Product innovation, cost-cutting and firm economic performance in the post-crisis context: Canadian micro evidence

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Abstract

Purpose – It has been suggested that to be successful in the current global economy with increased competition and ever changing markets, especially in the post-crisis context, firms need to focus more on innovation in exploring new ideas and designing new products to develop new markets than on cost-cutting strategies to maintain cost leadership in old markets. However, because of the lack of micro data, this conjecture has not been systematically evaluated. This paper aims to fill this important void by studying the economic performance associated with these two different business strategies using Canadian micro data.

Design/methodology/approach – The main data for our analysis are from the Survey of Innovation and Business Strategy (2009 and 2012) which is a sample-based survey of Canadian government. The authors used in this research regression models for the econometric analysis of the underlying factors for undertaking certain business strategies and how business strategies link to economic performance. They also used propensity score matching to ensure the group of firms with innovation strategy being comparable to that with cost-cutting.

Findings – The research shows that firms focusing on product innovation are indeed more productive than firms focusing on cost-cutting, although there is no evidence that these two different strategies make a difference in profitability. The first indication from the research has been that certain characteristics of Canadian firms are very useful predictors for firms to undertake product innovation. They are, among other things, the age of the firms, the single-establishment structure of the business and being multinationals.

Research limitations/implications – This empirical research opens up many interesting avenues for future research. Some other variables could be integrated into the models to increase the rate of explained variance. Moreover, because this research is based only on the case of Canadian firms and for a relatively short period of four years after the 2008 crisis, an extension to other context and to a longer period of time should be interesting.

Practical implications – The research has confirmed that Canadian firms adopting long-term business strategies based on product innovation are more productive.

Social implications – The results truly concur with the vision of the Government of Canada, like some other developed countries, on the importance of innovation and its policies in encouraging business innovation in driving the growth of the Canadian economy and improving the standard of living of country.

Originality/value – Mainly because of the lack of micro data, the existing researches have not provided solid evidence on why firms are choosing different business strategies when they are operating in the same business conditions and how the financial crisis has affected the undertaking of business strategies. They have not established a clear linkage between economic performance and different business strategies, although there has been some anecdotal evidence about their association. This study aims to bridge the knowledge gaps with theoretical and practical contributions.

Keywords Business strategy, Productivity, Product innovation, Cost-cutting, Post-crisis

Paper type Research paper

1. Introduction

The financial crisis of 2008-2009 could be considered to have been the worst financial crisis since the Great Depression of the 1930s. Most economists think that the world economy, especially that of developed countries, can never return to the normal global patterns of consumption, trade and investment of the past decade, and firms will live in a wholly different "new normal" characterized by slow economic growth, high unemployment rates, etc. To cope with this turbulent business environment, right business strategies are the key for success.

However, firms, even within a narrowly defined industry that produces relatively homogenous products or services, often pursue different business strategies. There has been an intense debate on what business strategies firms should take to be successful in the current markets. According to Martin (2009), to be successful in the current market, firms should innovate and explore new ideas so as to design new products for the ever changing markets, whereas many firms do not perform well because they often focus on the business of exploiting past ideas (e.g. production processing and cost-cutting). It has been suggested that product innovation allows firms to develop and maintain a lasting, sustainable competitive advantage (Brown and Eisenhardt, 1995; Porter, 1985; Souitaris, 2001; Stock *et al.*, 2002; Shan and Jolly, 2013; Defélix *et al.*, 2015). On the other hand, cost reduction is considered to be a major strategic choice for firms to compete through lower costs (Mersereau, 2000; Ahire and Devaraj, 2001).

The financial crisis of 2008-2009 and the "new normal" context in the following years have also added complexity in the debate on the right choice of business strategy. Several researchers think that the reorganization of innovative activities appears to be a preferable strategy in the post-crisis context. The work of Jaruzelski and Dehoff (2009) on the 1,000 businesses that spend the most on research and development (R&D) in the world establishes that two-thirds of those studied were able to maintain and even increase their R&D expenditure. Therefore, taking

advantage of the crisis in developing new products, while relying on the new paradigms (like that of green growth), appears to be a business practice for most solid businesses. Archibugi *et al.* (2012) find that the 2008 economic crisis led to a concentration of innovative activities among fast growing and already innovative firms in the UK. However, in an European survey on the impact of the economic crisis on innovation, Archibugi *et al.* (2013) conclude that the crisis has brought, at least in its initial stage, destruction in innovation investment. According to Colombo *et al.* (2016), the stock of resources accumulated by larger firms, firm's innovation and internationalization investments in the pre-crisis period and firms' cash flow determine the extent of the changes in product innovation and internationalization strategies as firm's reaction to the crisis.

The results from studies on cost reduction, as a long-term development strategy of businesses in the post-crisis context, tend to be mixed. According to Askenazy *et al.* (2013), cost reduction allows the firm to carry out a dynamic management of its resources, and this considerably increases its capacity to come out of a crisis. For these authors, cost reduction is presented as the most efficient lever to improve the profitability of the firm. However, Duperrin (2011) notes that firms should not reduce costs during a period of crisis. Instead, they should first question their operational efficiency and work organization. In other words, to spend less does not always mean better production, and failing to pay attention to such an aspect could throw the firm into a negative spiral. According to the study of Cowling *et al.* (2015), 40 per cent of UK small- and medium-sized enterprises (SMEs) tried to cut costs by downsizing during the recession. Almor (2011) shows, however, that while the downturn forces many Israeli firms to downsize and rethink their business strategies, new opportunities are created, especially for smaller firms, allowing them to reposition themselves.

However, mainly because of the lack of micro data, the literature has not provided solid evidence on why firms are choosing different business strategies when they are operating in the same business conditions. In addition, it has not been clear how the financial crisis has affected the undertaking of business strategies. Moreover, a clear linkage has not been established between firms' economic performance and the different business strategies, although there have been some anecdotal evidences.

This study aims therefore to bridge the knowledge gaps by using Canadian micro data. In this study, we will focus on two specific long-term business strategies. The first one is product innovation, which is the exploration of new ideas for goods or services positioning (e.g. product leadership, market segmentation, product diversification or improving quality). The second is cost-cutting, which is the exploitation of old ideas for low-price and cost leadership (e.g. mass market).

Our objective is twofold. First, we study the factors that may be important for firms' decision in pursuing these two different business strategies, and, second, we link these business strategies to firms' performance[1]. More specially, we address three research questions in this study:

RQ1. What is the most important long-term business strategy (product innovation or cost-cutting) for Canadian firms? Has the undertaking of business strategies changed after the 2008 financial crisis?

RQ2. What are the factors/predictors for firms to pursue the two different business strategies? Do firm's size, age, structure, being multinational, and headquarter location play important roles?

RQ3. Is economic performance (i.e. productivity or profitability) associated with the two business strategies?

The answers to these questions should be of considerable interest to both academics and policymakers. First, it helps to elucidate which factors drive firms to the undertaking of different business strategies. Second, it provides us with a deeper understanding of the role of different business strategies in supporting and strengthening firms' competitiveness. Third, it can help us design more sophisticated and effective policy initiatives to encourage certain business strategies that are important for firm's strong economic performance.

The rest of the paper is organized as follows: in Section 2, we review the related literature. Section 3 then describes the data and sets up the regression models. Section 4 discusses the empirical results, whereas Section 5 is the conclusion.

2. Literature review
In this section, we provide a brief of the literature associated with our research questions.

2.1 Basic competitive strategies of firms
Management strategy designates the formulation, implementation and control of corporate strategies by leaders (Coulter, 2002). This definition, which at first seems very simplistic, turns out to be complicated in terms of application. Moreover, in the literature, the concept is still subject to debate. According to the underlying logic to the idea of strategic management, managers continuously try to formulate and apply the best strategies to reach the projected growth, to improve the performance of their organization, to be open to new national and international markets and to be competitive in the market (Porter, 1986). This type of management affects the totality of firms that operate in an economic context where efficiency represents the ultimate objective.

Three basic strategies, also called generic strategies (Porter, 1980 and 1985), were developed from this basic hypothesis: "a competitive advantage is sustainable if it is inimitable or not substitutable by the competitors". This strategic positioning approach of Porter was mainly about positioning a firm in the market in relation to its competitors (Fleury and Fleury, 2003). In his work, Porter was interested in the competitive strategies of firms by introducing the notion of potential competitive advantage linked on the one hand to the choice among three types of possible strategies and, on the other hand, to laying emphasis on only one of the strategies so as to optimize its mastery and thus develop a real and sustainable competitive advantage (Chan and Wong, 1999; Arpita, 2013). The three types of competitive strategies are dominating through costs; differentiating; and concentrating.

2.1.1 Differentiating. In the globalized economy, firms have to differentiate themselves and to be specialists to participate in global value chains (Lee *et al.*, 2010). Differentiating is a strategy aiming to look for some value that would make it possible for the firm to distinguish itself from its competitors in terms of the value proposed to customers. This is possible when the firm proposes goods and services endowed with

unique feature or superior quality (Arpita, 2013). Engaging in this type of strategy is synonymous with investing in risky practices of research and development. Indeed, many studies have identified this strategy as a determinant of innovation in firms (Kotabe, 1990; Zahra and Covin, 1994; Camison and Villar-Lopez, 2011). In the same vein, Porter (1980) and Zahra (1993) find that the strategy of differentiation is positively correlated with innovation[2].

Innovation tends to vary in the degree of novelty. Radical innovations are the ones that are the most profitable. In fact, they underpin the competitiveness of firms by allowing them to gain a sustainable competitive advantage (McDermott and O'Connor, 2002, Hung and Chou, 2013).

2.1.2 Dominating through costs. This type of strategy that focuses on operational effectiveness aims to produce with the least cost. It affects all the elements in production value chain (Losonci and Demeter, 2013). Often, this strategy is based on tangible assets (e.g. machineries) as opposed to intangible assets (e.g. industrial secret and copyright) (Lee and Qu, 2011; Arpita, 2013; Komnenic *et al.*, 2013). It, however, may also be to the detriment of research and development activities (Klingenberg *et al.*, 2013). This is consistent with the finding that this type of strategy is negatively correlated with innovation (Zahra, 1993). If one does a *rapprochement* with the theory of Rogers (1962) on the diffusion of innovations, the partisans of this strategy would fall into the categories of "belated majority" and "latecomers" on the Rogers curve. Enterprises first observe the reactions of consumers to the competing innovations. Then, they will decide whether to adopt these innovations once the costs start decreasing.

2.1.3 Concentrating. Some firms try to get ahead by concentrating. This type of strategy is in the camp of niche or focusing strategies. In adopting a niche strategy, a firm can focus its efforts and resources on a narrowly defined area. The niche strategy is often employed by SMEs that have limited resources at their disposal. Thus, they have to focus their effort on a well-defined niche or segment (Porter, 1980, 1985; Coulter, 2002). The concentrating strategy is simply the application of dominating through costs and differentiating in a niche market. This may explain why most commonly researched business strategies are dominating through cost and differentiating.

According to Porter (1980, 1985), cost-cutting and differentiating represent the extremities of a continuum. Note, however, that these two strategies are not necessarily mutually exclusive (Hambrick, 1983). Some recent researches established a complementary relationship between these two strategies: cost control is conducive to the level of novelty in innovation (Amara *et al.*, 2009) contrary to the long held notion that cost reduction has a negative influence on innovative activities (Vázquez *et al.*, 2001; Darroch and McNaughton, 2002).

2.2 Business strategies, underlying factors and economic performance of firms
What are the underlying factors for the undertaking of different business strategies? Numerous studies show that the size of firms (Archibugi *et al.*, 2013), their age (Sahut *et al.*, 2012), their technological sophistication (Correa *et al.*, 2010) and their environment (Ortiz-de-Mandojana and Bansal, 2015) could play a considerable role in the strategic responses that organizations adopt, either in cost control or in innovation. In the same vein, Mersereau (2000) established that "the perceived degree of the urgency of cost reduction, the technological complexity, or the culture of organization are factors that influence all its programs of cost reduction". Becheikh *et al.* (2006) show that the practice

of strategic management, the R&D, the export activities, the variety of technological advances used in the process of production are the only variables that positively influence innovation. Moreover, the structure of the firm, as well as its export activities, equally plays a considerable role in the choice of its long-term business strategies.

In the globalized economy, foreign forces may also play an important role in influencing business strategy undertaking. When value creation could be multiplied because of a better territorial insertion, multinationals endeavor to take into account the "regional factor" in their business strategies (Scott, 1999; Fornahl, 2007). This situation was highlighted by the articulation of social networks, their creation, superposition or nesting. The global extension of firms in form of multinationals, with subsidiaries in foreign countries, is thus transformed by the behavior of demand and supply specific to segments of the world market. Thereafter, this behavior of globalization is accelerated by the behavior of other competitors or by the protectionist barriers imposed by certain countries. Thus, with the awareness that the recent economic and financial crisis made most countries to adopt protectionist measures, notably because it concerns the economic life in general, one could legitimately ask if the multinational status, the location of the head office and subsidiaries always influence the strategies of innovation or cost reduction of firms.

Concerning the impacts of different business strategies on the organizational performance, the literature does not sufficiently explain the relation of influence. Most empirical studies explain the impact of innovation in general on organizational performance but seen from the perspective of advantage. Some studies (Geroski, 1994) stipulate that there are two alternative views on the innovation-performance organizational relation. The first is based on the fact that the development of new products would strengthen the competitive advantage of the firm, but the results in terms of economic value would bring about an outcome of differentiation so long as the organization defends its position in relation to competition. The second stipulates that the process of innovation will ensure the creation of skills that would allow the firm to become more flexible and adaptable to its environment, and this would eventually lead to a competitive advantage for the firm.

3. Research design

In the remainder of this paper, using a linked micro database, we examine the business strategies undertaken by providing Canadian firms' evidence, with a focus on the two dominate long-term business strategies: product innovation and cost-cutting. In addition, we study their linkage with economic performance in terms of productivity and profitability.

3.1 Data

Four micro-data files at Statistics Canada are linked for this study. The variables extracted from each micro database are listed in Appendix. Here, we provide a brief description of each of those four micro-data files.

The main data for our analysis are from the Survey of Innovation and Business Strategy (SIBS) (2009 and 2012). SIBS is a sample-based survey, a joint project between Industry Canada, Foreign Affairs, Trade and Development Canada and Statistics Canada. It provides detailed qualitative information about a firm's various business strategies and practices, such as its long-term strategic orientation and performance

monitoring. The survey also provides detailed information about a firm's business structure and operational activities, such as head office and subsidiary locations. The targeted population is firms in Canada with more than 20 employees and revenues of at least \$250,000 in 14 sectors from NAICS 11 to 56[3]. The first survey of 4,228 firms was conducted in 2009, which was followed by the second survey of 4,467 firms in 2012. There are 1,280 firms that were surveyed in both 2009 and 2012[4].

The surveyed firms in either 2009 or 2012 are then linked to the same firms in the following three administrative databases to obtain other information that are important for our analysis.

General Index of Financial Information (GIFI) (2000-2012) collects financial statement information from each firm when it files a T2 Corporation Income Tax Return. It generally contains information on firm's income statement and balance sheet files. For this study, we extract total sales of goods and services for gross output, net income before taxes and extraordinary items for physical capital compensation and total tangible capital assets for measuring physical capital.

Longitudinal Employment Analysis Program (LEAP) (2000-2012) contains annual payroll and employment information for each business–employer in Canada. In addition, it provides information about the structure of each firm, whether or not the firm is of a single or multiple establishment. The information in LEAP is generated from the annual statements of remuneration paid (T4 slips) that Canadian businesses are required to issue to their employees for tax purposes. For each firm, the estimated employment is based on the payroll as reported to Canada Revenue Agency. For this study, the individual labor unit (ILU) is used.

The employment measure is closer to a head count – every individual who received at least one T4 slip in a given year. If individuals worked for different firms during the year, their 1.0 ILU is split proportionately across the firms according to the share of their total annual payroll earned in each[5]. In addition to data on employment and labor compensation, LEAP also provides information about a company's structure being a single or multi-establishment firm.

Finally, Business Register (BR) (2000-2012) provides information on the date of establishment and the country of control of each firm[6]. The database is the central repository of information on businesses in Canada. Used as the principal frame for the economic statistics program at Statistics Canada, it maintains a complete, up-to-date and unduplicated list of all active businesses in Canada that have a corporate income tax (T2) account are an employer or have a GST account.

Besides gross output, labor and capital, for productivity analysis, we also need to estimate intermediate inputs. Following Gu and Lafrance (2014), in this study, we derive intermediate inputs as total sales minus labor compensation (payroll) and capital compensation (being approximated by net income before taxes and extraordinary items).

To ensure that these series are comparable overtime, variables associated with production function and in current dollars are required to be deflated. Deflators at the firm level are not available, so detailed industry deflators based on the Canadian KLEMS database are used. In particular, total sales, physical capital assets, payroll and the derived intermediate inputs at the firm level are deflated by gross output, capital stock, value-added and intermediate input deflators at the 35-NAICS-based industry level.

Information for firms in the linked database is traced backward to 2000 and forward to 2012, using information from those micro databases. The number of observations of the linked data for 2000-2012 period is in Table I[7]. The observations ranged from 5,305 in 2000 to about 7,200 in the 2012. In total, there are 85,596 observations for the whole period.

As mentioned before, in this study, we focus on firms' long-term business strategies and distinguish between product innovation and cost-cutting. By product innovation, we mean that a firm's main focus in long-term strategy is on goods or services positioning (e.g. product leadership, market segmentation, product diversification, improving quality). In contrast, by cost-cutting, we mean that a firm's main focus is on old/existing products in terms of low-price and leadership in cost effectiveness (e.g. mass market). The main focus of long-term business strategies can be observed for surveyed firms in either 2009 or 2012. However, together with the questionnaire on "when was your current long-term strategy implemented?", we can also trace a firm's long-term strategy from the sample year back to the year the strategy was implemented.

3.2 Regression models

In this section, we set up regression models for our econometric analysis of the underlying factors for undertaking certain business strategies and how business strategies link to economic performance.

3.2.1 Firm-level predictors of different business strategies. To empirically link certain factors that are associated with a firm's decision to undertake a certain business strategy, in

Year	Primary[a]	Durable manuf.[b]	Non-durable manuf.	Retail and wholesale trade	FIRE[c]	IPAS[d]	Others	Total
2000	208	1,279	1,866	174	275	631	872	5,305
2001	218	1,336	1,936	176	286	686	905	5,543
2002	229	1,361	1,977	191	289	723	980	5,750
2003	239	1,388	2,047	183	298	767	1,060	5,982
2004	253	1,475	2,196	188	314	837	1,032	6,295
2005	276	1,608	2,438	191	322	883	842	6,560
2006	292	1,676	2,564	192	327	945	852	6,848
2007	310	1,746	2,645	196	337	976	860	7,070
2008	315	1,782	2,697	194	337	1,006	876	7,207
2009	319	1,813	2,729	192	339	1,009	880	7,281
2010	321	1,815	2,720	195	336	1,019	881	7,287
2011	324	1,801	2,705	194	337	1,023	889	7,273
2012	322	1,779	2,676	193	334	1,012	879	7,195
Total	3,626	20,859	31,196	2,459	4,131	11,517	11,808	85,596

Notes: [a]Primary includes agriculture, forestry, fishing and trapping, mining and oil and gas extraction; [b]durable manufacturing includes industries producing long-last goods such as wood, metals and equipment while non-durable manufacturing consists of industries producing short-lived goods such as food, clothing, paper, printing, chemicals, plastic and rubber; [c]FIRE includes finance, insurance, real estate, renting and leasing; [d]IPAS includes information and cultural industries; professional, scientific and technical services; and administrative support, waste management and remediation services

Table I.
Observed firms by
industry and year

this section, we specify a model that estimates the probability of the firm's strategy as a function of series of variables related to a firm's characteristics and past performance and a set of industry and year fixed effects. The equation is estimated as a binary logit model as follows:

$$\ln\left[\frac{\text{Prob}(Strategy_i = 1)}{\text{Prob}(Strategy_i = 0)}\right] = \alpha + \beta_x X_i + \beta_p Z_i + \Lambda_{I,k} I_i + \delta D_{i,2012} + \varepsilon_i, \tag{1}$$

where

$\text{Prob}(Strategy_i = 1)$	= denotes the probability of a firm's undertaking of product innovation as its main focus of long-term business strategy, whereas;
$\text{Prob}(Strategy_i = 0)$	= is the probability of the firm's undertaking of cost-cutting to be the main focus of long-term business strategy;
X_i	= is a set of firm's characteristics that may be associated with the decision to undertake a different long-term business strategy, including firm's size, age, structure, being multinationals and country of control;
Z_i	= is a vector of economic performance indicators, including lagged average wage rate, capital intensity, productivity and profitability;
I_i	= is a vector of industry dummies at the 35-industry level;
$D_{i,2012}$	= is the dummy variable for year 2012 (with 2009 being the reference); and
ε_i	= is the error term.

The "dependent" variable is the log odds ratio, $\text{Prob}(Strategy_i = 1)/\text{Prob}(Strategy_i = 0)$, of undertaking product innovation versus cost-cutting. In essence, the logit estimation is to test:

    H1. A firm's decision on undertaking product innovation versus cost-cutting is associated with both firm's specific factors and their economic performance.

To this end, we use lagged economic performance indicators to minimize the endogeneity issue associated with the choice of business strategies.

3.2.2 Business strategy and economic performance. To account for the differences in economic performance between groups of firms with different long-term business strategies, we conduct econometric analysis. The analysis is to test our second hypothesis:

    H2. All else equal, firms undertaking product innovation as their main long-term business strategy are more productive than firms engaging in cost-cutting.

For productivity performance and its association with business strategies, we follow the Cobb–Douglas production function and set up the basic regression model as the following:

$$\ln Y_{it} = \alpha + \alpha_1 \ln L_{it} + \alpha_2 \ln K_{it} + \alpha_3 \ln M_{it} + \beta_1 B_{it} + \Gamma X_{it} + \Lambda_I I_{it} + \delta T_{i,2012} + \varepsilon_{it} \tag{2}$$

where Y_{it}, L_{it}, K_{it}, and M_{it} are the components associated with production, representing gross output, labor, capital and intermediate inputs, which are deflated using their corresponding detailed industry deflators:

B_{it}	= is a dummy variable related to business strategy (1 for product innovation and 0 for cost-cutting);
X_{it}	= is a vector of control variables associated with firm's characteristics such as firm's age, structure, country of control, being multinationals, and if they are exporting or attempting to export;
I_{it}	= is a vector of industry dummies at the 35-industry level;
$T_{i,2012}$	= is a year dummy for 2012; and
ε_{it}	= is the error term.

For the control variables, we define young firms as those that are less than six years old. The available evidence indicates that if they survive, new entrants take about five years to become as productive as incumbents (Liu and Tang, 2014). In addition, we include a dummy variable to capture firms with a multi-establishment structure because there is evidence that such firms are more productive than stand-alone firms (Baldwin and Gu, 2006). Furthermore, we include foreign-controlled and multinational dummy variables. There is evidence that foreign-controlled firms or multinationals in Canada are significantly more productive than Canadian-controlled pure domestic firms because they are more flexible in production with operations across borders, move innovative and benefit from advanced technology and superior managerial practices from their parents (Tang and Rao, 2003; Baldwin and Gu, 2005; Rao *et al.*, 2009; Verhoogen, 2009)[8]. Finally, year dummies are introduced to capture business cycle effects and industry dummies to capture industry specific effects resulting from differences in financial and technological opportunities across different industries.

The regression model allows us to assess if firms undertaking product innovation as their main long-term business strategy tend to be more productive than firms engaging in cost-cutting. As a common issue in empirical economic studies, the micro data here are observational rather than experimental. In other words, there is no control of firm-specific factors when we compare firms with product innovation to those with cost-cutting. The group of firms with product innovation may be "apples", whereas the group of firms with cost-cutting may be "oranges". An econometric comparison of the two different groups may lead to incorrect causal inferences. To address this issue, we will use propensity score matching (PSM) to ensure "apples" being compared to "apples". This will be discussed further when we discuss empirical results associated with firm's performance in Section 4.3.

4. Empirical results
In this section, we discuss the empirical results associated with firm's business strategies and their link to economic performance. Before our econometric analyses, however, we think it is important to provide a descriptive discussion of the profile of Canadian firms in undertaking the two business strategies: product innovation and cost-cutting.

4.1 The profile of Canadian firms in undertaking business strategies
Table II displays the number of observed firms with the information on their most important long-term business strategy, whether cost-cutting or product innovation, in 2009 and 2012. There were 5,785 firms in 2009. The number is more than the surveyed firms (4,228) in SIBS in 2009. This is because some firms that were surveyed only in SIBS in 2012 (and not in 2009) also appear in 2009 if their current long-term business strategies were implemented in 2009 or earlier. For 2012, the number of observations in Table II is less than the number of firms surveyed (4,467) because of missing information for some of the surveyed firms.

As shown in Table II, product innovation was the most popular long-term business strategy for all industries, ranged from 76 per cent in primary industries to 94 per cent in IPAS in 2012.

Although it is not strictly comparable between 2009 and 2012 because of the sample changes between the two years, at the aggregate level, the percentage of firms that undertook product innovation/cost-cutting was 87.8 per cent in 2009, which is similar to 88.9 per cent for 2012. This indicates that in aggregate, firms had not significantly changed their long-term strategy after emerging from the financial crisis.

As shown in Figure 1, however, there are exceptions at the industry level. Specifically, more firms in the primary and commercial sectors (wholesale and retail) adopted cost-cutting (or fewer firms adopted product innovation) in 2012 compared to 2009. In contrast, more firms in the remaining sectors adopted product innovation (or fewer firms adopted cost-cutting).

Table III represents the transformation matrix in the long-term strategy of the firms surveyed in both 2009 and 2012 SIBS, providing additional evidence about a change in

| | 2009 | | | 2012 | | |
	Cost-cutting	Product innovation	Total	Cost-cutting	Product innovation	Total
Primary[a]	48	185	233	60	186	246
Durable manuf.[b]	222	1,269	1,491	133	858	991
Non-durable manuf.	249	2,029	2,278	152	1,428	1,580
Retail and wholesale trade	18	122	140	25	122	147
FIRE[c]	20	191	211	14	206	220
IPAS[d]	62	724	786	35	560	595
Others	95	551	646	67	567	634
Total	714	5,071	5,785	486	3,927	4,413

Notes: [a]Primary includes agriculture, forestry, fishing and trapping, mining and oil and gas extraction; [b]durable manufacturing includes industries producing long-last goods such as wood, metals and equipment while non-durable manufacturing consists of industries producing short-lived goods such as food, clothing, paper, printing, chemicals, plastic and rubber; [c]FIRE includes finance, insurance, real estate, renting and leasing; [d]IPAS includes information and cultural industries; professional, scientific and technical services; and administrative support, waste management and remediation services; The table only includes firms with SIBS information. Firms that were surveyed in 2012 will appear in 2009 if their current long term strategy was implemented in 2009 or earlier. This is why the number of observations in 2009 is larger than the number of surveyed firms in 2009
Source: Authors' own calculations using un-weighted data

Table II.
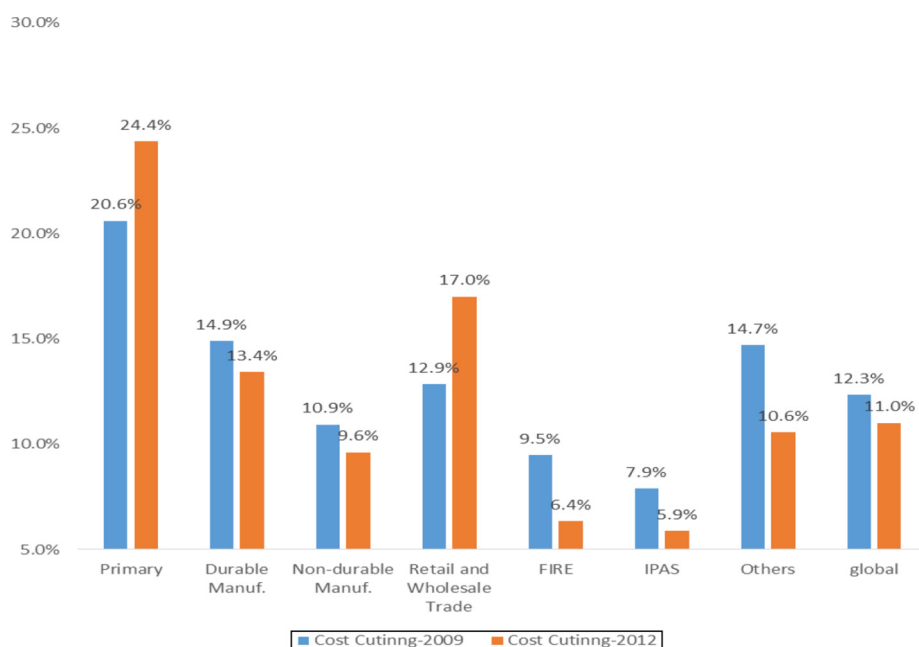Number of observed firms engaging in cost-cutting or product innovation

30.0%

25.0% — 24.4%

20.6%

20.0%

17.0%

15.0% — 14.9%
13.4%

14.7%

12.9%
12.3%
11.0%

10.9%
10.0% — 9.6%
9.5%
10.6%

7.9%
6.4%
5.9%

5.0%

Primary | Durable Manuf. | Non-durable Manuf. | Retail and Wholesale Trade | FIRE | IPAS | Others | global

■ Cost Cutinng-2009   ■ Cost Cutinng-2012

| | | The firms in 2012 | | |
		Cost-cutting	Product innovation	All
The firms in 2009	Cost-cutting	–	110	110
All	Product innovation	114	986	1,100
		114	1,096	1,210

Source: Authors' own calculations using un-weighted data

business strategies at the disaggregated level. There were 1,100 firms pursuing product innovation and 110 firms pursuing cost-cutting in 2009. Only 10 per cent of those product innovation firms in 2009 changed their strategy to cost-cutting in 2012, but all cost-cutting firms in 2009 switched to product innovation in 2012.

Notably, however, despite those transformations, product innovation continued to be the dominant long-term business strategy for Canadian firms after the financial crisis.

4.2 Econometric analysis
This section is devoted to the econometric analysis of the relationship between firm's economic performance and their business strategies and the underlying factors behind the choice of those strategies.

4.2.1 Firm's characteristics, economic performance and business strategy. Why do some firms choose product innovation while others go for cost-cutting as their main long-term business strategy? In this section, we link firm's characteristics and their economic performance to the undertaking of different business strategies. Table IV

16

| | Response profile: 16,238 for 1 (product innovation) and 2,145 for 0 (cost-cutting) | | | |
| | Regression (1) | | Regression (2) | |
	Parameter estimate	Odds ratio	Parameter estimate	Odds ratio
Large firms	0.102 (0.116)	1.107	0.097 (0.115)	1.102
Young firms	−0.185** (0.075)	0.831	−0.188** (0.075)	0.829
Foreign-controlled	−0.062 (0.107)	0.940		
US-controlled			−0.200 (0.129)	0.818
Europe-controlled			−0.377* (0.195)	1.457
Asian-Pacific-controlled			−0.303 (0.398)	1.354
Multi-establishment firms	−0.835*** (0.156)	0.434	−0.829*** (0.156)	0.437
Multinationals	−0.145* (0.076)	1.156	−0.131* (0.076)	1.140
Lagged real wage rate	−0.009*** (0.002)	1.000	−0.009*** (0.002)	1.000
Lagged capital intensity	−0.180*** (0.030)	1.000	−0.180*** (0.030)	1.000
Lagged multifactor productivity	−0.029 (0.022)	1.030	−0.031 (0.022)	1.031
Lagged profitability	−0.438 (0.373)	0.645	−0.435 (0.374)	0.647
Industry dummies	Yes		Yes	
Year dummies	Yes		Yes	
Observations	18,383		18,383	

Table IV.
The likelihood of firms pursuing product innovation compared to cost-cutting

Notes: Reported standard error in parenthesis is heteroscedasticity-consistent; "*", "**" and "***": Significance at 10, 5 and 1%, respectively

reports the underlying factors associated with the likelihood of a firm pursuing product innovation as the most important long-term business strategy in reference to a firm pursuing cost-cutting.

The estimation shows that multinationals and firms paying high wages and being high capital intensive tend to be more likely to pursue product innovation, whereas young firms (under six years old) and firms with two or more establishments tend to be less likely to do so. In general, foreign control plays a limited role in the choice of long-term strategies (Regression 1). Except for European-controlled firms with marginal significant for product innovation, foreign control from other regions is insignificant (Regression 2).

In terms of odds ratio, young firms were more likely to go with cost-cutting than with product innovation[9]. This could be explained by the life cycle of firms. Young firms are startups. With new products in hand, their main strategy may very well make them more cost effective to gain market acceptance. Similarly, for high profitable firms, the odds are that they were more likely to pursue cost-cutting than product innovation. Profitable firms tend to have market-established products and are successful. This may reduce the incentive for them to develop new products, especially if this is at the expense of profitability. Success in terms of profitability may also cause firms to become complacent in making effort to develop new products. In terms of odds ratio, it is also interesting to see firms with multiple establishments being more likely to pursue cost-cutting versus product innovation. This may be because those firms tend to have established products/technologies. They are trying to dominate through costs in different markets. However, more research is required for the underlying rationale.

Finally, we observe that foreign control from different regions matters for business strategy undertaking in Canada. Why are the odds for firms controlled by European countries, and to lesser degree by Asian-Pacific countries, to undertake product innovation higher than for them to undertake cost-cutting? And why are the odds lower for those controlled by the USA? This may be because of their different business models. Unlike firms controlled by European or Asian-Pacific countries, US companies tend to build factories (branch plants) in Canada, primarily to take advantage of resources (e.g. labor) and/or sell products in the Canadian market. Product innovation is often centralized at their parent companies in the USA.

4.2.2 The linkage between different business strategies and firm's performance. As discussed in the methodology section, when we compare the economic performance of firms that engage mainly in product innovation as the focus of long-term business strategy to those that engage mainly in cost-cutting, we rely on observational rather than experimental data. The results may be driven by the possibility that the two groups of firms being compared are very different, leading to incorrect causal inferences. To minimize the problem and control for firm-specific factors, in this section, we use PSM to select firms within the group undertaking product innovation that are observably similar to those firms under cost-cutting[10]. The "treatment" here is cost-cutting. We choose cost-cutting to be the treatment because we have far more firms under product innovation than under cost-cutting.

For the matching, we first calculate for all firms the average estimated probability over the data period based on Regression (2) in Table IV. The estimated probability for a firm is the likelihood that the firm will undertake product innovation (or will not undertake cost-cutting). It is associated with a number of potential matching factors including firm's characteristics (firm's size, age, structure, being multinational and country of control) and economic performance (e.g. lagged wage rate, capital intensity, productivity and profitability) that may influence the firm's decision in business strategy undertaking[11].

For each of the firms that only undertook cost-cutting over the observed period, we select two firms with equal or the nearest estimated probability from the groups of firms that only undertook product innovation over the observed period[12]. All the firms with cost-cutting and the product innovation firms being selected to match each cost-cutting firm are stacked together, forming the matched data. In the matched data, we also keep those firms that switched their long-term business strategies over data period. Other firms are excluded.

The propensity score distributions of product innovation and cost-cutting firms for undertaking product innovation before and after the PSM are in Figures 2 and 3, respectively. Clearly, after matching, the propensity score distributions of product innovation firms and cost-cutting firms are much closer. This suggests that the selected firms with product innovation are very similar to those with cost-cutting in the likelihood to undertake product innovation. This means that the matched data allow us to compare "apples" to "apples". In other words, we are comparing two similar groups of firms. Thus, the matched data allow us to minimize the impact of the difference in firm specific factors between the two comparing groups of firms on the regression results.

Table V reports the estimation results for the relationship of productivity performance with the business strategies using the matched data. The factors employed generally explain the economic performance of firms in the order of 99 per cent based on
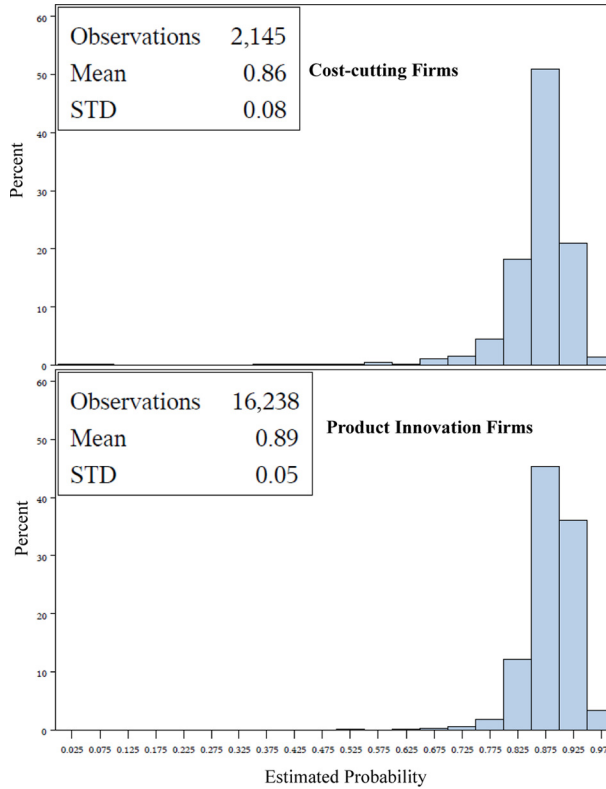
Figure 2.
The whole sample
propensity score
distributions of firms
with product
innovation and
cost-cutting by
estimated probability

the adjusted R^2. All the coefficients of the explanatory variables are statistically significant.

The estimation shows that firms with product innovation being their most important long-term strategy are more productive than firms with cost-cutting being their most important long-term strategy (Regression 1). The finding remains valid after control analysis for firm's characteristics, including firm's age, structure, being a multinational and foreign control, in addition to the control of industry and year-specific effects (Regression 2).

As expected, the estimation also shows that being multi-establishment firms, multinationals and foreign-controlled is a positive predictor for better productivity performance. It is surprising and interesting to find that newly created firms tend to achieve better productivity. The results are different from Liu and Tang (2014) for the manufacturing sector. The difference may reflect that the sample here mainly includes large similar firms and for the whole business sector, whereas in Liu and Tang (2014), the sample includes both small and large different establishments and for the manufacturing sector only.

Profitability is also an important indicator of firm performance. Thus, we also run regressions to compare the profitability performance of firms with product innovation to that of firms with cost-cutting. Table VI reports the regression results. The estimation
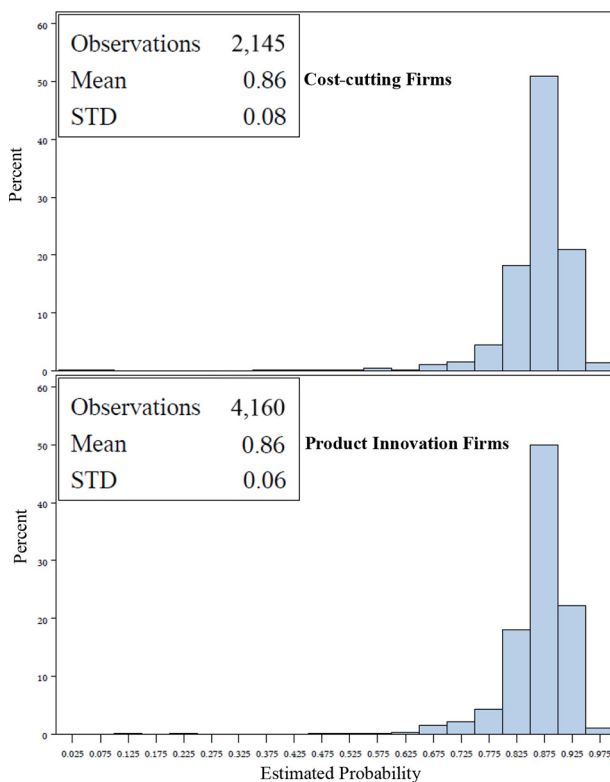
Figure 3.
The matched sample
propensity score
distributions of firms
with product
innovation and
cost-cutting

Dependent variable: log of real gross output	Regression (1)	Regression (2)
Log of labor	0.198*** (0.007)	0.194*** (0.007)
Log of real capital	0.084*** (0.005)	0.084*** (0.005)
Log of real intermediate inputs	0.734*** (0.008)	0.729*** (0.008)
Product innovation (with reference to cost-cutting)	0.012** (0.005)	0.013** (0.005)
Young firms		0.023** (0.009)
Multi-establishment firms		0.067*** (0.016)
Multinationals		0.051*** (0.008)
Foreign-controlled		0.055*** (0.013)
Industry-dummies	Yes	Yes
Year dummies	Yes	Yes
Adjusted R^2	0.99	0.99
Observations	6,305	6,305

Notes: Reported standard error in parenthesis is heteroscedasticity-consistent; *** and ** denote significance at 1 and 5%, respectively

Table V.
Productivity
performance of firms
with product
innovation based on
the matched sample

seems to suggest that the choice of business strategy is not statistically significant for profitability. In contrast, it shows that being a large firm, multi-establishment firm structure, multinational or being foreign-controlled are all important indicators for higher profitability. Note, however, that these factors could only explain about up to 12 per cent of the variation in profitability across firms according to the adjusted R^2. This means that firm's profitability is mainly determined by factors other than those considered in this study.

5. Conclusion

In the new economic environment following the financial crisis of 2008-2009, strategic management has become, more than ever, an essential factor in the competitiveness of firms. Yet, the major reproach is that firms are inclined to a reactive attitude *vis-à-vis* the environment and allow themselves to be controlled by the events around them (Amara *et al.*, 2009). This study has nuanced these statements by clarifying long-term strategies of Canadian firms in the context of the upheavals resulting from the economic and financial crisis of 2008. The long-term business strategies studied by this research are product innovation and cost-cutting strategies.

The first indication from the research has been that certain characteristics of Canadian firms are very useful predictors for firms to undertake product innovation. They are, among other things, the age of the firms, the single-establishment structure of the business and being multinationals. In general, however, the study has shown that Canadian firms are more inclined to business strategies based on product innovation, compared to those based on cost-cutting. Better still, this observation remains valid in the post-crisis period.

Productivity and investment in innovation are inseparable. Product innovation gets through the activities of R&D and the adoption of advanced technologies and also by other activities that generate knowledge such as the managerial methods, organizational practices and other intangible factors. Product innovation improves productivity, and productivity is one of the driving forces of competitiveness. The research has confirmed that Canadian firms adopting long-term business strategies based on product innovation are more productive.

	Dependent variable: profit rate (net income divided by total sales)	
	Regression (1)	Regression (2)
Product innovation (with reference to cost-cutting)	0.0004 (0.002)	0.001 (0.002)
Large firms	0.046*** (0.006)	0.018*** (0.005)
Young firms		−0.004 (0.003)
Multi-establishment firms		0.045*** (0.009)
Multinationals		0.022*** (0.004)
Foreign-controlled		0.014*** (0.005)
Industry dummies	Yes	Yes
Year dummies	Yes	Yes
Adjusted R^2	0.10	0.12
Observations	6,305	6,305

Table VI.
Profitability of firms with different business strategies based on the matched sample

Notes: Reported standard error in parenthesis is heteroscedasticity-consistent; "*", "**" and "***": Significance at 10, 5 and 1%, respectively

These results truly concur with the vision of the Government of Canada on the importance of innovation and its policies in encouraging business innovation in driving the growth of the Canadian economy and improving the standard of living of Canadians (e.g. Government of Canada, 2012).

Notes

1. This is different from Baldwin and Johnson (1996) that examine the relationship between innovation and a broad group of business strategies in marketing, finance, production, management and human resources.

2. The term innovation has been used broadly. According to the Oslo Manual (OECD, 2005), innovation henceforth includes four categories: product, process, marketing and organization. In this paper, we focus on product innovation.

3. NAICS stands for the North American Industry Classification System.

4. The sample sizes of the SIBS 2009 and SIBS 2012 are 6,233 and 7,818, with the overall response rate being 70 and 60 per cent, respectively.

5. Another employment measure, the average labor unit (ALU), is also available. ALU is derived by dividing the business's annual payroll (from T4) by the corresponding industry/province/ size class average annual earnings per employee (from Survey of Employment, Payrolls and Hours). Because the imputation is based on average payroll, it will overestimate employment of productive firms and underestimate employment of less productive firms because high productive firms in general pay high wages. Note, however, that ILU also has its own shortcomings. It overestimates employment of firms with part-time workers. The problem may be minimized by the introduction of industry dummies in the analysis.

6. It is important to note that we define foreign control using the Country of Control variable from the Business Register database. It classifies firm as to the country of residence of the ultimate shareholder or group of shareholders. This information is derived from ownership questionnaires filed annually with Statistics Canada by corporations liable under the Corporations Returns Act from information obtained from the Canada Revenue Agency's administrative records or is obtained via profiling of the firm. It follows the inter-corporation ownership (ICO) concept.

7. The number of observations in 2009 or 2012 is more than the surveyed firms in SIBS. This is because many firms surveyed only in 2009 (and not in 2012) also appear in 2012 through the linkage to other three micro databases, although those firms have no SIBS information in 2012. Similarly, many firms surveyed only in 2012 (not in 2009) also appear in 2009 through linkage to three other micro databases, although those firms have no SIBS information in 2009.

8. For a detailed discussion on the activities of foreign multinationals in Canadian manufacturing, see Wang (2014).

9. The odds ratio for wage rate or capital intensity is one, although these two variables are statistically significant in influencing the probability of undertaking product innovation. This is because the odds ratio for a variable is calculated as the ratio of the odds before to the odds after a unit change in the variable. Given the fact that wage rate and capital intensity are large continuous variables, a unit change in either of them will have no meaningful impact on the odds. As a result, the odds ratio is almost one.

10. For a discussion on using the propensity score method to estimate causal effects, see Li (2013).

11. Because of the use of lagged variables, only firms with at least two consecutive observations in terms of economic variables will appear in the estimation and in the analysis based on the matched data in this section.

12. For each cost-cutting firm, one may choose to match one from product innovation firms, which will make selected product innovation firms to be more "similar" to cost-cutting firms. However, the estimation results with one-to-one matching are generally similar to those with one-to-two matching.

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Appendix

Micro data and variable definitions

Survey of innovation and business strategy (SIBS), 2009 and 2012.

For variables related to business strategies, multinationals and headquarter or subsidiary locations, we require the following variables from SIBS:

- most important long-term business strategy (product innovation vs cost-cutting);
- the year of business strategy being implemented;
- head office location (i.e. Canada, the USA, Europe, Asian-Pacific and others); and
- subsidiary location (i.e. Canada, the USA, Europe, Asian-Pacific and others).

Longitudinal employment analysis program (LEAP), 2000-present

For employment, payroll and firm structure, we require the following variables from LEAP:

- business payroll by province;
- individual labor units by province; and
- multi-establishments.

General index of financial information (GIFI), 2000-present

For capital intensity and productivity, we require the following variables from GIFI:

- total sales of goods and services;
- net income before taxes and extraordinary items; and
- total tangible capital assets.

Business register, 2000-present
For firm's age, ownership and industry codes, we require the following variables from BR:

- country of control;
- firm's establishment date; and
- industry code (NAICS).

26

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