 100 employees	...	...	...	...	1.088	0.000	4.446	0.000

... not applicable

**Note:** R&D stands for research and development. Province, industry and cohort dummy variables are included.

**Sources:** Statistics Canada, Canadian Patent Research Database

Using a fully specified version of the model, including more explanatory variables, a multinomial logistic regression using exit the market as the base outcome shows that the following variables are more likely to increase the probability of a business to be alive seven years after entry by: 34.0% for R&D, 208.5% for revenue, 76.0% for profit, and 21.6% for exporters (Table 4, Full model).<sup>7</sup>

Similarly, relative to exit, the following variables are more likely to increase the probability of exit through M&A, by 65.5% for R&D, 196.8% for revenue, 29.0% for profit and 10.6% for exporters.

It is worth noting that while R&D increases the probability of a business to stay alive seven years after entry by 34.0% relative to exit, it increases the probability of exit through M&A by nearly double that rate.

With respect to patents, the results show that patenting is more likely to cause mixed effects on the probability of being alive seven years from entry and exit through M&A. These include the following:

- **Patent survival effect:** Relative to the base outcome, patents have a positive and significant effect on firms' survival seven years after entry, estimated at 19.2%.
- **Patent trigger effect:** Relative to the same base outcome, patents have a positive impact on the probability of exit through M&A. However, the effect is not statistically significant.

Overall, inferential analysis shows that patents are more likely to increase firms' probability to be alive seven years following entry. As for the trigger effect, the mixed results between the reduced form of the model and the fully specified one may require further analysis to determine its existence and magnitude.

Considering the strong positive correlation between patents and R&D, while the former is a proxy for innovation output, the latter is a measurement for input innovation. A possible explanation to the reported results in Table 4 relative to the trigger effect is the fact that a significant portion of the explanatory power of patents is actually captured by R&D. An alternative solution to this model specification is to omit R&D or include an interaction term of R&D and patenting.

Results from a multinomial probit model of firms exiting without R&D show that patents have a significant trigger effect, estimated at 44.3% relative to exit as a base outcome.<sup>8</sup> Notably, having both R&D expenditures and a patent increases the probability of survival by 30.6% relative to exit, but while positive, the trigger effect is not significant.<sup>9</sup>

These results show, for the first time, that patents have a trigger effect on firms' exit through M&A and that the overall impact of patents on firms' exit will be a trade-off between the survival and trigger effects.

While patents can be a great asset that helps firms to remain active and survive for a longer period of time, when perceived as a strategic asset to be acquired, it can become the reason behind their exit. In this case, the trigger effect can more than offset the survival effect and firms end up exiting the market under their current status but continue to operate under different names or different management.

---

7 Both multinomial logistic and multinomial probit regressions have led to similar results. This increases the robustness of the results. The results for the multinomial probit regression are available in Annex 1.

8 For more details see Annex 2 on multinomial regression without R&D.

9 For more details, see Annex 3 on multinomial regression with an interaction term.

## Conclusion

In this attempt to assess the role of patents in the context of firms' exits, this paper provides first insights on both survival and trigger effects associated with patents to increase the likelihood of a new business surviving or exiting the market. Considering the fact that the Canadian economy is largely dominated by SMEs, supporting Canadian SMEs to remain active may set the path for potentially successful businesses to innovate and scale up their activities.

While most exits are start-ups and SMEs that failed to compete in a private market for various reasons, when exits involve IP rights, a thorough analysis is required because of the complex role of patents in this context. In fact, although patents can be a great asset to attract investors and secure financing, and therefore improving firms' survival, it can also be perceived as a great asset to acquire as part of firms' inorganic growth strategies aimed at acquiring disruptive innovation with great potential, therefore accelerating firms' exits.

As the perception of exits as homogenous events mainly caused by efficiency problems and market selection changes to view them as more heterogenous processes caused by the different forms of exits, motivations and contexts, this paper focuses on the role that patents play in exits.

Using data from the CPRD and the NALMF, and a probit model to assess the probability for a new business to be alive seven years from entry, this paper concludes that patents have a significant and positive survival effect, estimated at 4.5%, therefore delaying firms' exits from the market.

As for the trigger effect, a multinomial logistic regression model shows that patents increase the probability of exiting through M&A, relative to mere exit. However, the latter is not significant when using a fully specified model. By changing the model specification by omitting R&D, the trigger effect was found to be positively significant, estimated at 44.3%. A more thorough analysis investigating the patent trigger effect is needed to understand the disparity between the reduced versus the complete version of a model in terms of significance and magnitude.

By considering patents' survival effect, this paper shows that innovation combined with a strategic use of patents can set the path for Canadian businesses to grow and prosper. As for the trigger effect, since it increases the probability of exit through M&A, a detailed analysis of the characteristics of the acquiring companies may help decipher the issue of IP leakage in Canada and provide much needed empirical evidence about its existence, magnitude and effect on the Canadian economy.

**Annex Table 1**

**Marginal impact on survival seven years after entry, exit and exit from mergers and acquisitions, multinomial probit model**

Base outcome is exit the market	Alive seven years after entry		Exit by mergers and acquisitions	
	coefficient	p-value	coefficient	p-value
Constant	-1.877	0.000	-4.085	0.000
Patent	0.169	0.001	0.149	0.146
R&D performer	0.286	0.000	0.464	0.000
Has positive revenues	1.683	0.000	1.226	0.000
Has positive profits	0.663	0.000	0.282	0.000
Exporter	0.182	0.000	0.122	0.009
<b>Firm size categories (5 employees and under omitted)</b>				
6 to 20 employees	0.564	0.000	1.404	0.000
21 to 100 employees	0.826	0.000	2.134	0.000
More than 100 employees	0.847	0.000	2.502	0.000

**Note:** R&D stands for research and development. Province, industry and cohort dummy variables are included.

**Sources:** Statistics Canada, Canadian Patent Research Database

**Annex Table 2**

**Marginal impact on survival seven years after entry, exit and exit from mergers and acquisitions, multinomial probit model excluding research and development**

Base outcome is exit the market	Alive seven years after entry		Exit by mergers and acquisitions	
	coefficient	p-value	coefficient	p-value
Constant	-1.837	0.000	-3.997	0.000
Patent	0.362	0.000	0.443	0.000
Has positive revenues	1.680	0.000	1.224	0.000
Has positive profits	0.658	0.000	0.273	0.000
Exporter	0.219	0.000	0.195	0.000
<b>Firm size categories (5 employees and under omitted)</b>				
6 to 20 employees	0.571	0.000	1.419	0.000
21 to 100 employees	0.838	0.000	2.155	0.000
More than 100 employees	0.871	0.000	2.540	0.000

**Note:** R&D stands for research and development. Province, industry and cohort dummy variables are included.

**Sources:** Statistics Canada, Canadian Patent Research Database

**Annex Table 3**  
**Marginal impact on survival seven years after entry, exit and exit from mergers and acquisitions, multinomial probit model, with interaction of research and development and patent**

Base outcome is exit the market	Alive seven years after entry		Exit by mergers and acquisitions	
	coefficient	p-value	coefficient	p-value
Constant	-1.876	0.000	-4.084	0.000
Patent	-0.058	0.573	-0.152	0.551
R&D performer	0.277	0.000	0.454	0.000
Patent* R&D performer	0.306	0.010	0.382	0.169
Has positive revenues	1.683	0.000	1.226	0.000
Has positive profits	0.663	0.000	0.283	0.000
Exporter	0.182	0.000	0.123	0.008
<b>Firm size categories (5 employees and under omitted)</b>				
6 to 20 employees	0.564	0.000	1.405	0.000
21 to 100 employees	0.827	0.000	2.135	0.000
More than 100 employees	0.851	0.000	2.507	0.000

**Note:** R&D stands for research and development. Province, industry and cohort dummy variables are included. Patent\*R&D performer is an interactive term for businesses that have a patent and have positive R&D expenditures.

**Sources:** Statistics Canada, Canadian Patent Research Database

## References

- Abbes, C., Baldwin, J.R., and D. Leung (2022a). "Patenting activity of Canadian-resident businesses", Economic and Social Reports, March 2022. Statistics Canada Catalogue no. 36-28-0001. Ottawa: Statistics Canada.
- Abbes, C., Baldwin, J.R., Gibson, R., and D. Leung (2022b). "Canadian Patent Research Database", Analytical Studies: Methods and References. Statistics Canada. Catalogue no. 11-633-X.
- Hall, B., Christian, H., Mark, R. and V. Sena (2014), "The Choice between Formal and Informal Intellectual Property: A Review", *Journal of Economic Literature* 2014, 52(2), 1–50
- Caballero, R., and M. Hammour (1994), "The Cleansing Effect of Recessions", *The American Economic Review*, Vol. 84 (5), pp. 1350–68.
- Eckert, A., and C. Langinier (2011), "A Survey of the Economics of Patent Systems and Procedures", *Journal of Economic Surveys*, Vol. 28 (5), pp. 995-1015.
- Cefis, E., Bettinelli, C., Coad, A. and O. Marsili (2022), "Understanding firm exit: a systematic literature review", *Small Business Economics* (2022) 59:423–446
- Greenspoon, J. and E. Rodrigues (2017), "Are Trends in Patenting Reflective of Innovative Activity in Canada?", CCLS Research Report 2017-02.

Gallini, N. (2012), "The Patent System and Canada's Innovation Agenda", Prepared for Marketplace Framework Policy Branch, Industry Canada.

Schumpeter, J. (1942). "Capitalism, socialism, and democracy". Harper & Bros.

The Impact Center (2017), "Canada Patent Puzzle", University of Toronto