Canada's Billion Dollar Firms

Contributions, Challenges and Opportunities

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About the DEEP Centre

The Centre for Digital Entrepreneurship and Economic Performance (DEEP Centre) is a Canadian economic policy think tank based in Waterloo, Ontario. Founded in 2012 as a non-partisan research institute, the DEEP Centre's work shapes how jurisdictions build fertile environments for launching, nurturing, and scaling companies that will thrive in an increasingly connected world. We understand the changing drivers of success in the global economy and the critical interconnections between technology, entrepreneurship, and long-run economic performance. Our goal is to help policy-makers identify and implement powerful new policy levers to foster innovation, growth, and employment in their jurisdictions.

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Canada's Billion Dollar Firms: Contributions, Challenges and Opportunities

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Executive Summary

How does the Canadian economy perform in the creation of billion-dollar firms? Does firm size make a significant difference in shaping the performance of the Canadian economy? What are the key drivers of growth among Canada's largest firms? How sizable are their contributions to domestic employment and research and development (R&D) spending? And what can the Canadian government do to help Canada's largest firms continue to achieve success in the global economy?

This report answers these questions through a five-part analysis of the growth and evolution of Canada's largest firms, and a comparative analysis of billion-dollar enterprises in five comparative jurisdictions: Australia, Germany, Sweden, the United Kingdom, and the United States. A comparative analysis of growth-related government policies in the comparator nations is also provided, and a series of growth and innovation strategies that hold promise for Canada and merit further investigation are identified.

Although the focus of the report is on large firms, some attention is devoted to small and mid-range Canadian firms in order to assess the opportunities and challenges they face in scaling up to achieve mega-large revenue status. This analysis yields insights across these segments and provides a number of recommendations for policy-makers.

The definition of "largest" here is based on annual revenue and segments firms above and below the billion-dollar annual revenue mark (Canadian funds). Hereafter, we refer to firms above this threshold as "billion-dollar firms."

Part I. Canada's Population of Billion Dollar Firms

Part I of this report provides an in-depth quantitative analysis of the demographic segmentation of Canada's largest firms and the pipeline of mid-range firms (defined as firms between CAN$500 and $999 million in annual revenue) that are best positioned to join them. It quantifies the cohort's overall contribution to employment in Canada and evaluates the contributions of individual industrial sectors. This section of the report also presents data on export dependence and R&D spending by Canada's largest firms. The analysis provides an overall positive view of the development of Canada's billion-dollar cohort. We also find that there is a healthy evolution of firms from below the billion-dollar revenue threshold, with a significant percentage of mid-tier firms either positioned to enter the billion-dollar cohort or providing attractive acquisition targets.

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The findings, however, are not universally positive. There are significant sectoral differences across the sample of billion-dollar firms. For example, Canada has excelled in developing large resource firms over the past decade, and has also seen significant growth in the number of billion-dollar firms in the consumer retail, engineering and construction, and transportation sectors. Together, these firms have generated significant Canadian-based employment growth. This performance, however, is not matched in other key sectors. The manufacturing sector, for example, has seen its population of mega-large firms and related employment shrink significantly. In knowledge-intensive sectors of the economy, such as health care and technology, a high degree of churn sees no change in the number of billion-dollar firms, but rather, wholesale changes in who those firms are.

Moreover, the analysis of employment and export data highlights the growing internationalization of Canadian firms, with both positive and potentially less positive domestic effects. Positive findings include the fact that leading Canadian firms are more globally engaged than ever, and this global engagement is a significant factor underpinning their growth—both over the past decade and into the future. The risk highlighted in the data is that international growth often means more emphasis on hiring overseas and potentially less Canadian employment, particularly as internationalizing firms make strategic decisions to locate their operations closest to the largest centres of global demand.

Part I also includes a review of transactions and acquisitions in this demographic. It finds a relatively significant nominal impact on the aggregate number of firms, as well as the distribution of firms across sectors. This finding is not necessarily negative. Billion-dollar firms rely heavily on domestic and foreign acquisitions to fuel growth; a high number of acquisitions generally reflect a healthy growth trajectory for many of Canada's largest firms. And, as our section on foreign commercial entities shows, foreign-owned firms and the Canadian companies they acquire play an ongoing and integral role in the Canadian economy, both in terms of employment and R&D spending.

Part II. A Qualitative Survey of the Opportunities and Challenges Facing Canadian Firms

Part II draws on interviews with executives from 28 Canadian firms to provide a qualitative analysis of the key factors that have propelled the growth of three segments of Canadian firms: fast-growing billion-dollar firms, mid-tier firms, and fast-growing young firms. Part II thus offers a more nuanced assessment of the strengths and weaknesses of the domestic Canadian business environment, as explained by leading Canadian executives. It sheds light on the international and domestic expansion and acquisition strategies that Canada's mega-large firms are deploying to fuel their growth, as well

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as the investment, talent and policy-related challenges that both billion-dollar and mid-range firms face at home and abroad. This analysis provides a sobering assessment of Canada's R&D initiatives from the point of view of some of Canada's largest firms, and highlights significant opportunities for improved collaboration across industry, academia and government to promote innovation and to facilitate access to emerging markets.

Part II also provides an assessment of the growth prospects and challenges facing fast-growing young Canadian firms. Here, we find that executives at young firms identify access to talent—namely, sophisticated "go-to-market" management talent—as the most significant impediment to growth. At the same time, these entrepreneurs call for a streamlined system of government supports and increased attention to enabling factors such as public procurement programs geared for small- and medium-sized firms (SMEs), a more robust financing ecosystem in Canada, more investment in branding Canada as a destination for investment in entrepreneurial ventures, and better mentorship and business acceleration programs for start-ups. Across all three segments of firms, the qualitative review delves into the key areas of government policy that impact firm growth strategies, and provides a series of key insights for policy-makers in their quest to help facilitate ongoing firm and employment growth.

Part III. Comparative Quantitative Analysis: A Cross-Jurisdictional Review of Billion-Dollar Firms

Part III compares Canada's population of billion-dollar firms to those in five comparable jurisdictions: Australia, Germany, Sweden, the United Kingdom, and the United States. This analysis reveals the extent to which the number of large enterprises produced in Canada is equivalent to the comparable economies. In so doing, the analysis allows for a sector-by-sector evaluation of the Canadian economy's strengths and weaknesses in facilitating the development of billion-dollar firms. While Canada's population of billion-dollar firms is on par with the per capita average across the group of comparative economies, we find significant variances in performance across sectors, which merit further analysis. The relative weight of Canada's energy sector, for example, is juxtaposed against a relatively small share of manufacturing firms as contrasted to our comparators. Moreover, this section of the report highlights the fact that Canada's overall economic output is far more dependent on firms that are below the billion-dollar segment, relative to all but one of the other jurisdictions studied.

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Part IV. Cultivating Success: A Cross-Jurisdictional Review of Domestic Policy Efforts

In Parts IV and V, we delve into the policy initiatives adopted in each jurisdiction to promote economic growth and competitiveness, both generally and in specific sectors. In particular, Part IV reviews three elements of domestic policy—taxation, R&D incentives, and other corporate growth incentives. We find that Canada ranks competitively on taxation levels and on the incentives that promote R&D investment, however, other economies place far greater emphasis on sector-specific policies and on unique assistance initiatives geared to facilitating the growth and expansion of strategic industries. We also find that despite Canada's competitive policy environment, its relative rank on productivity and innovation-related measures has not moved in tandem. We flag this as a concern that requires closer scrutiny.

Part V. Country Case Studies: Lessons for Canada from a Comparative Review of the Policy Enablers of Sector-Specific Growth

In Part V, our analysis of these discrete policy areas is followed by a series of country-specific case studies. These case studies highlight one sector of interest in each country and the policies developed to facilitate growth therein. In Australia, we examine the policies, including strong R&D incentives, which have facilitated two decades of growth and export success in its life sciences and biotechnology sectors. In Germany, we review the country's multi-faceted approach to manufacturing success, including its vocational programs, export promotion strategies and its world-renown network of R&D centres. In Sweden, we explore the important role that clusters play in distinguishing it as a world leader in promoting R&D-intensive industries, particularly biotechnology and life sciences. In the United Kingdom, we evaluate British efforts to instill a renaissance in industrial manufacturing. Finally, in the United States, we explore the institutional roots and policy drivers of America's decades-long pre-eminence in information technology and related services.

Collectively, the country studies are helpful in identifying valuable policy initiatives that have the potential to address recognized gaps in the current Canadian policy framework. Indeed, we note numerous instances where Canadian executives have called for the kinds of policies and support programs that appear to have contributed to significant sector-specific growth in our comparator countries.

This section concludes with a series of insights and recommendations for Canadian policy-makers, based on the broad catalogue of growth and innovation promotion initiatives identified in our comparative survey. Among other things, these recommendations include the need for integrated export promo-

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tion, more coordination and focused support for clusters and innovation centres, the need for a fresh look at Canada's approach to intellectual property, and the need for more attention in the promotion of global engagement in firms of all sizes.

Part VI. Conclusions, Recommendations, and an Agenda for Future Research

In Part VI, we summarize of the report's key findings. This section highlights the structural and policy-related challenges facing Canadian firms, both small and large. It also reviews a wide variety of general and sector-specific policy levers and programs that policy-makers can use to facilitate a more robust and dynamic Canadian economy. Finally, Part VI highlights a series of unanswered questions and frames an agenda for future research.

Ultimately, this report contributes to a richer understanding of the key factors driving the growth of Canada's largest firms, the contributions of this cohort of firms to the broader Canadian economy, and the policy-relevant areas that either assist or impede the success of firms of all sizes across Canada. In so doing, we hope this report provides policy-makers and other interested stakeholders with a valuable framework to help the Canadian economy and Canadian citizens prosper in an increasingly competitive and dynamic global economy.

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Part I. Canada's Population of Billion-Dollar Firms

Introduction

While contemporary public policy has focused heavily on the development of entrepreneurial start-ups, evidence suggests that Canada's future prosperity and employment growth depends far more on our ability to nurture and support ultra-competitive, high-growth firms—firms that have annual growth rates over 20 percent and have successfully entered overseas markets and invested significantly in research and innovation. Just 4.7 percent of Canadian firms (or 13,000 of over 1.2 million domestic firms) qualify as high-growth, high-impact, and they contribute nearly 50 percent of all Canadian job growth.[1] So while start-ups remain an important part of the economic ecosystem—and thus a worthy target of public policy—the capacity to develop large international firms that excel in innovation and can compete globally for talent and new export markets provides a truer measure of Canada's ability to stimulate broad employment gains and sustainable economic growth going forward.

In Part I of this report, we analyze the population of Canadian firms with the most significant annual revenues. In so doing, we seek to provide a better understanding of Canada's performance in the development of large, globally competitive firms. We also seek to better understand the contributions that firms with revenues over CAN$1 billion make to the economy, especially their contributions to domestic employment.

The demographic studied for the purpose of this exercise includes firms with annual revenue in excess of CAN$1 billion. This segment is not particularly large. Of the 1,568 Canadian firms defined as "large" by way of employing over 500 employees, only 169 publicly traded firms generate a billion dollars in annual revenues or more.[2] This small sample notwithstanding, the insights available through a cross-comparison of data over a 10-year period are rich. In particular, this analysis of Canada's largest firms provides valuable insights into sector-specific growth patterns, employment trends, R&D spending, acquisition activity, and the overall health and evolution of the Canadian economy.

The questions framing our analysis of this segment of mega-revenue firms are organized into four related themes:

1. **Population dynamics.** How is the aggregate population of mega-revenue firms in Canada evolving? Has the overall population of billion-dollar companies declined, stayed the same, or grown over the past decade?

[1] Industry Canada. Key Small Business Statistics. Small Business Branch, July 2012.

[2] A full listing of Canada's population of publicly traded billion-dollar firms is available in Appendix I.

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2. **Industry dynamics.** Which industries are growing more prominent in Canada, as measured by growth in the number of billion-dollar leaders? Which industries have suffered a loss of billion-dollar leaders, and which appear to have settled into a pattern of stasis or stagnation?

3. **Economic impacts:** To what extent are the 169 firms in this segment major contributors to employment, export growth, and R&D in Canada? And, by extension, does the data on employment, exports, and R&D suggest any signs of potential promise or peril for the Canadian economy as a whole?

4. **Acquisition activity:** How has transactional activity, including privatizations and acquisitions, influenced both the number of billion-dollar firms and the sectoral composition of this segment? To what degree is there evidence to support the hypothesis that foreign acquisitions have resulted in a hollowing out the Canadian economy?

The organization of Part I of this report is as follows. First, we describe the evolution of this mega-revenue segment over the past decade and provide a breakdown of these firms by industry to highlight the comparative fortunes of different sectors of the Canadian economy. Second, we provide an analysis of the transaction activity in this demographic and highlight the contributions of billion-dollar firms to job creation, export growth, and R&D spending. Third, we describe the evolution of mid-range firms with revenues ranging from CAN$500 million–$999 million over the 2003–2012 period. Where data allows, we also provide a brief overview of privately held and foreign firms in the largest revenue segment.

Key Findings from the Analysis of Billion-Dollar Firms

The analysis provided below reveals a generally positive picture of the evolution of Canada's largest firms, with a few areas of potential concern. Among the positive takeaways, we highlight the following key findings:

- The overall growth of the billion-dollar cohort and the maturation of a significant percentage of mid-range firms into billion-dollar firms speak to a strong growth profile for Canadian firms.

- Canada has excelled in developing large resource firms over the past decade, notably in the energy sector, a development that should not be surprising, given the confluence of growing global demand and Canada's abundant natural resource endowments.

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- While the growth of natural-resource-related sectors is most evident in this quantitative analysis, the consumer retail, engineering and construction, and transportation sectors have each seen their respective cohort of billion-dollar firms grow significantly.

- The growth of billion-dollar firms in resources, retail and wholesale, and engineering and construction has generated significant Canadian-based employment growth.

- The fact that Canadian firms in both the billion-dollar and mid-range category are attractive targets for acquisition further highlights the strength of many Canadian companies.

These positive trends are tempered by lacklustre or poor performance in other sectors. In particular, the manufacturing sector has seen its population of mega-large firms, and related employment, shrink significantly. In knowledge-intensive sectors of the economy, such as health care and technology, a high degree of churn sees no change in the number of billion-dollar firms, but rather, wholesale changes in who those firms are. The report also reveals potential concerns regarding the evolution of Canadian-based employment, and an apparent weakness in R&D investment by Canadian firms. In the analysis that follows, we explore all of these areas in order to present a balanced analysis of Canada's billion-dollar firms and their contributions to the Canadian economy.

Methodology

Due to the comparative nature of this project and the availability of common data across the jurisdictions studied, this analysis is limited to publicly traded firms. Given the availability of Canadian data on privately held firms, this sample is included in the broader demographic analysis, but omitted from subsequent comparative analysis in Part III.

The definition of industry sectors included herein is broad. In order to capture firms across a majority of subsets, several broad definitions bear distinction.

We define:

- "manufacturing" to include goods production, industrial production, and chemicals firms;

- "energy and utilities" to include all oil and gas firms and utilities;

- "health care" to include both life science/pharmaceutical firms as well as other laboratory or health-care-related firms.

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Part I. Canada's Population of Billion-Dollar Firms

It should be noted that our analysis of mega-large firms does not necessarily reflect the overall dynamism or importance of a specific sector. For example, while Canada is home to just one publicly traded firm in the life sciences sector with revenues over CAN$1 billion, the US Census Bureau's North American Industry Classification System (NAICS) data for the pharmaceutical and medicine manufacturing sector (code 3254) shows the sector includes an estimated 377 establishments, employing over 25,000 Canadians. Similarly, while Canada hosts just six mega-large technology firms, NAICS data (code 334) shows over 1,700 computer- and electronics-related firms. Moreover, while acquisitions by foreign multinationals may have removed firms from the dataset of "Canadian" companies, these formerly Canadian-owned firms still operate in Canada and continue to make important contributions to employment and, in some cases, to domestic R&D spending.

The Distribution and Evolution of Canada's Billion-Dollar Firms, 2003–2012

On the basis of 2012 net revenues, a total of 169 publicly traded firms in Canada can be classified as billion-dollar Canadian firms.[3] In 2012, this demographic segment of firms contributed nearly CAN$150 billion in operating income, and employed nearly 1.4 million Canadians. The sectoral distribution of publicly traded firms with revenues over CAN$1 billion is shown in Figure 1. Note that this count omits several large foreign subsidiaries and does not include privately held firms. For the purposes of the subsequent comparative analysis, and owing to a lack of verifiable data on privately held firms in foreign jurisdictions, the focus of this section of the report is on publicly traded firms. We provide a distinct analysis of privately held firms later in this report.

[3] For the purposes of this project, both Bloomberg and Globe and Mail data has been utilized to build this sample. See Report on Business, "Rankings of Canada's Top 1,000 Companies," The Globe and Mail, June 27, 2013.

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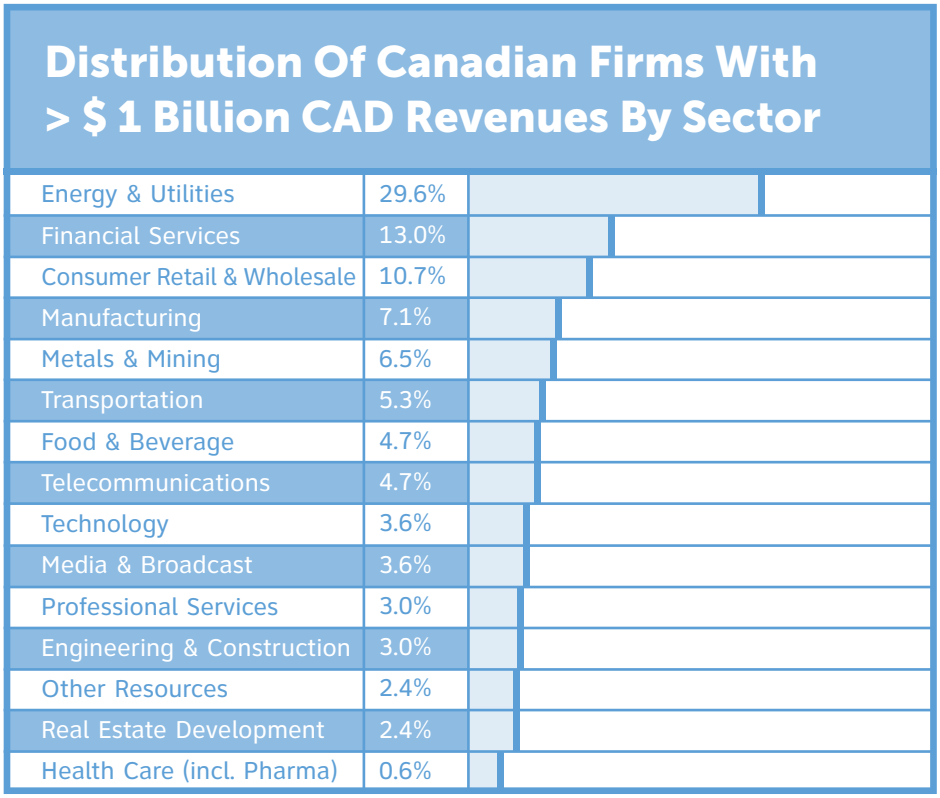
Figure 1: Distribution of Billion-Dollar Firms in Canada (2012)



In order to measure change across this segment of firms over the 2003–2012 period, this exercise adopts the Bank of Canada's inflation calculation for the period 2003–2012 at 18.87 percent. The nominal CAN$1 billion measure is thus adjusted to CAN$885 million to account for inflation. One hundred forty-six firms qualify in 2003 as billion-dollar firms using this adjusted measure. And, as noted in the primer on project methodology, we define:

- "manufacturing" to include goods production, industrial production, and chemicals firms;
- "energy and utilities" to include all oil and gas firms and utilities;
- "health care" to include both life science/pharmaceutical firms as well as other laboratory or health-care-related firms.

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Table 1 details this distribution and the change in population during the period 2003–2012.

Table 1: Distribution of Billion-Dollar Firms in Canada

Industry	Number of Billion-Dollar Firms in 2012	Number of Billion-Dollar Firms in 2003	Change, 2003–2012
Energy & Utilities	50	33	+17
Financial Services	22	26	-4
Consumer Retail & Wholesale	17	10	+7
Manufacturing	12	18	-6
Metals & Mining	11	10	+1
Transportation	9	6	+3
Food & Beverage Production	8	6	+2
Telecommunications	8	8	NC
Media & Broadcast	6	5	+1
Technology	6	6	NC
Engineering & Construction	6	2	+4
Professional Services	5	3	+2
Real Estate	4	3	+1
Other Resource	4	10	-6
Health Care (incl. pharma)	1	0	+1
Total Firms	**169**	**146**	**+23**

Note: NC=no change

The most significant trend across this period is the significant increase in the number of energy sector firms (+17) into the billion-dollar category. Within this broad categorization, all growth is seen among oil and gas firms. A similar increase is not seen in the metals and mining sector, despite the significant growth of several large players (Barrick Gold, Teck Resources, and Goldcorp), owing to the consolidation and acquisition of large Canadian mining companies such as Inco, Falconbridge and Noranda. Consolidation and acquisition is also central to the significant loss of billion-dollar forestry and paper product firms.

Growth in the number of large retail and wholesale firms, as well as transportation and engineering and construction, counters significant declines in manufacturing firms. Among retail and wholesale firms, significant international and domestic expansion and acquisition strategies have buoyed the growth of firms such as Dollarama, Wajax, Uni-Select and AutoCanada. Among transportation firms, organic growth is a far more significant factor driving

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the growth of new firms such as CAE, Chorus and the Mullen Group. Strong growth is also seen in the engineering and construction sector, driven largely by consolidation and general economic growth. Both of these latter sectors, however, have also been the beneficiaries of significant revenue growth associated with the growth of the Western Canadian energy sector.

Finally, while significant policy attention is directed toward the development of technology firms, this has not translated into a concomitant increase in the number of supra-large Canadian technology firms. Rather, in the churn and waves of creative destruction, industry leaders such as Nortel Networks have disappeared, BlackBerry has lost significant market share, and others such as ATI Technologies have been acquired and folded into their purchasers.

Overall, the concentration of billion-dollar firms in the resources, utilities, and financial services sectors is consistent with Statistics Canada research on the sectoral concentration of large firms. Moreover, this shift towards resource-related sectors is matched by the significant increase in the share of energy-related products among Canada's total exports over the same period. The decline in the number of large manufacturing and industrial firms is similarly seen in broader Statistics Canada research.[4]

Additional data:

Table 2: Size Distribution (By Revenue) of Publicly Traded Canadian Billion-Dollar Firms (2012)

Size (in CAN$)	Number of Firms
Size (in CAN$)	Number of Firms
$1–2 billion	63
$2–5 billion	51
$5–10 billion	18
$10 billion +	37
Total Firms	**169**

[4] D. Leung and L. Rispoli. "Small, Medium-sized and Large Businesses in the Canadian Economy: Measuring Their Contribution to Gross Domestic Product from 2001 to 2008." Economic Analysis Research Paper Series, no. 82. Statistics Canada Catalogue No. 11F0027M.

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Table 3: Regional Distribution of Publicly Traded Canadian Billion-Dollar Firms (2012)

Province	Number of Firms	Province	Number of Firms
Ontario	55	NWT / Yukon / Nunavut	0
Quebec	37	PEI	0
Manitoba	4	Nova Scotia	4
Saskatchewan	2	New Brunswick	0
Alberta	52	Newfoundland	1
British Columbia	8	Other	6
Total Firms	**169**		

Of the 37 oil- and gas-related companies in the sample, 34 are headquartered in Alberta. In the utilities sector, seven of 13 are headquartered Alberta. Across other sectors, the regional distribution of billion-dollar firms is more representative of the national population as a whole, albeit with a significant concentration of corporate headquarters in Ontario.

Mid-Range Firms: CAN$500 million–$999 million

This section presents an analysis of mid-tier firms with revenues ranging between CAN$500 million and $999 million. The analysis is informative as a means of identifying both the overall cohort size and sector-breakdown of firms that are poised to enter the ranks of the mega-large club.

Based on 2012 revenues, Canada hosts a total of 83 publicly traded firms in the CAN$500 million to $999 million market segment.

These 83 firms are together responsible for employing approximately 112,000 Canadians. As compared to the largest segment of firms reviewed above, the employment generated by this segment of firms is far smaller on an average basis, which reflects the fact that Canada's largest employers in the retail and financial services sectors belong to the billion-dollar category.

Of particular interest in the 2012 cohort of mid-range Canadian firms is the strong presence of manufacturing firms. The number of mid-range manufacturing firms in the cohort has declined slightly relative to 2003, owing in part to transactions and acquisitions (as will be explained in the following section). Yet, it remains the top sector in this segment of publicly traded firms. The metals and mining sector shows strong growth with the addition of 10 firms to the cohort, due largely to the graduation of junior mining companies. Conversely, the energy and utilities sector cohort shrinks

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by four firms, both as a result of acquisitions and graduations to the billion-dollar segment. Three other sectors show results that merit explanation. The real estate sector shows significant growth, with the addition of six new firms to its cohort, owing, in large part, to the creation and growth of real estate investment trusts. The forestry industry sees a jump from one to four firms, largely as a result of the demotion of firms from the billion-dollar category. Finally, the telecommunications cohort sees all three of its 2003 firms graduate to the billion-dollar category by 2012.

Table 4 provides a breakdown of the 2012 population of firms and a comparative look at change in this cohort of mid-range firms and sectors since 2003.

Table 4: Distribution of Mid-Range Canadian Firms, CAN$500 million–$999 million

Industry	Number of Mid-Range Firms (2012)	Number of Mid-Range Firms (2003)	Change
Manufacturing	15	17	-2
Metals & Mining	13	3	10
Energy & Utilities	8	12	-4
Financial Services	8	4	4
Consumer Retail & Wholesale	8	8	NC
Real Estate	8	2	6
Technology	5	5	NC
Professional Services	5	5	NC
Forest Products	4	1	3
Food & Beverage Production	3	5	-2
Transportation	3	1	2
Media & Broadcast	2	4	-2
Health Care (incl. Pharma)	1	1	NC
Engineering & Construction	0	2	-2
Telecommunications	0	3	-3
Total Firms	**83**	**73**	**+10**

Note: NC=no change

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Part I. Canada's Population of Billion-Dollar Firms

Compared to 2003, this segment of firms has experienced some, but not significant, growth in aggregate size. Seventy-three mid-range revenue firms are present in 2003. The ongoing trajectory of the 2003 cohort of mid-range firms is as follows:

- 26 were acquired or privatized;
- 21 graduated to the billion-dollar revenue category;
- 20 experienced no significant change in revenue;
- three were demoted to the sub-$500-million category;
- two were subject to insolvency; and
- one changed the location of corporate headquarters.

Among the 21 graduating firms, six were in the resources sector. Moreover, two additional companies derive a majority share of their revenues from Western Canada's oil and gas sector. In total, this segment of graduating firms represents nearly 30 percent of the segment.

A deeper look at the 15 graduating firms that are in non-resource sectors shows two clear trends. First, among manufacturers and retailers, international sales are a significant factor in their 2003–2012 growth. Second, across all non-resource firms, aggressive acquisition strategies are present and explain a significant share of growth over the period studied.

However, the distribution of Canadian firms by size provides a non-intuitive finding. While the upper echelon of largest firms hosts 169 companies, this next category hosts just 83. While these cutoffs are necessarily arbitrary, one might expect to find a much larger pool of mid-sized firms than mega-large firms, based on the assumption that mid-tier firms provide a larger funnel from which a small number of mega-large firms eventually graduate.

This question, however, and any concern it may engender, may be misplaced.

Looking at the evolution of the 2003 cohort, one finds a near 30 percent graduation rate of mid-tier firms over the 2003–2012 period, which speaks to a robust trajectory for many. Moreover, among the remaining firms, 27 are acquired, leaving less than a third that are identified as stagnant or non-performing.

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The vast majority are either aggressive growth firms and/or attractive acquisition targets.

Table 5: Size Distribution of Top 1000 Publicly Held Canadian Firms

Revenue (in CAN$)	Number of Firms
Revenue (in CAN$)	Number of Firms
$1 billion +	169
$500 million–$999 million	83
$250 million–$499 million	114
$100 million – $249 million	140
$50 million–$99 million	107
$25 million–$49 million	92
$1 million–$24 million	126
< $ 1 million	166
Total Firms	**1000**

Transactions and Acquisitions

Billion-Dollar Firms

As part of this stage of the project, we analyze the population of 2003–2004 billion-dollar Canadian firms to track their evolution over the following decade. As noted, we adopt the Bank of Canada's inflation calculation for the period 2003–2012 at 18.87 percent in order to properly identify qualifying firms. The nominal CAN$1 billion measure is thus adjusted to CAN$885 million to account for inflation since 2003.

Across the pool of 146 contained in this 2003-2004 sample, we find the following evolution as of 2012:

- 101 remained in the billion-dollar category;
- 37 saw their corporate structure altered through acquisition or takeover;
- four became insolvent; and
- four shrank in size and are no longer found within the largest revenue segment.

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Among the 37 firms that changed corporate structures:

- 31 were acquired; and
- six transitioned to privately held ownership.

The sectoral breakdown of these transactions is as follows: The vast majority (15 transactions) of acquisition occurred in resource-related sectors. Eight transactions occurred in manufacturing-related fields, which may help explain the decline in billion-dollar manufacturing firms identified as "Canadian" in the 2012 sample. The technology sector sees only one domestic firm (ATI Technologies) acquired by a foreign firm (US firm AMD, in 2006).

In the aggregate pool of transactions, the jurisdiction of the acquiring company is as follows: Canada (15 transactions), the United States (eight transactions), Switzerland (three transactions), Brazil (two transactions), China (two transactions), Abu Dhabi (one transaction), Australia (one transaction), France (one transaction), Germany (one transaction), India (one transaction), Luxembourg (one transaction), and the Netherlands (one transaction).

Among the eight firms that either shrank or became insolvent, the associated sectors are: forestry (two firms), financial services (one firm), life sciences (one firm), manufacturing (one firm), media (one firm), real estate (one firm), technology (one firm).

Mid-Range Firms

A similar exercise directed at the 73 mid-range revenue firms present in 2003—that is, firms with a range of CAN$500 million to $999 million (adjusted for inflation) in revenue—yields 26 firms that were acquired and/or privatized.

These transactions are listed as follows:

- 18 are acquired/merged (United States [10 firms], Canada [six firms], 1 Abu Dhabi [one firm], and Iceland [one firm]); and
- eight are privatized (Canada [four firms], the United States [three firms], South Africa [one firm]).

The sectoral breakdown of the transactions is as follows: manufacturing (seven firms), resource-related (six firms), services (four firms), food (four firms), technology (two firms), broadcast/media (two firms), and telecommunications (one firm).

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Aggregating both mega-large and mid-range of firms, we see that across the 219 firms with revenues above CAN$500 million in 2003, 63 are acquired through either public or private-market transactions. This is not an insignificant impact on the total population of firms, although 25 firms of those acquired are led by Canadian firms.

More importantly, across these two sets of data, we see a significant impact on manufacturing-related firms as 15 are acquired, all but two by non-Canadian parent companies. The two technology-sector transactions both involved public-market acquisitions by US-based companies. A full listing of transactions over the period studied is available in Appendix II.

Among the 21 firms that graduate to the billion-dollar revenue segment, the sectors of these firms are as follows: oil and gas (five firms), consumer retail (four firms), telecommunications (two firms), real estate (two firms), construction/engineering (two firms), financial service (one firm), manufacturing (one firm), mining (one firm), technology (one firm), and transportation (one firm).

Measuring the Contributions of Billion-Dollar Firms to Employment, Exports and R&D

Changes in Employment

In order to provide an accurate assessment of the role of billion-dollar firms in the economy, we analyze corporate annual reports, annual information forms and other regulatory filings to track changes in both global and Canadian employment over a five-year period (2007–2012). This period was chosen due to a lack of available data for earlier periods.

The aggregate population of 169 billion-dollar firms in Canada are responsible for a global employment total of just over 2.3 million individuals. In Canada, this employment total is nearly 1.4 million people, indicating that 61.8 percent of the employment provided by such firms is within Canada. By way of comparison, in 2007, the share of Canadian-based employment in billion-dollar companies was 65.3 percent, indicating a slight decrease in the share of Canadian versus international employment over this period. Meanwhile, Statistics Canada's CANSIM (Canadian Socio-Economic Information Management System) data indicates that Canadian affiliates operating abroad have maintained relatively steady employment levels over the 2007–2011 period, notwithstanding a dip in 2009–2010.[5]

[5] Note that 2011 is the most recent year for which data on Canadian foreign affiliates is available.

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Part I. Canada's Population of Billion-Dollar Firms

Between 2007 and 2012, the following patterns of change are noted:

- Globally, the billion-dollar firms studied added 338,000 jobs to their payrolls. Canadian-based employment accounts for 139,000, or 40 percent of these jobs.

- There was 17 percent total global employment growth over the 2007–2012 period. Non-Canadian employment grew by 30.2 percent, while Canadian-based employment grew by 10.7 percent. This Canadian growth rate is more than double the total rate of employment growth in Canada over the same period (10.7 vs. 4.1 percent).

Across industries, we see the following changes in both global and Canadian employment. Note that the energy and media and broadcast sectors are disaggregated to provide more granular data on each. The life sciences sector is omitted in this section due to a lack of data for the single company in the sample.

Table 6: Industry-Specific Employment Growth Among Publicly Traded Canadian Billion-Dollar Firms, 2007–2012

Industry	Number of Billion-Dollar Firms	Non-Canadian Growth (%)	Canadian Growth (%)	2012 Canadian Employment
Oil- & Gas-Related (Production, Pipelines, Service)	37	103	34	78,070
Financial Services	22	99	7	327,550
Consumer Retail & Wholesale	17	91	3	477,725
Utilities	13	11	29	44,533
Manufacturing	12	-13	6	72,783
Metals & Mining	11	37	42	22,934
Transportation	9	26	2	92,240
Food & Beverage Production	8	-9	-15	30,124
Telecommunications	8	99	10	138,203
Technology	6	89	-2	23,538
Media & Broadcast	6	31	-3	30,820

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Engineering & Construction	6	155	111	47,047
Professional Services	5	81	118	69,105
Real Estate	4	187	141	3,807
Forest Products	4	-3	-41	12,544
Total Growth	**168**	**30.2**	**10.7**	**1,378,783**

Across this data we see the following key trends:

- There was exceptional Canadian employment growth in the engineering and construction, services-related, and real estate-related firms.

- There was strong Canadian employment growth in resource-related sectors (oil and gas, metals and mining, and utilities).

- While technology firms recorded strong employment growth overall, all of this growth occurred outside Canada. Canadian employment by technology firms declined over the 2007–2012 period.

- Global employment among the largest manufacturing firms in Canada declined by 13 percent. However, Canadian employment increased by six percent. This positive trend, however, is tied to the performance of one particular high-growth company. The trend is also inconsistent with significant decreases in overseas employment seen in the broader population of Canadian goods producing affiliates operating abroad.

- While Canadian employment growth among financial services, consumer retail, and telecommunications firms has been limited, international employment among firms in both sectors has been very strong. This growth is evidently tied to successful international expansion and acquisition strategies.

When compared to changes in employment patterns within the broader population of all firms in each sector (as determined by CANSIM industry-specific employment data), we see the following:

- The resources sector is home to significant job gains, both among the mega-large firms in this sample and the broader population of firms. The largest firms in the mining and energy sector see Canadian-based employment gains of 42 and 34 percent respectively over the 2007–2012 period, whereas the broader population of firms in these two sectors generated combined employment growth of 19 percent.

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- While Canada's largest technology firms have seen a small decrease in Canadian employment, data from the Information and Communications Technology Council (ICTC) shows that employment in IT-related fields has grown by over 65 percent over the 2007–2012 period.[6] As noted earlier, a dearth of mega-large firms should not necessarily be confused with underperformance in the sector. The IT sector, in particular, features a large number SMEs that are contributing to the significant employment gains cited above.

- While the broader industry in manufacturing trend reveals a 12 percent decrease in manufacturing employment, the largest firms in the sector have fared far better, having generated a six percent increase in Canadian employment. Note, however, that Bombardier is responsible for a significant share of this growth. Removing it from the sample leaves a two percent decrease in employment among the remaining billion-dollar firms.

- In other sectors, strong employment gains among mega-large firms are matched by gains in the broader population, with the exception of firms in engineering and construction, real estate, and services, where the employment growth generated by mega-firms far outweighs that generated by the broader population in those sectors. Limited employment growth in mega-large retail, finance and transportation firms is congruent with broader sectoral trends.

Export Dependence

In this section, we investigate the degree to which the companies and sectors within this segment of the economy depend on international revenue. This dependence is measured by the share of total revenue that is secured in international markets. Note that for the purposes of this section, we disaggregate the energy sector among utility and extraction firms.

[6] Information and Communications Technology Council. Annual Report 2012 – Annual Snapshot of Canada's Digital Economy, March 2013.

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Table 7: Industry-Specific Export Dependence Among Publicly Traded Canadian Billion-Dollar Firms (2012)

Industry	Number of Firms	International Share of Revenue (%)
Life Sciences	1	84
Manufacturing	12	71
Technology	6	63
Metals & Mining	11	63
Forest Products	4	61
Service Related	5	51
Entertainment & Digital Media	2	50
Food & Beverage Production	8	40
Utilities	13	32
Real Estate	4	30
Financial Services	22	27
Oil- & Gas-Related	37	24
Transportation	9	23
Engineering & Construction	5	23
Publishing & Printing	5	8
Consumer Retail & Wholesale	17	6
Telecommunications	8	0

Within these aggregate sectoral totals, several insights are worth highlighting:

- Goods-producing firms rely heavily on international revenues. Firms such as Gildan, CCL Industries, Dorel Industries and Methanex all surpass 90 percent.

- High-technology firms rely substantially on international revenue. Firms such as BlackBerry and OpenText surpass 90 percent.

- Within the engineering and construction sector, a clear dichotomy is present between internationally oriented firms (SNC Lavalin, Stantec) and domestic ones (Bird, Churchill).

- Among food and beverage producers, large Canadian food producers rely on international markets for over 40 percent of their revenue.

- Within financial services, a clear dichotomy exists between internationally oriented firms (Manulife, CIBC, Bank of Nova Scotia, TD Bank) and smaller, domestic firms.

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R&D

Of the 169 domestic billion-dollar firms in this sample, R&D figures are released by only a small subset of firms. In many cases, R&D investments are included in aggregated non-operational spending figures, making the identification of specific investment trends impossible. For example, of 37 firms in the oil and gas sector, R&D figures are released by only 15 firms. These companies, however, account for close to CAN$2 billion in research spending. Within the financial services sector, R&D is not included in any company statements. Among technology-related firms, nearly CAN$2 billion in research spending is accounted for, but this amount is dominated by the over CAN$1.5 billion spent by BlackBerry. Among manufacturing firms in the sample, R&D figures are available for half, accounting for CAN$675 million. This figure is primarily attributable to the over half-billion dollars spent by Magna. In addition, Bombardier accounts for CAN$1.9 billion in R&D, a number that far exceeds previous annual totals and is largely attributable to the development of the C-Series.

Cross-country data compiled by the Organisation for Economic Co-operation and Development (OECD) illustrates broader trends in business enterprise research and development spending (BERD) that are congruent with the lack of data reported in this Canadian sample. First, Canada's large firms, defined here as those with at least 250 employees, account for a comparatively low percentage of the country's overall BERD.[7] According to the most recent figures, Canada's largest corporations account for 61.5 percent of BERD, in contrast to the OECD sample median of 69.2[8] percent. Of the 30 OECD countries for which data is available, the share of Canada's BERD undertaken by large companies is the eighth lowest. Only New Zealand, Estonia, Greece, Spain, Norway, Ireland, and the Slovak Republic recorded lower percentages of BERD spending by large companies.

Major comparator countries such as Sweden, the United States, the United Kingdom, and Germany all recorded significantly higher ratios of BERD spending by large firms. This finding is confirmed by a major study undertaken by the Expert Panel on the State of Industrial R&D in Canada, which notes that, "fewer large firms undertake IR&D in Canada than in highly IR&D intensive countries."[9]

[7] While Industry Canada defines large firms as those with over 500 employees, the 250 employee definition is used here to be consistent with OECD data.

[8] OECD Science, Technology and Industry Scorecard 2013.

[9] Council of Canadian Academies, The State of Industrial R&D in Canada. (Ottawa: Council of Canadian Academies, 2013), 48.

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The OECD data also provides a comparative breakdown of BERD spending by sector. Compared to the OECD median, Canada's BERD is more highly concentrated in the services sector. While Australia has a roughly similar industry-services mix, other comparator countries record significantly higher shares of BERD from industry sources. The share of large Canadian firms in the resources sector can thus partially explain its weak BERD performance.

The OECD also provides aggregate data on the role of a country's top 500 corporate R&D investors. Canada's largest R&D investors lag significantly behind both the OECD median and comparator countries. This may partially account for Canada's low overall BERD, which, at 0.91 percent GDP, is also below the OECD median.

To be sure, these relationships are not clear and require significant additional research beyond the scope of this project. For example, questions remain as to whether the data used to calculate BERD spending is influenced by either non-reporting of R&D expenditures or the aggregation of R&D expenditures into other non-operational budgets. If this aggregate data is reflects broader empirical realities, however, this apparent underinvestment in R&D could help explain Canada's underperformance in the manufacturing and life sciences sectors, as measured by the share of economic activity in each sector as well as by the number of large firms.

Privately Held Firms

Privately held firms play an important role in this segment of mega-large Canadian firms. While data on privately held firms is far less available, the following provides the sectoral distribution of privately held firms, as well as notes on ownership structures.

Based on 2012 revenues, Canada hosts 136 privately held firms with revenues in excess of CAN$1 billion. However, the number of fully independent Canadian-owned private entities is much smaller, at just 19. The total privately held population of mega-large firms can be subdivided along the following lines:

- 65 foreign subsidiaries or primarily foreign-owned;
- 49 domestic direct corporate subsidiaries;
- four municipal/public utility entities; and
- 19 independent private entities.

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A breakdown of the aggregate grouping (including foreign-owned and Canadian) of privately held firms along industry lines yields the following:

Table 8: Aggregate Grouping of Privately Held Canadian Firms by Industry

Industry	Number of Firms
Financial Services	44
Consumer Retail & Wholesale	22
Manufacturing	16
Media, Broadcast & Telecommunications	12
Oil & Gas	10
Engineering & Contracting	7
Utilities	7
Technology	5
Transportation	3
Food Processing	3
Life Sciences	2
Services	2
Metals & Mining	2
Real Estate	1
Total Firms	**136**

Among the next demographic of privately held firms, we find 60 firms with revenues between CAN$500 million and $999 million. Within this subset, 23 are foreign subsidiaries, and an additional 16 are direct corporate subsidiaries of domestic firms. Of the remaining 21 firms, five are financial services companies, three are quasi-public utilities, and two are resource firms.

Foreign Firms Operating in Canada

While the focus of this project is on Canadian-owned firms, we would be remiss if we failed to acknowledge the significant contribution of foreign-owned entities to the Canadian economy. The following analysis presents aggregate operating statistics for this segment of firms, and adds a series of short company case studies to highlight the role of such firms in the Canadian economy. Where applicable, we note the ongoing impact of Canadian operations acquired by foreign firms.

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Part I. Canada's Population of Billion-Dollar Firms

According to Canada Revenue Agency (CRA) data, Canada hosts over 7,800 foreign-controlled firms.[10] Of these, just 44 are publicly traded on the Toronto Stock Exchange (TSE), and only seven of these firms qualify in our categorization of billion-dollar firms. Beyond this narrow demographic, the role of the broader foreign component in the Canadian economy is significant. As Statistics Canada data shows, foreign-controlled enterprises (FCEs) operating in Canada accounted for 18.7 percent of total asset values and 28.9 percent of overall domestic revenue in 2011. Operating profits earned by FCEs represented 22.7 percent of the Canadian total.[11] Among non-financial firms, the manufacturing sector has the largest concentration of FCEs, with over 50 percent of assets held.[12]

In terms of countries of origin, US firms owned a 50 percent share of total FCE assets and 58 percent of operating profits. UK firms were second, at 14 percent and 8.5 percent, respectively, while firms from Germany captured 4.6 percent and 5.1 percent, respectively.

FCEs are highly visible on the list of Canada's top R&D spenders, holding 31 spots on Canada's top 100. These 31 foreign firms spend a combined CAN$3.3 billion on R&D in Canada. Top foreign R&D spenders include IBM, Pratt & Whitney, Ericsson, and AMD. Canadian revenue figures for these firms are not available. In 2003, FCEs took 21 spots on Canada's top 100 R&D spenders list, spending a combined CAN$2.15 billion. Aggregate employment totals for FCEs in Canada are unavailable.

While detailed employment and investment data on FCEs operating in Canada is limited, the following summaries provide a snapshot of four FCEs operating in Canada and their ongoing impact on Canadian employment and research and development activity.

GlaxoSmithKline Canada

GlaxoSmithKline (GSK), a British pharmaceutical company, employs 2,200 Canadian employees and has headquarters in Mississauga, Ontario and Laval, Quebec, where their North American research hub is located. They also have regional offices in Halifax, Nova Scotia; Montreal, Quebec; Toronto, Ontario; and Vancouver, British Columbia. In addition, manufacturing facilities are located in Mississauga and Quebec City.

[10] "Corporation Returns Act, by enterprise size and by country of control," Statistics Canada, *www.statcan.gc.ca/tables-tableaux/sum-som/l01/cst01/econ166a-eng.htm*

[11] "Corporation Returns Act, by type of control," Statistics Canada, *www.statcan.gc.ca/tables-tableaux/sum-som/l01/cst01/econ149b-eng.htm*

[12] "Business Performance and Management," Statistics Canada, *www.statcan.gc.ca/pub/11-402-x/2012000/chap/business-entreprise/business-entreprise-eng.htm*

The company's Canadian presence includes the assets formerly branded as ID Biomedical, a Vancouver-based vaccine company that GSK acquired in 2005 for CAN$1.7 billion.

The company's Canadian revenues are just shy of CAN$1 billion, at CAN$945 million. In 2012, GSK spent £3.5 billion in core R&D, including over CAN$112 million spent in Canada. GSK is ranked as the 21st largest R&D spender in Canada in 2012, based on data provided by ResearchInfosource.

Pratt & Whitney Canada

A division of Hartford-based United Technologies, Pratt & Whitney Canada is a global leader in aerospace and aviation. The firm specializes in business, helicopter, and regional aviation, and also provides advanced engines for industrial applications. Their Canadian head office is located in Longueuil, Quebec. Originally established as servicing centre for US military aircraft, the company now employs over 6,200 workers in Canada. In addition to their head office in Longueuil, the firm's other Canadian locations are in Saint-Hubert and Mirabel (both in Quebec), Mississauga and Ottawa (both in Ontario), Halifax, Nova Scotia, and Lethbridge, Alberta.

The company is the fifth-largest R&D spender in Canada in 2012, allocating over CAN$525 million to research activity in Canada. The company estimates that 1,350 of its employees hold specialized positions in the firm's R&D centres in Quebec and Ontario. Since 1982, the company states that it has spent CAN$10.6 billion in R&D investments through government partnerships in Canada. The firm also works closely with 20 universities across Canada to develop new technologies and processes. Over CAN$12 million is invested per year in collaborative projects with universities.

Microsoft Canada

Microsoft Canada was established in 1985 as a subsidiary of Microsoft Corporation. Since then, the company's Canadian presence has grown as a result of a series of acquisitions, including the purchases of Vancouver-based business intelligence firm 90 Degree Software, Inc. in 2008, and in 2009, the purchases of video game maker BigPark Inc., and Toronto-based data centre management software provider Opalis Software, Inc.

The company now employs over 1,000 individuals across Canada. In 2012, Canadian revenue for the firm exceeded CAN$1.6 billion. While the firm invests over US$10 billion annually in R&D, it does not release a Canadian-specific R&D figure. The company employs 300 at its Vancouver-based development centre, and in 2013, the company opened the Mississauga, Ontario-based Microsoft Technology Centre with a CAN$20 million investment.

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Electronic Arts Canada

Electronic Arts Canada is the Canadian subsidiary of California-based Electronic Arts (EA). The company's Canadian operations began with the 1991 acquisition of Burnaby, BC-based video game maker Distinctive Software. This acquisition, then worth CAN$11 million, created a Canadian beachhead for EA. In 2002, the company acquired another British Columbia-based game maker, Black Box Games, for an undisclosed sum, and in 2009 acquired Waterloo, Ontario-based social gaming firm J2Play.

Today, EA Canada operates four Canadian development studios in Vancouver and Burnaby, British Columbia, Montreal, Quebec, and Edmonton, Alberta, with over 2,000 employees in Canada. In 2013, the parent company spent over CAN$1 billion on research and development; however, a figure for investment specifically in Canada is unavailable.

Conclusions and Summary Observations

This review of the population of billion-dollar firms in Canada and the relative change in sectoral composition, employment and associated growth factors yields a number of key insights that we summarize in the twelve main findings below:

1. Canada added 23 firms to ranks of billion-dollar enterprises over the past decade, increasing the overall population by 16 percent. Canada's overall success in generating billion-dollar companies on a per capita basis will be further highlighted in the comparative analysis in Part III, which reviews Canada's performance to Australia, Germany, Sweden, the United Kingdom and the United States.

2. While adding 23 firms on aggregate, churn and transactions among billion-dollar firms saw 68 new entrants added to the list. New entrants were predominantly in the energy sector, with 25 new oil and gas companies added to the billion-dollar category. The consumer retail and wholesale sectors add seven new entrants to the billion-dollar category, while the metals and mining sectors also add seven new entrants.

3. The number of billion-dollar firms in Canada's resource sector, notably the energy sector, has grown significantly more than other industrial and service-based sectors. The energy sector not only has the largest concentration of billion-dollar firms, it also has the largest number of new entrants by some distance over the last decade. However, the expansion of the resource sector has spurred the growth of mega-revenue firms in a variety of complementary sectors, especially construction and transportation.

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4. Following the energy sector, Canada's retail and wholesale sectors have demonstrated the next most significant growth in the number of billion-dollar firms, with seven new entrants over the past decade. This growth is a reflection of significant industry consolidation and aggressive domestic and international expansion strategies.

5. In other traditionally significant sectors of the Canadian economy, the performance in creating billion-dollar firms is less impressive. In particular, the manufacturing and forestry sectors have seen their population of mega-large firms shrink significantly. In the case of manufacturing, global competitive dynamics no doubt explain part of this decline. Transactions may also play an important role, given the acquisition of 13 Canadian manufacturing firms with revenues over CAN$500 million over the period 2003–2012.

6. In knowledge-intensive sectors of the economy such as health care and technology, a high degree of churn sees no change in the number of billion-dollar firms, but wholesale changes in who those firms are. As will be discussed in our comparative quantitative analysis in Part III, Canada's performance in creating billion-dollar health care and technology firms is not significantly below the average in comparable economies; however, the share of overall economic activity pertaining to both sectors is lower than the comparative average.

7. With a few exceptions, we find that the majority of Canada's largest firms are not significant investors in R&D, based on a review of available data. However, while less than one-third of billion-dollar energy sector firms release R&D data, these firms account for close to CAN$2 billion in R&D investment in 2012. Among manufacturing firms, R&D investment is disclosed by half of the billion-dollar firms, amounting to more than CAN$2.5 billion.

8. We find that the acquisition of Canadian firms by foreign entities produces a relatively significant effect on the total population studied. Of 219 publicly traded firms with revenues over CAN$500 million in 2003 , 63 are acquired, and 38 of these by foreign firms.

9. The aggregate population of 169 billion-dollar firms in Canada employs 2.3 million individuals globally, of which nearly 1.4 million are Canadians. Over the 2007–2012 period, billion-dollar firms have been hiring overseas talent more aggressively than domestic talent, which reflects their growing participation in international markets and the overall importance of international expansion to fuelling the growth of large Canadian firms. While non-Canadian employment growth for the firms studied grew by 30.2 percent from 2007 to 2012, Canadian based-employment within

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this population grew by only 10.7 percent. Nevertheless, this Canadian growth rate is more than double the total rate of employment growth in Canada over the same period (10.7 percent versus 4.1 percent).

10. Billion-dollar engineering and construction and resource-related firms have made the most significant contributions to Canadian employment growth between 2007 and 2012, with growth rates of 111 percent and 40 percent respectively. Meanwhile, technology firms shrunk their Canadian workforces, while pursuing significant employment growth abroad.

11. Successful Canadian billion-dollar firms in the manufacturing, mining, forestry and technology sectors are heavily reliant on foreign markets for revenue. Over 70 percent of manufacturing revenue comes from exports, and over 60 percent for mining, forestry and high-tech firms. On the other end of the spectrum, Canadian telecommunications companies earn zero revenues abroad, while Canadian publishers collect only eight percent of their revenues internationally and retailers just six percent.

12. Among mid-range firms, the vast majority are either aggressive growth firms and/or attractive acquisition targets. Over the period 2003–2012, 21 firms grew to become billion-dollar firms, representing nearly 30 percent of the overall population of 73 mid-range firms that existed in 2003. Over the same period, 20 mid-range firms experienced no significant change in revenue, 18 firms were acquired, and eight firms were taken private.

If there are questions and concerns requiring further research, they relate to the evolution of Canada's manufacturing, technology, and life sciences sectors, as well as the impact of transactions on the pipeline of future billion-dollar firms. For example, is the domestic market in Canada too small to catalyze the creation of large, globally competitive firms in sectors such as technology and life sciences? Or have foreign acquisitions of promising firms limited the pool of Canadian manufacturing companies with the potential to compete on the world stage? These questions merit additional analysis.

Moreover, while a variety sectors showcase strong Canadian employment growth, decreases in employment among the majority of goods-producing manufacturing and food-production firms in the sample highlight potential concerns regarding the evolution of labour demand in Canada. For example, will rapid technological advances and growing competitive pressures to increase efficiencies dampen demand for labour in Canada? And how will the growing internationalization of Canadian firms impact the domestic employment picture? While the internationalization of Canadian firms is

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generally viewed as a significant net positive to the Canadian economy, data collected for this report underscores large differentials between non-Canadian and Canadian employment growth in sectors that are highly dependent on international revenues. There is no doubt that Canadian firms must go global to grow, however, interview findings reviewed in Part II of the study indicates a potentially deflationary impact on domestic labour demand as firms move operations, and potentially headquarters, closer to large sources of demand.

Finally, the apparent weakness in R&D spending by Canadian firms merits further investigation. Do we have an accurate picture of the true state of R&D spending in Canada, given that the data used to calculate BERD spending is influenced by either the non-reporting of R&D expenditures and/or the aggregation of R&D expenditures into other non-operational budgets? If the portrayal is indeed accurate, has Canada's underperformance in R&D undermined our performance in the creation of large firms in knowledge-intensive sectors? Are vital sectors encumbered by a small number of entrenched market leaders with an insufficient amount of competition and/or market disruption to spur ongoing investment in innovation and productivity-enhancing technologies?

We review many of these questions in Part VI, with a view toward framing an agenda for further research. In the meantime, Part II provides a qualitative analysis of billion-dollar, mid-range and fast-growing firms to further interrogate the data provided here. The results add considerable nuance to our understanding of the key factors driving the growth of Canadian firms, as well as the challenges they face in an increasingly competitive global environment. When combined with the comparative jurisdictional analysis provided in Parts III, IV, and V, the overall report provides incredibly rich insights into Canada's population of billion-dollar firms and a related series of questions about what policy-makers can do to help them along.

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Part II. A Qualitative Survey of the Opportunities and Challenges Facing Canadian Firms

Introduction

Part I of this report analyzed the distribution of Canada's billion-dollar enterprises across sectors and examined the contributions of this cohort to employment, export growth and R&D. This section provides a qualitative analysis of the drivers of growth among Canadian firms, complementing the data-driven analysis outlined in Part I. In particular, the qualitative analysis uncovers the key factors that have propelled the growth of Canada's largest firms over the past decade, as identified by the senior executives leading these companies. It offers a more nuanced assessment of the strengths and weaknesses of the domestic Canadian business environment and sheds light on the international expansion strategies that Canada's mega-large firms are deploying to fuel their growth. The qualitative review also provides an assessment of the growth prospects and challenges facing mid-tier firms and fast-growing young firms.

We provide a brief summary of the key findings from the qualitative survey below, followed by a description of the methodology and a detailed overview of survey results for small, mid-tier and mega-large firms. The section concludes with a series of recommendations for enabling firm growth in Canada.

It should be emphasized that the findings, assertions and recommendations summarized below are qualitative in nature. Specific assertions or sentiments conveyed by Canadian executives are not necessarily backed by empirical evidence. However, we do find that the qualitative results and insights are broadly consistent with the trends identified in the data. As such, the qualitative survey results are helpful both in explaining the empirical observations identified in Part I and in conveying the tacit wisdom that executives have gleaned from their experiences in leading successful Canadian firms.

Key Findings for Mid-Tier Firms and Billion-Dollar Firms in Canada

High-growth Canadian firms increasingly see themselves as global firms. The Canadian executives at large firms—both mid-tier and mega-large—were passionate about their businesses and proud of their accomplishments, both domestically and on the international stage. Across many sectors, it was clear that high-growth leaders in Canada increasingly view themselves as global enterprises, with significant overseas operations. In fact, internationalization was highlighted by most as a critical success factor going forward, given the relatively small size of Canada's domestic market. Reflecting this increasingly international orientation, Canadian business leaders consistently talked about striving to be the number one or two global provider in their industry sector.

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Part II. A Qualitative Survey of the Opportunities and Challenges Facing Canadian Firms

Global competition is increasing, creating a tougher business environment. There was a shared realization among executives at Canada's largest firms that global competition continues to increase quickly and the road to sustained competitiveness is more difficult than ever. As they look forward, many see their company's ability to maintain an aggressive rate of growth as the only way to avoid being swallowed up by larger international competitors.

High-growth leaders identified a diversity of strategies for boosting competitiveness. Staying globally competitive, for these executives, means investing in technology, reaching new levels of efficiency, aggressively acquiring high-potential companies, participating in emerging market growth, and getting access to the best talent, wherever it may be found—whether domestically or abroad. However, the most consistently important factor driving the growth Canada's largest firms was their success in acquiring firms that helped expand their business offerings, and/or gave them a presence in key growth markets.

Government's most important role is facilitating international expansion. On the role of government in the economy, executives in Canada's largest firms typically did not see policy as either a significant enabler or inhibitor of their domestic performance. For example, most executives do not view Canada's R&D incentives as a significant factor in driving their investments. However, both mid- and mega-large firms would like greater assistance in securing overseas business opportunities and, more importantly, in creating a level playing field with their international competitors. Many Canadian business leaders believe that foreign firms operating in Canada face fewer barriers and restrictions than their companies do when operating abroad.

Key Findings for Fast-Growing Small Firms in Canada

Successful Canadian start-ups catalyze growth by identifying innovative niche opportunities where they can offer world-class products and services. Many of the small firms we spoke to have carved out unique niches in technologically driven fields, such as wireless pressure and heat-sensing systems for industrial applications, application development for mobile computing, and traffic data and signal automation systems for municipalities. The upshot is that all of the fast-growing, small Canadian firms interviewed shared a general sense of optimism that exciting growth opportunities are within reach.

Today's small firms prioritize international growth early. Having enjoyed some initial domestic successes, the challenges ahead boil down to each firm's capacity to execute a plan for scaling their company on a global basis. In fact, a couple of executives described having their first major successes internationally, which subsequently parlayed into domestic opportunities. Others foresee tough decisions ahead with respect to whether or not they

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choose to remain in Canada or shift their operations abroad, to be closer to the primary sources of venture financing, customers, and talent in their particular fields.

Canadian entrepreneurs may lack the entrepreneurial zeal and assertiveness required to grow large ventures. Despite general optimism about their own growth prospects, there was a shared sentiment that Canadian entrepreneurs need to shed their inhibitions and be more assertive—even aggressive—in pursuing bold ideas to change the future. While this qualitative assertion was not explicitly backed by data, several executives pointed to recent examples of promising Canadian start-ups selling out to larger firms, rather than opting to build their company into a viable international competitor.

For most executives at small firms, the biggest growth challenges are talent- and management-related. A number of firms noted that Canada lacks seasoned management talent with deep experience in implementing "go-to-market" strategies. Others identified challenges in competing with established firms for high-end engineering talent and some noted that specific skill sets (e.g., finding a CFO that understands software financing and monetization strategies) are hard to find in Canada. Several executives described significant challenges in maintaining their innovative corporate culture while growing their teams and putting in place the systems and controls required for large-scale operations.

Access to finance was not identified as a significant challenge. Most of the firms interviewed had already accessed significant angel investments and venture financing and did not see access to capital as a major constraint on their growth. That said, fast-growing small firms in Canada increasingly look to sources of financing in the United States, especially in later stage financing rounds. Only one firm anticipated challenges acquiring sufficient financing to seize major growth opportunities, recognizing that landing a major contract often entails making significant up-front investments in people and production facilities.

Small firms value government support more than large firms. Executives at small firms all noted the valuable roles that various government programs play in supporting entrepreneurial ventures. One executive even identified his company as a specialist in ferreting out opportunities to leverage government support.

Small firms see significant potential to expand and streamline Canada's support systems for entrepreneurs. Suggestions included better mentoring systems to guide young executive teams, more investment in branding Canada as a destination for investment in entrepreneurial ventures, greater inclusion

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in international trade missions, and more assistance in competing for the best talent. Detailed recommendations are supplied in the conclusion.

Methodology for the Qualitative Analysis of Firm-Growth Dynamics in Canada

To conduct the qualitative analysis, the DEEP Centre interviewed 28 executives across three segments of Canadian firms: fast growing billion-dollar firms (12 firms); stalled and growing mid-tier firms (eight firms); and fast-growing young firms (eight firms).

In each interview, the following key questions were asked to frame the insights and examples provided in this presentation.

- What are the primary success factors for billion-dollar companies (e.g., export growth, R&D, access to talent, acquisitions) and how do these factors vary across sectors?
- What are the primary impediments to growth among Canada's population of SMEs (e.g., access to growth capital, managerial talent, capacity to export)?
- What are the most impactful roles for government to play in enabling corporate growth at various stages of firm maturity?
- What could Canadian policy-makers do to better support enterprise growth, for example, in areas of science and technology support?
- What is the role of managerial talent, or a lack thereof, in the evolution of Canadian firms?

The insights derived from this process are presented on the basis of firm size, with relevant insights grouped into thematic policy domains, including trade, R&D, and talent. The insights here are not attributed publicly to specific interviewees. As a precondition to participation, most firms indicated their desire to remain anonymous.

Billion-Dollar Firms

Interviews were conducted with 12 Canadian firms with annual revenues exceeding CAN$1 billion and, in all but two cases, significant 2003–2012 growth. Industry coverage for this segment of firms includes automotive, engineering and construction, food production, manufacturing, pharmaceutical, technology, and transportation. Among the 12 firms interviewed, three are privately held (construction, food production, and pharmaceutical).

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Part II. A Qualitative Survey of the Opportunities and Challenges Facing Canadian Firms

Growth and International Expansion Strategies

- Citing the limited opportunities for additional expansion in Canada's domestic market, a significant majority of firms in this segment identified international expansion as one of the core drivers for growth. While international growth was important for most firms over the past decade, virtually all executives agreed that international expansion will be even more important in the decade ahead.

- In defining the most important international growth opportunities, most of the large Canadian firms interviewed are expanding into emerging markets, with the exception of a few that seem largely preoccupied with expansion to the United States.

- The ability of large Canadian firms to drive growth and international expansion is clearly tied to aggressive acquisition strategies, regardless of the sector. Ten of the 12 company executives interviewed identified acquisitions as the primary driver of firm growth.

- The high-growth leaders interviewed for the report all agreed on the importance of international growth opportunities, yet, they also shared the perception that Canadian firms, in general, are too insular and insufficiently global in their outlook, and therefore overly focused on growth within North America. A number of executives suggested that Canadian employees and management teams lack the international experience required to seize opportunities in emerging markets.

- Among the industrial firms in the sample, the expansion of Western Canada's resource sector has been a primary driver for growth for firms supplying construction, transportation, and environmental services.

- Across this segment of firms, the executives who were interviewed made repeated and explicit mention of a culture of risk aversion as the primary impediment to the creation of more globally competitive Canadian firms. Interestingly, risk aversion was not an attribute that they attributed to their own firms, but rather, a general observation made about the broader approach to risk and growth among firms in Canada.

Issues Related to R&D

- Among this segment of firms, only one firm (pharmaceutical) identified Canada's public R&D incentives as integral/important to their growth.

- A majority of firms noted that Canada's public R&D incentives make no tangible impact on their strategic investments. The general sentiment

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was that business opportunities and return on investment drive investment decisions, not government incentives. As one executive put it: "We invest to survive."

- While not a significant incentive or catalyst for investment, several interviewees suggested that R&D credits nevertheless serve to subsidize investments that they need to remain competitive.

- There was no cross-industry consensus on whether Canada has the right talent base to support significant domestic investments in R&D, with both positive and negative assessments supplied by the executives of Canada's largest firms. One large knowledge-intensive firm, for example, notes that Canada has a distinct disadvantage with respect to R&D skills, particularly in advanced sciences and high-skill process manufacturing specialists. This particular executive argued that Canada's most talented R&D professionals seek more lucrative opportunities in the United States. On the other hand, other significant Canadian R&D investors in the sample maintain significant R&D operations in Canada, as they believe there is a tangible talent advantage in Canada.

- Despite the reported "tangible talent advantage," among the significant R&D performers, there was a general consensus that the differential between the quality of talent in Canada and emerging markets had closed in the past decade. Given the cost differentials and comparatively large markets, Canadian firms suggested that they would increasingly seek to take advantage of the growing population of highly skilled professionals in countries such as India and China by expanding their R&D operations in those locations.

- A majority of firms noted that they purchase, rather than build, technological and process-related innovations. Several firms cited the adoption of new technologies and process innovations as highly critical to their ability to compete in increasingly global markets. As one executive put it: "We've got to be at the leading edge in order to keep our customers on board."

- Numerous executives bemoaned the lack of collaboration and synergy between industry, government, and academia in seizing significant new innovation opportunities in Canada. One executive suggested that the country lacks a 20-year vision for the economic value proposition of Canada that could help focus the efforts of policy-makers across the country.

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Issues Related to Labour and Skills

- Among this segment of firms, the question of labour and skills shortages reveals no consensus. While some firms noted a lack of engineering and management talent, others suggested that they face no significant challenge in either finding or attracting skilled talent. Profitable, fast-growing firms in attractive sectors (e.g., software development, engineering, and aerospace) appear to have little trouble finding the talent they need. The one consistent weakness identified in Canada's talent pool is the relative lack of high-end management talent with international experience.

- Among the primary advantages of Canadian operations, technology firms identified a higher rate of talent retention as a key reason for maintaining a significant base in Canada. For example, Canadian software engineers were described as more loyal than their US counterparts, who were deemed more likely to hop from company to company.

- Despite the explicit mention of the quality and knowledge-related advantages of the Canadian labour force, several firms emphasized the growing imperative to be located in close proximity to overseas customers, where the most significant sources of growth lie in the future. In addition to employee wage costs, the "gravitational pull" to be close to their most important customers has made the relocation of Canadian operations a real, if not, definite possibility.

Other Related Government Policy Issues

- Firms involved in the production of consumer goods noted an immediate need for the government to focus on the completion of trade agreements to ensure that other mature economies did not acquire significant competitive advantages with key emerging markets.

- A number of executives commended the government on its role in promoting Canadian firms and industry overseas. But others saw room for improvement, with several suggesting that staffing Canadian embassies with individuals with business pedigrees would help to generate better opportunities for Canadian firms.

- Many firms noted that foreign firms operating in Canada face far fewer barriers to entry and competition than do Canadian firms operating abroad. One pharmaceutical firm, in particular, pointed to significant competitive disadvantages it was facing due to the fact that its products face far more stringent regulatory requirements than products imported from international competitors.

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- Several firms in this segment noted the need to make permanent increases in accelerated capital cost allowances as a means of incentivizing immediate technology and capital investments.

Mid-Tier Firms

Interviews were conducted with eight Canadian firms with annual revenues exceeding CAN$200 million and/or with mature firm histories defined as over 15 years old. Growth patterns for this segment of firms are heterogeneous and include high-growth, stagnant, and declining revenue trends. Industry coverage for this segment of firms includes environmental services, food production, manufacturing, pharmaceutical, and technology. Among the eight firms interviewed, three are privately held (manufacturing and technology sectors).

Growth and International Expansion Strategies

- A general theme across interviews with mid-tier firms is the increasing need to be close to the end consumer, which several speculated could have repercussions on Canadian employment growth and the future of Canadian operations.

- Non-Canadian growth is broadly seen as the key to future success. Asian markets, in particular, were identified as a key source of growth for food and technology firms.

- Several firms noted that geographic market diversification acts as a risk mitigation strategy for low-growth in mature Canadian and US markets.

Issues Related to R&D

- Among this segment of firms, Canada's public R&D incentives are considered integral and important to growth. This positive perspective, however, is dampened by the fact that significant R&D investment is undertaken by only two of eight firms. The remaining six firms noted a preference to purchase new technology as necessary.

- On the issue of investment and research, firms noted the impact of failed investments in the 1990s as a major reason for ongoing reticence to invest heavily. Those investments were identified as having failed because of increasingly rapid cycles of technological obsolescence and the rapid growth of emerging market competition in the production of manufactured goods.

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Issues Related to Labour and Skills

- Among this segment of firms, attracting and retaining key management talent was identified as a challenge by firms operating or headquartered in smaller urban centres.

- Several firms in this segment noted underdeveloped academic-industry partnerships and highlighted their desire to improve their capacity to leverage and commercialize research taking place within Canadian universities.

Other Related Government Policy Issues

- Many firms noted that foreign firms operating in Canada face far fewer barriers to entry and competition than do Canadian firms operating abroad.

- The "Buy American" policy, notably at the subnational level, and the presence of unique regulatory standards related to safety and quality were noted as ongoing impediments to cross-border activity.

- The inability to protect their intellectual property was noted by manufacturing and technology firms as a major challenge in the expansion of sales/outreach in fast-growing Asian markets.

Fast-Growing Small Firms

Interviews were conducted with executives from eight Canadian firms with annual revenues ranging from less than CAN$1 million to over CAN$30 million over the 2007–2012 period. Many of these firms were identified by third-party sources as being among Canada's "highest potential" companies. Industry coverage for this segment of firms includes energy-related firms, manufacturing, retail, and technology. All firms in this category are privately held.

Access to Finance

- The small firms interviewed did not identify access to finance as a primary barrier to expansion or growth, although one firm did express concern about its inability raise capital quickly to scale-up production in the event that their firm won a major contract.

- Personal finances, government grants, and angel capital are the predominant vehicles for early-stage financing and growth.

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- In later stage financing, the main issue identified was not a general shortage of capital, but a lack of the "right kind" of venture capital investors within Canada. Venture talent in Canada was described as less aggressive than US-based investors and less willing to entertain higher company valuations. One executive noted that Canadian investors often only entertain investment opportunities after a US lead investor has undertaken a major investment.

- Where financing is identified as a challenge, it is not a result of a lack of options, but rather the cost of capital and the concomitant need to delegate power and strategic control.

Issues Related to R&D

- Both manufacturing and technology firms noted that Canada's public incentives for R&D provided valuable assistances in support their growth and innovation-related investments.

- However, the process for accessing scientific research and experimental development (SRED) credits was described as onerous, lengthy and a boon for consultants and lawyers. Lengthy timelines for refunds were identified as a major strategic impediment. One firm noted that it had only just closed a SRED file from 2004, and described the process as a "costly, bureaucratic nightmare."

Issues Related to Labour and Skills

- Of primary concern to firms in this segment is the ability to attract sophisticated managerial talent. Finding seasoned executives with "go-to-market" experience and the ability to grow a company to $100 million in revenue was noted as a significant challenge for several firms, and, in one case, underscores an uncertainty over remaining in Canada. Other firms pointed to the need to hire sales and business development talent in the United States, and cited a high probability that they would build significant operations outside of Canada to support their growth objectives.

- Access to engineering talent was identified as a significant challenge for firms in this segment. Firms included in this process noted the need to expand hiring and recruitment to a variety of international markets, and noted their competitive disadvantage in recruitment, owing to size and fiscal capacity.

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Other Related Government Policy Issues

- Among this segment of firms, several noted the lack of public procurement processes geared toward the integration of SME technology or processes as compared to other jurisdictions.

- While government incubators and accelerators are viewed as helpful and important, executives offered differing perspectives about the quality and appropriate positioning of the services that accelerators provide. For example, one executive highlighted the critical role that accelerators play in moving firms up the learning curve. Another executive noted, however, that a lack of industry-specific knowledge at a particular accelerator meant that its value-add was limited to facilitating introductions and networking. Overall accelerator performance was noted as an area for increased attention.

- Small, fast-growing firms identify networking and mentorship as being of particularly high value. One interviewee noted that the firm's inclusion in an overseas trade mission was valuable not so much for the commercial deals concluded, but rather, for the relationships made with the executives of larger, same-sector Canadian firms.

Conclusions and Recommendations for Policy-makers

Enabling the Growth of Mid-Tier and Billion-Dollar Firms in Canada

The qualitative survey of Canada's largest high-growth firms yields unique insights into the factors that are driving their growth. At the same time, executives were generous with their suggestions for how public policy in Canada could facilitate their success in the future and create a better enabling environment for high-growth firms generally.

1. **Enhance support for international growth.** Canada's support for internationalization was identified as a source of strength. But there is a sense among executives that more exuberant champions, who can better flog the value of Canada and Canadian firms, are needed. "There is a lot of good about Canada, said one executive, "but it is not being promoted well." Several executives called for greater coordination among various branches of government, and many would like to see more diplomatic staff with business experience that could provide greater assistance in securing overseas business opportunities.

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2. **Advocate for reduced trade and regulatory barriers for Canadian firms seeking access to foreign markets.** As Canadian business leaders strive to survive in an increasingly competitive global environment, many argued that their foreign competitors have a much easier time operating in Canada than Canadian firms do when operating internationally. Mega-large firms would like greater assistance in creating what they describe as a level playing field with their international competitors. In particular, mega-large Canadian firms would like government to continue to prioritize free trade deals, and they are seeking more vigorous assistance in eliminating the regulatory barriers and restrictions that hamper their access to or success in emerging markets.

3. **Re-evaluate Canada's R&D incentives.** Very few firms see Canada's SRED program as a major incentive for investment and virtually all firms describe the program as costly and bureaucratic. As one executive put it: "SRED credits subsidize investments, but they are not real incentives." As an alternative, some executives called for accelerated capital cost allowances to support their investments in technology. But the general sentiment was that government should go back to the drawing board and think about better ways to facilitate innovation in Canada. Some additional suggestions for how to better promote innovation are outlined below.

4. **Provide leadership in driving and coordinating Canada's innovation agenda.** Executives repeatedly called for more leadership from government in defining a strategic innovation agenda for Canada. As one executive put it: "Canadians need more of a Singaporean attitude. We are too small to be big, and too big to be small, but most of all, we need to be more forward-looking. We need a real 20-year strategic plan that outlines the fundamental value proposition of Canada." There was a general sense that Canada would accomplish more if more of the resources of government were focused on building toward a shared vision in a systematic way and in full partnership with Canadian business leaders.

5. **Facilitate collaboration across industries and between industry and academia.** As an extension of the last point, several executives noted a distinct lack of collaboration between industry, academia, and government around major innovation priorities. One executive argued that the geography of the country is a hindrance to collaboration: "We are spread too thin," they noted. "We don't have strong clusters and we lack the concentration of talent, expertise, and capital required to make a big impact." Executives saw a role for government in helping industries build consortia around long-term, pre-competitive domains of research that could nurture significant growth opportunities. They also saw an opportunity for government to play a role in facilitating the creation of better linkages between industry and academia.

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6. **Reduce the fragmentation and bureaucracy of government support functions.** Several executives called for less bureaucracy and more business input into the development of economic policies and programs. In particular, there were calls for a better two-way dialogue with business, not just through the usual task forces and round tables. As one executive put it: "Business minds need to be imbedded into the program design and delivery process." Executives also suggested that there is too much institutional fragmentation, with too many departments sharing a piece of the broader economic development puzzle. It would be better, it was suggested, if there was one "go-to" place that provided a central hub for business support, policy development and business engagement.

Enabling High-Growth Start-Ups in Canada

Executives in fast-growing small firms mostly talked in positive terms about the support they had received, both from various levels of government and from the broader business community. However, many were forthcoming with suggestions for how Canada could further strengthen its support for entrepreneurial companies. Our synthesis of those recommendations is as follows:

1. **Brand and market Canada as a destination for entrepreneurial investment and growth.** Montreal, Toronto, Vancouver and Waterloo all boast significant entrepreneurial clusters, but there is concern among company founders that few people outside of Canada identify these locations as places to invest in digital media and technology firms. Executives called for leaders in business, government, and academia to participate in strengthening Canada's brand as a destination for entrepreneurial investment and growth.

2. **Use the education system to develop a culture of global entrepreneurialism.** Reflecting on his own international experience, one executive called for educators to encourage young Canadians to think globally and entrepreneurially. Foreign exchange programs and overseas work placements were offered as ways to foster a global outlook and provide young Canadians with more international experience. International experience, in turn, is viewed as an important in fostering the confidence and personal networks to run a global business.

3. **Focus Canada's entrepreneurial support strategies.** Several entrepreneurs suggested that Canadian jurisdictions work to identify a couple of key niches for investment and concentrate on building clusters around those niches. As one executive put it: "We can't say we're a great place for everything. We need to concentrate on a couple of key niches and direct resources in a focused way."

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Part II. A Qualitative Survey of the Opportunities and Challenges Facing Canadian Firms

4. **Simplify the interface to government support programs for small firms.** While small firms in Canada have welcomed the support they receive from various levels of government, many have noted it takes considerable time and resources to identify sources of support and to navigate application processes. Several entrepreneurs called for a cross-jurisdictional governmental interface for small businesses and for streamlined processes that use fewer resources. There were also calls for governments to include more small firms in their international trade missions as way to help kick-start their international growth.

5. **Assist early-stage companies in securing anchor customers.** More than access to finance, executives at numerous firms talked about the importance of anchor customers and suggested that both the government and Canada's business community could be more supportive of Canadian SMEs. Toronto, for example, has an amazing diversity of big companies in every sector that could serve as a client base for young firms. But it was suggested that large Canadian firms could make it easier for small businesses to do business with them. Similarly, two firms lamented the fact that public agencies outside Canada were initially more willing to adopt their technology solutions than agencies within Canada. Procurement opportunities geared to Canadian start-ups would provide a significant boost to the sector.

6. **Encourage wealthy Canadians to invest in Canadian ventures.** There is a perception among some executives that wealthy individuals in Canada are not as active in investing in entrepreneurial ventures as their US counterparts. It was suggested that tax benefits could persuade high net-worth individuals to engage more in the angel investing community. In particular, executives noted the benefits of access to more patient capital that would not place excessive pressure on companies to sell out early.

7. **Facilitate access to experienced management talent.** As noted earlier, there is a widely shared perception that Canada's pool of seasoned management executives is very small and in high demand, which presents a significant challenge for fast growing small firms searching for the talent required to execute their growth strategies. While firms interviewed for this report are currently scouting such talent internationally, one executive suggested that targeted immigration policies could help attract the "go-to-market" talent that start-ups desperately need. Another suggestion is to provide short-term "experienced executives" grants to provide high-growth start-ups with fund to compete for high-end executive talent. Australia's grants for experienced executives outlined in Part IV may serve as a model for such a program.

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8. **Amplify and support the culture of knowledge-sharing among Canadian entrepreneurs.** One distinct Canadian advantage noted by executives was the spirit of cooperation and knowledge-sharing that exists among Canadian entrepreneurs. It was argued that entrepreneurs in Silicon Valley and New York are less cooperative and tend to view their peers as competitors for talent, capital, and media attention, even if their companies work in different sectors. One executive suggested that the collaborative culture within Canada could provide the basis for a broader entrepreneurial mentoring and knowledge exchange program that could be anchored in a pan-Canadian network of business accelerators.

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Part III. Comparative Quantitative Analysis: A Cross-Jurisdictional Review of Billion-Dollar Firms

Part I offered a detailed snapshot of Canada's billion-dollar firms and their contributions to employment, export growth and R&D spending. Part II provided a qualitative analysis of the factors driving the growth of the highest performers and offered a more nuanced assessment of the strengths and weaknesses of the domestic Canadian business environment, as identified by the senior executives leading large Canadian companies. In this section, we provide a comparative analysis of billion-dollar firms in five relatively similar economies: Australia, Germany, Sweden, the United Kingdom, and the United States.

Focusing on overall population and industry dynamics, the comparative analysis reveals the extent to which the number of large enterprises produced in Canada is equivalent to the comparable economies highlighted herein. In so doing, this comparative analysis allows for a sector-by-sector analysis of the Canadian economy's strengths and weaknesses in facilitating the development of billion-dollar firms.

Australia, Germany, Sweden, the United Kingdom, and the United States were selected because of their similarities in terms of levels of economic development as measured by GDP per capita and export intensity, as well as the availability of data. While there are certainly unique structural factors that drive the economic dynamics in each country, this comparison of data and policy across like economies yields important insights into why comparable jurisdictions are more or less successful in generating global, mega-revenue firms than Canada, both on aggregate and on a sector-by-sector basis.

The population of mega-large firms provided in each analysis is comprised of publicly traded companies. Reliable data on privately held companies was only available for Australian and US firms. Each analysis provides a break-down of the total population of firms by industry sector. Industry codes and subsectors have been omitted to allow for aggregate classification under broader, but more easily comparable, sector definitions. A full firm-population analysis for each comparable economy is provided at the end of this section.

Key Findings from the Comparative Quantitative Analysis

Across this aggregated data of comparable economies, several insights are evident. We present our comparative findings in five categories of analysis: the aggregate, per-capita creation of billion-dollar firms; a sector-by-sector analysis of the creation of billion-dollar firms; a brief comparative evaluation of overall economic output across sectors; an analysis of the ratio of billion-dollar firms to the total number of firms by sector; and a look at revenues shares attributable to billion-dollar and sub-billion-dollar firms.

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Aggregate, Per-Capita Performance in Creating Billion-Dollar Firms

As Table 1 shows, Canada's creation of billion-dollar firms is on par with the average found across the group of comparative economies on a per capita basis. Using per-capita measures on the basis of economic size and population, Canada's score doubles the share of mega-large firms in Germany, which evidently relies much more on a dynamic population of SMEs. On the other hand, relative to Australia and Sweden, Canada underperforms on both measures, and holds only a slight advantage over the United Kingdom and the United States. All together, suppositions regarding the relationship between the size of an economy and the share of largest firms are shown to be false in that larger economies do not produce a greater share of billion-dollar firms, at least among our sample of comparators. Moreover, while Canada and Sweden show far higher than average export intensities than the United Kingdom and the United States, so too does Germany, while Australia's is ranked last amongst this sample. A structural cause for performance in creating large firms is subsequently very uncertain.

Table 1: Billion-Dollar Firms Per Capita across Jurisdictions

Jurisdiction	# Firms	Population (millions)	Firms per million	GDP (USD PPP)	Firms per million GDP
Canada	169	34.88	4.8	1,821,450,000	0.09
Australia	155	22.68	6.8	1,541,700,000	0.10
Germany	153	81.89	1.9	3,429,520,000	0.04
Sweden	67	9.63	7.0	523,804,000	0.13
United Kingdom	243	63.19	3.8	2,476,670,000	0.10
United States	1411	317.48	4.4	16,244,580,000	0.09
		Avg per million inhabitants	4.8	**Avg per GDP**	0.09

Sector-by-Sector Performance in Creating Billion-Dollar Firms

Moving onto a sector-based analysis across jurisdictions reveals a number of interesting findings (Table 2). First, across most sectors, Canada's performance in creating billion-dollar firms is largely consistent with our comparators. Six sectors, however, reveal significant differences:

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Part III. Comparative Quantitative Analysis: A Cross-Jurisdictional Review of Billion-Dollar Firms

- **Energy and Utilities.** Over one-third of the population of billion-dollar firms in Canada can be found in the oil and gas, mining and metals, and other resource sectors. The comparative data shows that Australia, the United Kingdom and the United States each possess an aggregated resource total of approximately 15 percent.

- **Manufacturing.** By way of contrast, Canada has the smallest share of its largest firms in the manufacturing sector, here aggregated to include manufacturing, industrial products and chemicals firms. Australia and the United Kingdom are both between 75 and 110 percent larger than the Canadian figure in this sector, while significantly higher shares are seen in Germany, Sweden, and to a lesser extent, the United States.[13] Allocating cause is beyond the scope of this project; however, it is worth noting that while many point to the performance of the Canadian dollar as a cause of the Canadian manufacturing decline, similar currency strengths in the United Kingdom and Sweden (relative to the euro), and in Australia (relative to the US dollar), should force caution in such diagnostics. Part V provides case studies on the aggressive sectoral supports given to manufacturing in the United Kingdom and Germany, which may go further toward explaining their comparative success.

- **Professional Services.** Canada possesses a far smaller share of large firms in professional services relative to Australia, the United States, and the United Kingdom.

- **Engineering and Construction.** In engineering and construction, Canada's share is below average, even though Canada has seen considerable growth in this sector. Interview results indicate that the smaller share of firms may be the result of aggressive consolidation in the Canadian sector.

- **Technology.** Among technology firms, Canada's performance is relatively on par with the sample average, with US technology dominance providing the exception. At 11.8 percent, the US share of large technology firms dwarfs Canada's 3.6 percent.

- **Health Care and Life Sciences.** Finally, in the health care sector, which aggregates pharmaceutical and other health care firms, Canada's share of firms is distinctly lower than the sample average. Broadly speaking, this is largely due to the inclusion of private health care organizations in other jurisdictions. When confined to pharmaceutical/life sciences firms, Canada's performance is in tune with Australia and the United Kingdom, albeit far removed from the share seen in Germany, Sweden and the United States.

[13] The US figure for manufacturing is likely inflated due to the inclusion of mining and construction firms, segregated in the other jurisdictions but included in manufacturing due to data inconsistencies within the US data set.

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Table 2.1: Comparative Breakdown of Billion-Dollar Firms by Sector

Country	Energy & Utilites (%)	Engineering & Construction (%)	Financial Services (%)	Food Production (%)	Health Care (%)
CAN	29.6	4.0	13.0	4.7	0.6
AUS	4.5	8.4	14.2	11.6	3.2
GR	5.2	5.2	11.8	2.0	6.5
SWD	1.5	10.4	16.4	4.5	6.0
UK	7.8	2.9	14.4	4.9	2.1
US	14.1	*	11.3	3.5	8.0

– indicates no billion-dollar firms in this sector
* indicates data unavailable

Table 2.2: Comparative Breakdown of Billion-Dollar Firms by Sector

Country	Manufac-turing (%)	Media & Broadcast (%)	Metals & Mining (%)	Prof. Services (%)	Real Estate (%)
CAN	7.1	4.0	6.5	3.0	2.4
AUS	12.3	2.6	10.3	7.7	4.5
GR	47.1	3.3	0.7	–	0.7
SWD	33.3	1.5	1.5	4.5	–
UK	15.6	4.5	7.8	15.2	0.8
US	25.1	2.7	*	8.1	2.3

– indicates no billion-dollar firms in this sector
* indicates data unavailable

Table 2.3: Comparative Breakdown of Billion-Dollar Firms by Sector

Country	Retail & Wholesale (%)	Technology (%)	Telecommunications (%)	Transportation (%)
CAN	10.7	3.6	4.7	5.3
AUS	14.2	–	1.3	5.2
GR	4.6	4.6	2.0	6.5
SWD	10.4	4.5	4.5	1.5
UK	12.3	4.1	2.5	4.9
US	8.7	11.8	1.3	3.0

– indicates no billion-dollar firms in this sector
* indicates data unavailable

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Part III. Comparative Quantitative Analysis: A Cross-Jurisdictional Review of Billion-Dollar Firms

Comparative Evaluation of Economic Output across Sectors

Shifting the lens from the creation of billion-dollar firms to the overall economic output associated with these sectors reveals a more nuanced picture. For example, while Canada's smaller share of large manufacturing firms might cause some to question the sector's health, its contribution to the Canadian economy is on par with its equivalents in Sweden, the United Kingdom and the United States, and, in fact, exceeds Australia. Only Germany's manufacturing sector plays a bigger role, at nearly double the Canadian share.

In other sectors, however, this comparative result is less inspiring. For example, the technology and life sciences sectors in Canada contribute a smaller share of economic activity than do the same sectors in Australia, Sweden, the United Kingdom and the United States. Our reliance on aggregated OECD data across the professional, scientific, and technical classifications, however, limits the analytical value of these differences.

Comparative Analysis of Firm Size Ratios

Another way of representing Canada's comparative firm demographic is to calculate the ratio of the number of billion-dollar firms in each jurisdiction versus the total number of firms in a sector. In order to provide a comparatively accurate data set, only publicly traded firms are taken into account for this exercise.

The share of billion-dollar firms among all Canadian firms in the manufacturing sector is significantly lower than in our comparative sample. While 11 percent of the sample of sector-specific publicly traded firms are billion-dollar companies, this value lags behind Australia (15 percent), the United Kingdom (28 percent), Germany (40 percent), and the United States (48 percent). A similar comparative trend is present among technology firms, where Canada's ratio of billion-dollar firms to the sector total is significantly smaller than Germany, the United Kingdom, and the United States. Canada's technology score on this metric, however, doubles Australia's.

Comparative Analysis of Revenue Shares

A similar exercise looking at the share of revenue associated with billion-dollar firms versus sub-billion dollar firms is similarly insightful. On aggregate, Canada is far more reliant on sub-billion-dollar firms to generate revenues[14] than the comparative economies. For example, we find that the share of

[14] Data on Swedish firms is not included in this exercise owing to reliability issues.

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revenues attributable to sub-billion-dollar firms in Canada is double what we find in Germany, the United States and the United Kingdom. Only Australia is more dependent on sub-billion-dollar firms to generate revenues. By industry, the Canadian manufacturing sector is significantly more reliant on sub-billion-dollar firms: nearly four times more so than the comparative average. In consumer retail, Canada is double the comparative average with the exception, once again, of Australia, which is more reliant on smaller firms than Canada.

Canada's reliance on smaller firms, both on aggregate and in particular sectors, is not necessarily a sign of poor performance. Nevertheless, it raises numerous questions about how to interpret these findings. Is the smaller share of revenues attributable to mega-large Canadian firms in certain sectors a sign of weakness? Does it indicate, for example, that small- and mid-tier firms in manufacturing, technology, and life sciences are lacking critical ingredients, such as access to capital, talent, or markets required to grow into substantial global players? Could it demonstrate that smaller Canadian firms have simply been good at identifying profitable niches in their sectors? Does this trend simply reflect a greater degree of industry consolidation in the comparator jurisdictions? Or do acquisitions and mergers dampen Canada's population of large firms? These questions are beyond the scope of this report, but they merit further investigation.

Country Profiles

Australia

While geographically distant from Canada, the Australian economy provides an appropriate comparison for Canadian data, owing to the similar size of both economies, and to a lesser extent, the relative trade dependence on one major trade partner. Moreover, the countries' respective currencies have largely moved in tandem relative to the US dollar, reflecting natural resource strengths in both countries.

Table 3: Canada-Australia Basic Comparative Statistics

Indicator	Canada	Australia
GDP (USD)	$1.821 trillion	$1.521 trillion
GDP per capita (USD ppp)	$ 42,317	$ 41,954
Population	34.88 million	22.68 million
Share of trade with largest trade partner	United States – 61.9 %	China – 31.6%

Source: International Monetary Fund (IMF) (2013)

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Part III. Comparative Quantitative Analysis: A Cross-Jurisdictional Review of Billion-Dollar Firms

Demographic Analysis

The Australian economy hosts 377 billion-dollar firms. This includes 327 publicly traded firms and 50 privately held. Accounting for public entities and foreign firms, the Australian economy is home to 155 domestically held billion-dollar firms.

This population of firms can be categorized by industry as follows:

Table 4: Distribution of Australian Billion-Dollar Firms by Industry

Industry	Number of Billion-Dollar Firms
Consumer Retail & Wholesale	22
Financial Services	22
Manufacturing	19
Food & Beverage Production	18
Metals & Mining	16
Engineering & Construction	13
Professional Services	12
Transportation	8
Real Estate	7
Energy & Utilities	7
Health Care (incl. Pharma)	5
Media & Broadcast	3
Telecommunications	2
Total Firm Population	**155**

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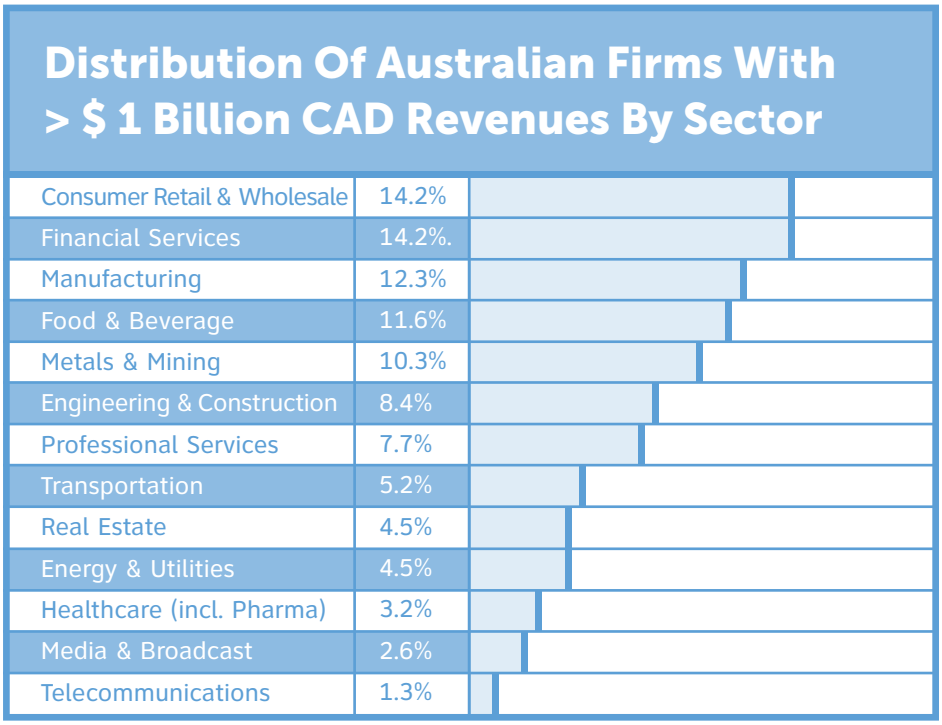
Part III. Comparative Quantitative Analysis:
A Cross-Jurisdictional Review of Billion-Dollar Firms

Figure 1: Distribution of Australian Billion-Dollar Firms by Share of Total Population



On an aggregate, per-capita basis, Australia produces roughly 40 percent more billion-dollar firms than Canada. Of particular interest, however, is the difference in intensities among resource-related sectors of the economy. While in Canada, resource extraction firms occupy nearly 30 percent of the billion-dollar demographic, in Australia, the metals and mining and energy sectors comprise slightly less than 15 percent.

By way of contrast, the share of billion-dollar firms in manufacturing-related activities is nearly double in Australia. The discrepancy in the comparative fortunes of large manufacturing firms in Australia and Canada raises questions for further investigation regarding the factors that have precipitated Canada's significant decline in this sector, especially given the similar movements in exchange rates.

There are domains in which Canada performs well in comparison. Canada hosts six large technology companies, for example, while there are none in Australia. And there are areas where the two countries are quite similar. In the health care sector, for example, Australia is home to two publicly traded pharmaceutical firms, while Canada has one publicly traded firm and one private firm with billion-dollar revenues.

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Part III. Comparative Quantitative Analysis: A Cross-Jurisdictional Review of Billion-Dollar Firms

Germany

While the German economy may be double the size of Canada's, it provides a valuable comparative basis, given similar economic conditions and a similar basket of key exported goods and services. In particular, both countries are significant exporters of automotive parts, industrial and chemical products, and agri-food products. The intensity of exports as a share of the economy, however, differs significantly, with Canada's export intensity of 31 percent significantly trailing Germany's 51 percent.

Table 5: Canada-Germany Basic Comparative Indicators

Indicator	Canada	Germany
GDP (USD)	$1.821 trillion	$3.4 trillion
GDP per capita (USD ppp)	$ 42,317	$ 38,666
Population	34.88 million	81.89 million
Share of trade with largest trade partner	United States – 61.9%	European Union – 69%

Source: IMF (2013)

Demographic Analysis

Data on German firms is limited to publicly traded companies. We find 153 publicly traded domestic firms with revenues over CAN$1 billion, or €680 million. This population of firms can be categorized by industry as follows:

Table 6: Distribution of German Billion-Dollar Firms by Industry

Manufacturing	72
Financial Services	18
Transportation	10
Health Care (incl. Pharma)	10
Engineering & Construction	8
Energy & Utilities	8
Consumer Retail & Wholesale	7
Technology	7
Media & Broadcasting	5
Telecommunications	3
Food & Beverage Production	3
Metals & Mining	1
Real Estate	1
Total firm population	**153**

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Part III. Comparative Quantitative Analysis: A Cross-Jurisdictional Review of Billion-Dollar Firms

The first and most intriguing finding is that Germany is comparatively poor at generating billion-dollar firms. On a per capita basis, Canada produces more than double the number of billion-dollar firms, despite Germany's relative strengths in producing mega-revenue manufacturing and life sciences firms as discussed below. Indeed, Germany's population of billion-dollar firms is smaller than Canada's, despite the fact that its population and economy are approximately twice as large.

In a sector-by-sector analysis, there is one clear and significant difference. The share of manufacturing-related firms in Germany (39 percent) dwarfs Canada's six percent share, which translates in nominal terms to a dramatic 72–11 difference. The growth and sustainability of German manufacturing/industrial firms is of substantial interest, given trends in the euro and the country's relatively high cost level vis-à-vis its primary export markets.

The other noteworthy difference pertains to the growth of German health and life sciences firms. Ten such firms are included in the sample, again far higher than the Canadian sample of one publicly traded life sciences firm. The comparative success of both sectors raises interesting questions about the mix of factors in the German business and public policy environment that could account for the exceptional strength of Germany's large manufacturing and life sciences firms. In Parts IV and V, we evaluate a range of such factors, including export promotion, skills training, and deep investments in clusters and innovation centres.

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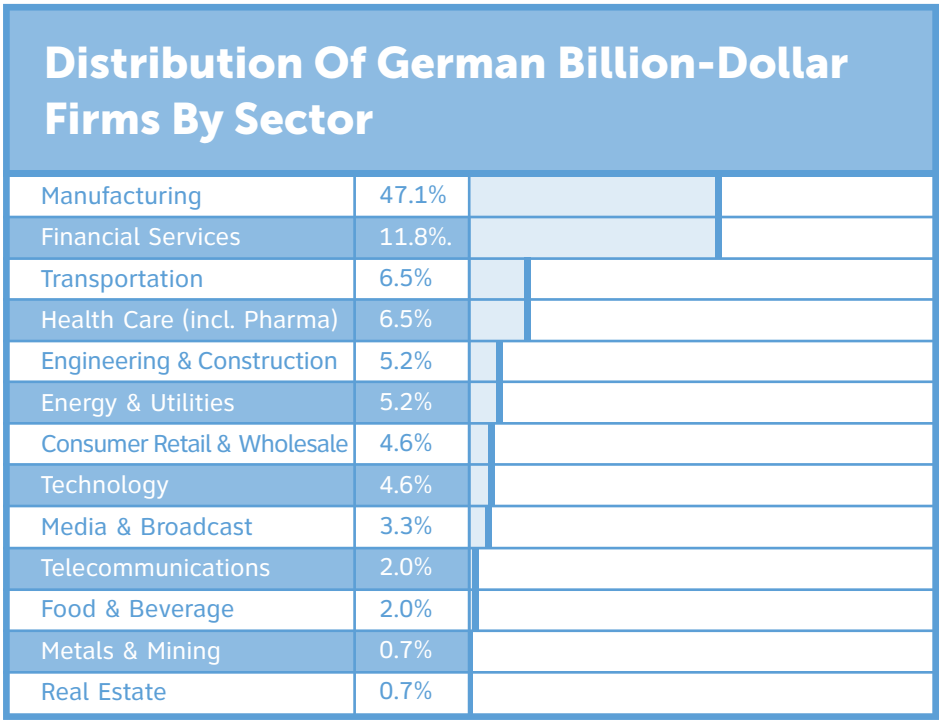
Figure 2: Distribution of German Billion-Dollar Firms by Share of Total Population



Sweden

While significantly smaller than its Canadian counterpart, the Swedish economy provides an appropriate comparative base, given the similar basket of core exports. In particular, both countries see significant export shares for vehicles and vehicle parts, as well as high-technology products. Moreover, resources (oil and forestry) remain significant to the Swedish economy. The export intensity of the economy is measured at 45 percent.

Table 7: Canada-Sweden Basic Comparative Indicators

Indicator	Canada	Sweden
GDP (USD)	$1.821 trillion	$525.7 billion
GDP per capita (USD ppp)	$ 42,317	$ 40,304
Population	34.88 million	9.63 million
Share of trade with largest trade partner	United States – 61.9%	European Union – 75%

Source: IMF (2013)

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Part III. Comparative Quantitative Analysis: A Cross-Jurisdictional Review of Billion-Dollar Firms

Demographic Analysis

Available data on publicly traded companies in Sweden shows 67 firms with annual revenues exceeding CAN$1 billion. This population of firms can be categorized by industry as follows:

Table 8: Distribution of Swedish Billion-Dollar Firms by Industry

Manufacturing	22
Financial Services	11
Consumer Retail & Wholesale	7
Engineering & Construction	7
Health Care (incl. Pharma)	4
Technology	3
Telecommunications	3
Food & Beverage Production	3
Professional Services	3
Transportation	1
Energy & Utilities	1
Media & Broadcasting	1
Metals & Mining	1
Total firm population	**67**

Contrary to Germany, Sweden performs comparatively well in the aggregate, per capita creation of billion-dollar firms. In fact, Sweden is the highest per capita creator of billion-dollar firms in our comparative sample.

The composition of the Swedish demographic of billion-dollar firms provides two interesting components. First is the predominant role of industrial and manufacturing firms in this segment. Comprising 34 percent of the segment, this sector has succeeded, despite a comparatively price level (according to OECD data) that leaves Swedish prices significantly higher than the European countries it sends the majority of its exports to. A second element of note is the strong presence of health-care-related companies, notably pharmaceutical and health care technology firms.

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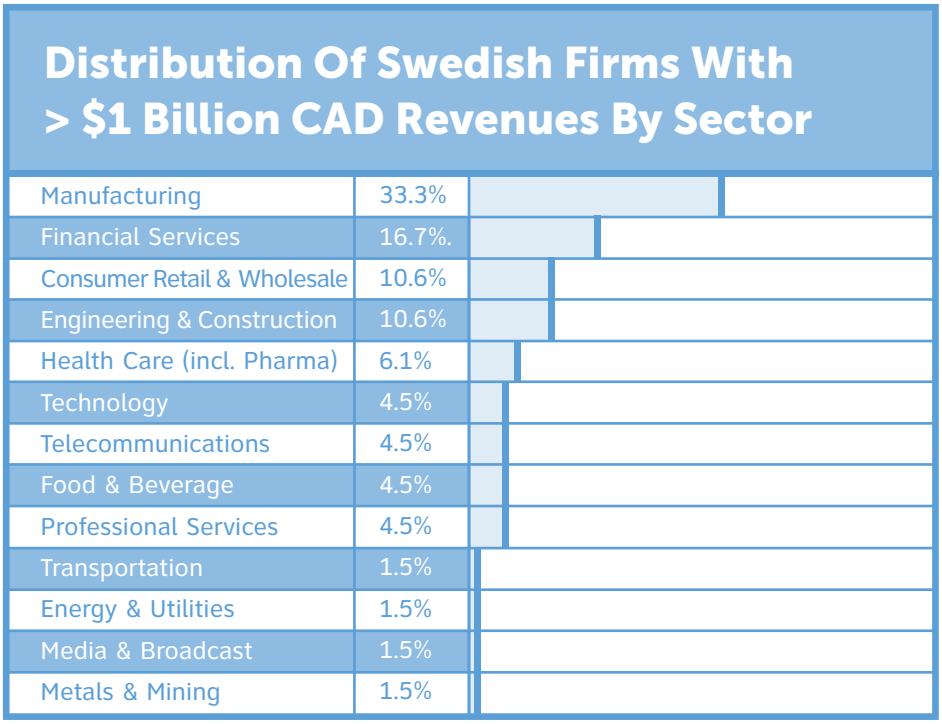
Figure 3: Distribution of Swedish Billion-Dollar Firms by Share of Total Population



United Kingdom

Like Canada, the United Kingdom is widely seen as a mature industrial economy in transition, as its manufacturing base struggles under the weight of more flexible and lower-wage competition. Moreover, similar issues related to currency valuations (£ vs. €) vis-à-vis the country's primary trade partner provide a valuable comparative basis for the Canadian economy. Both countries also share a significant export focus on industrial and chemical products. The United Kingdom's export intensity (20 percent) trails Canada's, which sits at 31 percent.

Table 9: Canada-United Kingdom Basic Comparative Indicators

Indicator	Canada	United Kingdom
GDP (USD)	$1.821 trillion	$2.435 trillion
GDP per capita (USD ppp)	$ 42,317	$ 36,569
Population	34.88 million	63,19 million
Share of trade with largest trade partner	United States – 61.9%	European Union – 56%

Source: IMF (2013)

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Part III. Comparative Quantitative Analysis: A Cross-Jurisdictional Review of Billion-Dollar Firms

Demographic Analysis

An analysis of publicly traded firms based in the United Kingdom shows 243 domestic firms, a number near-perfectly equivalent on a per capita basis to the Canadian total. A breakdown of this sample set by industry provides the following sector distribution:

Table 10: Distribution of UK Billion-Dollar Firms by Industry

Manufacturing	38
Professional Services	37
Financial Services	35
Consumer Retail &Wholesale	30
Metals & Mining	19
Energy & Utilities	19
Food & Beverage Production	12
Transportation	12
Media & Broadcasting	11
Technology	10
Engineering & Construction	7
Telecommunications	6
Health Care (incl. Pharma)	5
Real Estate	2
Total firm population	**243**

As noted, in the aggregate, per capita comparison, Canada holds a slight advantage in the creation of billion-dollar firms. Of particular interest in the sector breakdown is the strong presence of manufacturing (15.6 percent) and professional services firms (15.2 percent). In professional services, the United Kingdom has the highest concentration of firms in the comparative sample and a significantly higher concentration than Canada, whose share of professional services firms stands at only three percent. While the United Kingdom is often described as a maturing economy with a competitive deficiency in manufacturing, this must be understood as relative, considering the strength of these sectors compared to Canadian statistics. Moreover, given the strength of the UK pound relative to the currency of its largest trading partners, the euro, the sustained success of large industrial players denotes a potentially significant difference relative to Canadian industry.

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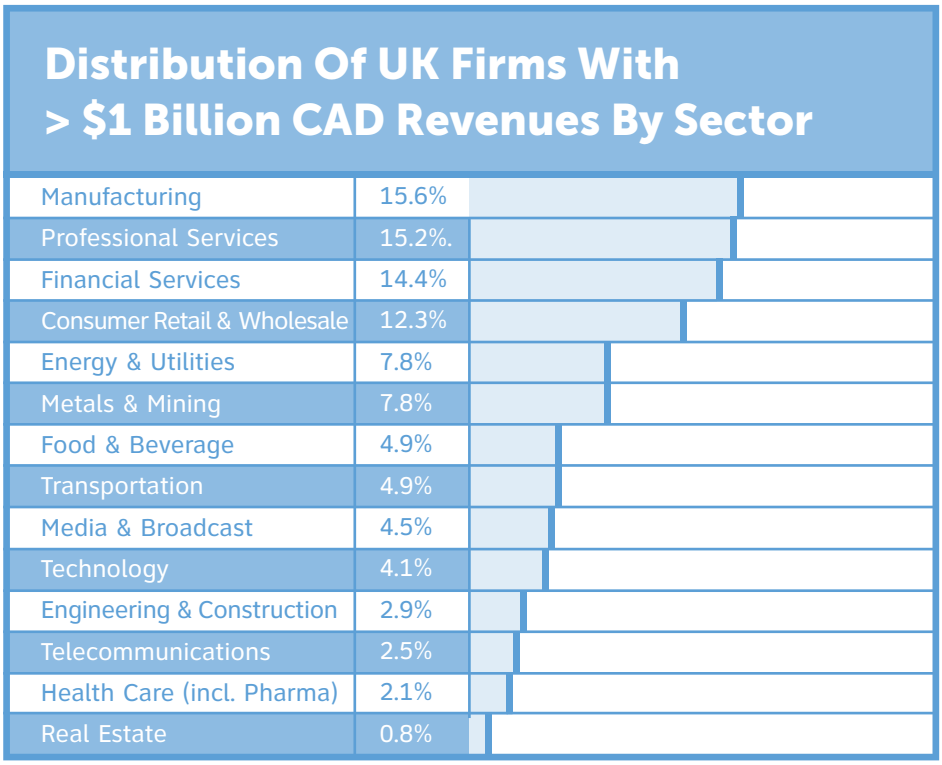
Figure 4: Distribution of UK Billion-Dollar Firms by Share of Total Population



United States

The US economy is nearly 10 times larger than Canada's, as is its population. These differences notwithstanding, the comparison of industrial sectors within the subset of largest domestic firms is valuable, given the overwhelming share of Canadian trade that is conducted with the United States, as well as similar policy priorities vis-à-vis R&D, technology, and industrial transition. The US export intensity (23 percent) trails Canada's 31 percent.

Table 11: Canada-United States Basic Comparative Indicators

Indicator	Canada	United States
GDP (USD)	$1.821 trillion	$16.66 trillion
GDP per capita (USD ppp)	$ 42,317	$ 51,704
Population	34.88 million	317.480 million
Share of trade with largest trade partner	United States – 61.9%	Canada – 16.1%

Source: IMF (2013)

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Part III. Comparative Quantitative Analysis:
A Cross-Jurisdictional Review of Billion-Dollar Firms

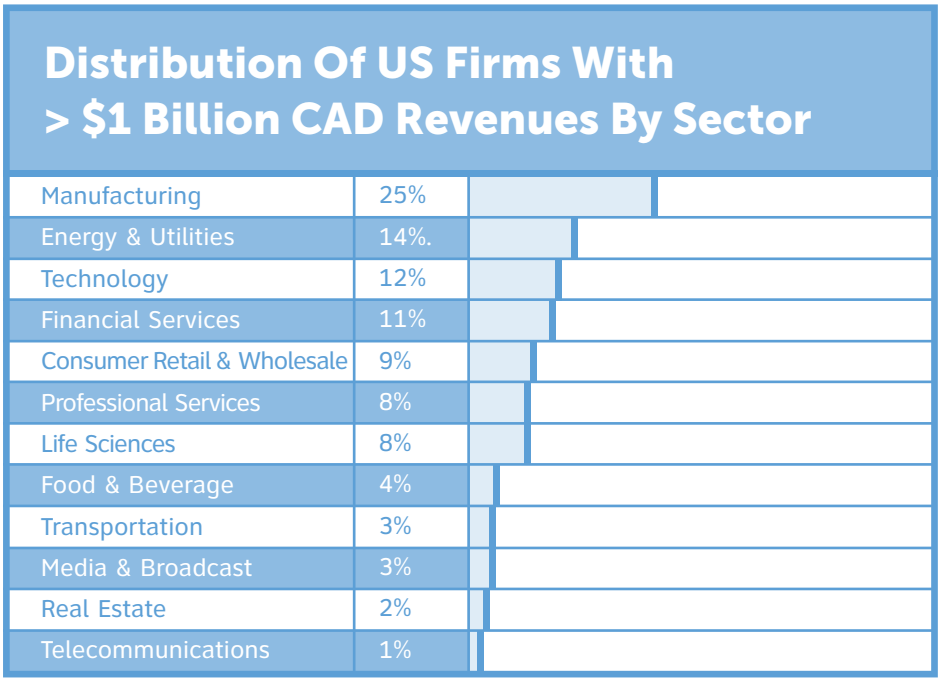
Demographic Analysis

An analysis of US-based publicly traded firms shows 1,411 domestic firms with revenues over US$1 billion. A breakdown of this sample set by industry provides the following sector distribution:

Table 12: Distribution of US Billion-Dollar Firms by Industry

Manufacturing	354
Energy & Utilities	199
Technology	166
Financial Services	160
Consumer Retail &Wholesale	123
Professional Services	114
Health Care (incl. Pharma)	113
Food & Beverage Production	50
Transportation	42
Media & Broadcasting	38
Real Estate	33
Telecommunications	19
Total firm population	**1,411**

Figure 5: Distribution of US Billion-Dollar Firms by Share of Total Population



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Part III. Comparative Quantitative Analysis: A Cross-Jurisdictional Review of Billion-Dollar Firms

Given the aggregate economic size of the United States, its pool of publicly traded billion-dollar firms is less, per capita, than Canada. However, within the US sample, we see significant differences related to the share of technology, professional services and life science (and health care) firms at the largest end of the economy. In particular, the 12 percent share of largest firms that are high-tech oriented (software and hardware) is a stark contrast to the three percent of Canadian firms in the same segment. Similarly, life science firms account for an eight percent share of the sample. This number, however, includes private health care facilities, and is thus somewhat incomparable with the segment size noted in Canada. The United States does, however, host 37 pure life science/pharmaceutical firms, while Canada hosts just one publicly traded company. The other noteworthy trend is the fact that the United States has a lower share of energy and utilities firms in the billion-dollar category, but it is the second largest sector and also the second highest share across the comparative sample.

Conclusion

This comparative analysis with Australia, Germany, Sweden, the United Kingdom and the United States set out to understand the extent to which the number of billion-dollar enterprises produced in Canada is equivalent to these comparable economies. We find that Canada's population of billion-dollar firms is on par with the per capita average across the group of comparative economies. In head-to-head comparisons, we trail Australia and Sweden significantly, outperform Germany, and hold a slight per capita advantage over the United Kingdom and the United States.

As noted above, we have also identified significant variances in performance across sector differences that merit further analysis. The relative weight of Canada's energy sector, for example, is juxtaposed against a relatively small share of manufacturing firms as compared to our comparators. Moreover, the findings highlight that Canada's overall economic output is far more dependent on firms that are below the billion-dollar segment relative to all but Australia. In an attempt to explain some of these differences, Parts IV and V delve into the policy initiatives adopted in each jurisdiction to promote economic growth and competitiveness.

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Part IV. Cultivating Success: A Cross-Jurisdictional Review of Domestic Policy Efforts

In this section, we explore whether the domestic policy environments in Australia, Germany, Sweden, the United Kingdom and the United States can help explain their performance in generating globally competitive enterprises. We focus principally on three aspects of domestic policy: taxation, R&D incentives, and other corporate growth incentives. We assess how Canada's current policy mix in these domains compares with policies found in our sample of comparator nations. While the specific policies we evaluate may not have been created with the explicit intent to promote the development of mega-large firms, they are important elements in the creation of an economic ecosystem that promotes firm growth and international competitiveness. The comparative policy analysis of taxation, R&D incentives and general corporate incentives is supplemented by a series of country-specific case studies in Part V.

Key Findings

Canada offers competitive growth policies and investment incentives, but has not seen a concomitant increase in some key measures of economic performance. While many criticize the state of Canada's productivity and R&D metrics, it is very difficult to explain these apparent deficiencies by pointing a lack of adequate incentives provided by Canadian government. In fact, our review of the policy environment in our comparator countries suggests that Canada's policy mix—at least with respect to taxation rates and the generosity of our R&D incentives—is quite competitive.

Canada's corporate tax rates are not the lowest among our comparators, but they are below the average. While this analysis does not take into account taxable deductions and other speciality programs aimed at reducing tax liabilities, Canada's effective tax rates for corporations are very well positioned vis-à-vis comparative economies, particularly with respect to the United States. This competitive tax positioning is true for both large and small businesses. Canada's relative position on tax treatment, however, comes nearly two decades later than downward movements in corporate tax treatment in Australia, Sweden and the United Kingdom.

Canada's R&D incentives are also competitively positioned relative to our comparators. In fact, Canada's overall public support for R&D is second only to the United States. This ranking, however, obscures a significant differential between direct funding and tax-related support. Only Australia provides a more generous tax treatment of R&D across the sample, whereas Sweden and Germany provide no tax incentives for R&D. While a detailed analysis of innovation metrics is beyond the scope of this project, it is clear from a review of secondary literature that Canada's preference for tax treatment rather than direct funding deserves attention.

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Part IV. Cultivating Success: A Cross-Jurisdictional Review of Domestic Policy Efforts

All considered, our comparative review reveals that Canada's relative standing on blunt measures of taxation and R&D is quite, if not very, competitive. Whether this competitive position leads to growth, however, is far less clear. The comparative analysis provided in Part III of this report highlights several weaknesses in the Canadian demographic of billion-dollar firms that such policies are evidently unable to redress on their own.

Our comparative review of growth and innovation policies reveals the growing proclivity of jurisdictions to deploy highly specialized incentives to boost growth in desirable sectors. We catalogue a suite of such incentives in the final section of Part IV. While such unique policy initiatives offer difficult terrain for comparative analysis, they illustrate the breadth of potential mechanisms that Canada could leverage to amplify the growth of specific sectors. While we are unable to provide an account of the effectiveness of the measures we have identified, we have flagged particular measures that we believe merit further analysis.

Corporate Taxation

As of 2013, the average combined corporate income tax rate across comparator countries stood at 28.9 percent. At 39.1 percent, the combined corporate tax rate within the United States was significantly higher than other sample countries. Among the other comparators, Sweden's combined corporate income tax rate is the lowest, at 22 percent. Canada effective rate compares favourably, coming in slightly lower than the average, at 26.1 percent.

Table 1: Corporate Tax Rates across Sample Countries (2013)

Country	Central government corporate income tax rate (%)	Adjusted central government corporate income tax rate (%)	Sub-central government corporate income tax rate (%)	Combined corporate income tax rate (%)	Targeted corporate tax rates
Australia*	30.0	30.0		30.0	Y
Canada	15.0	15.0	11.3	26.1	Y
Germany*	15.8 (15,0)	15.8	14.4	30.2	N
Sweden	22.0	22.0		22.0	N
United Kingdom*	23.0	23.0		23.0	Y
United States*	35.0	32.8	6.3	39.1	Y

Source: OECD Tax Database

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Part IV. Cultivating Success: A Cross-Jurisdictional Review of Domestic Policy Efforts

Of the countries examined, the United States, the United Kingdom, and Canada offer a special targeted corporate tax rate for small businesses. The average effective rate for the three countries is 18.5 percent. Canada's effective federal and provincial rate stands at 15.3 percent, with both the United States and the United Kingdom at 20 percent.

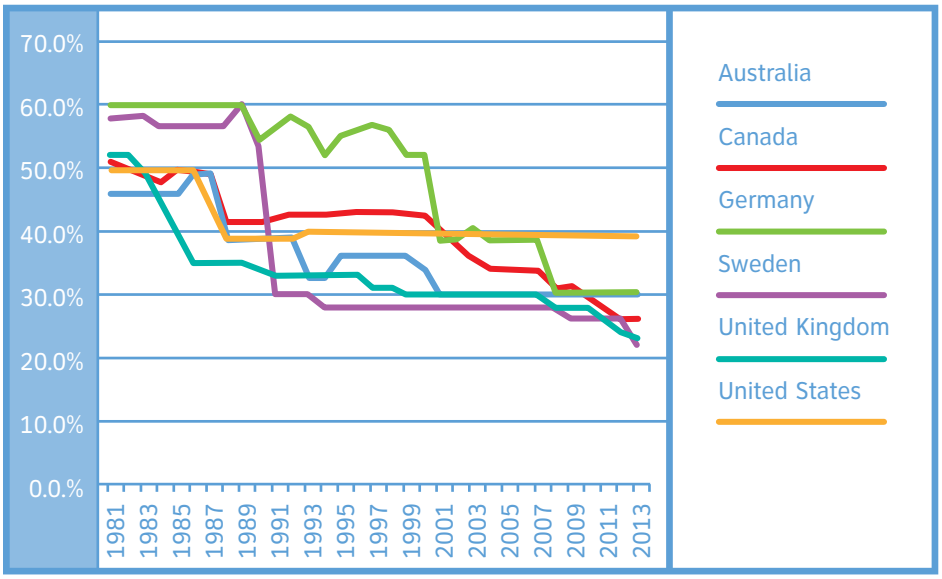
Table 2: Small Business Corporate Tax Rates in Selected Countries (2013)
Small business corporate tax rates (%)

Country	Central government	Adjusted central government	Sub-central government	Combined
Canada	11.0	11.0	4.3	15.3
United Kingdom*	20.0	20.0	-	20.0
United States*	15.0	14.1	6.0	20.1

Source: OECD Tax Database

Despite some significant internal variation within the sample, all comparator countries have experienced declining corporate tax rates over time. The United States constitutes a partial exception here, having remained relatively consistent at 38–39 percent since the late 1980s.

Figure 1: Historical Trend for Corporate Taxation (1981–2013)



Source: OECD Tax Database

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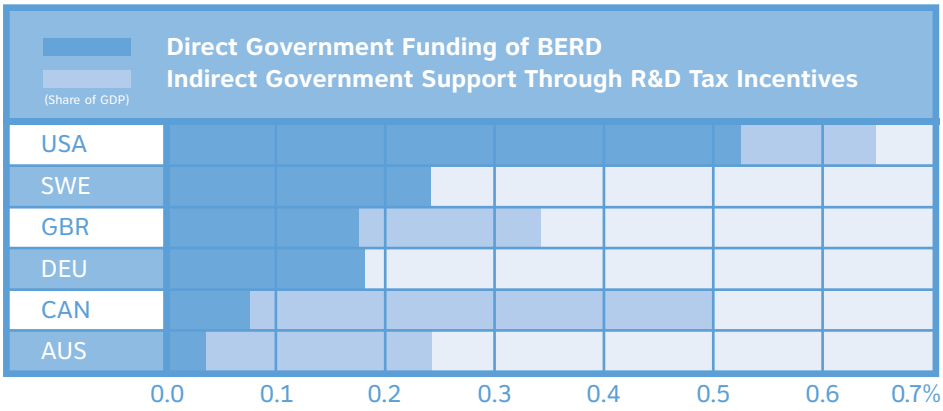
Part IV. Cultivating Success: A Cross-Jurisdictional Review of Domestic Policy Efforts

R&D Incentives

The six jurisdictions examined combine a varying mixture of tax incentives and direct support for R&D activities. Some countries, such as Canada and Australia, have a policy mixture heavily tilted towards tax incentives. Conversely, Sweden and Germany offer no preferential tax treatment for R&D. Despite the lack of incentives, Sweden has high levels of private R&D spending, ranking 4th in the top 10 EU countries for private R&D investment in 2012. Germany is currently considering the possibility of implementing a tax incentive system. At an individual level, it is worth noting that Sweden provides a tax incentive to qualified foreign experts residing in the country on their taxable income for the first three years of employment. This incentive reduces taxable income by 25 percent for individuals whose skill level is defined as hard to recruit domestically.

Figure 2 shows both direct government funding for business expenditure on R&D and indirect support through tax incentives among the comparator countries, expressed as a percentage of GDP. Taken together, Canada's overall level of government support is second only to that of the United States.

Figure 2: Government support for Research and Development



Source: OECD Science and Technology Database

Of the four comparator countries that provide tax support to R&D, Canada's policy mix is most heavily tilted toward tax incentives. Indeed, across the OECD as a whole, Canada's tax expenditure on BERD as a percent of GDP is second only to France. In the comparative sample, Australia places a similar emphasis on preferential tax treatment, whereas the United Kingdom and the United States place greater weight on direct expenditure.

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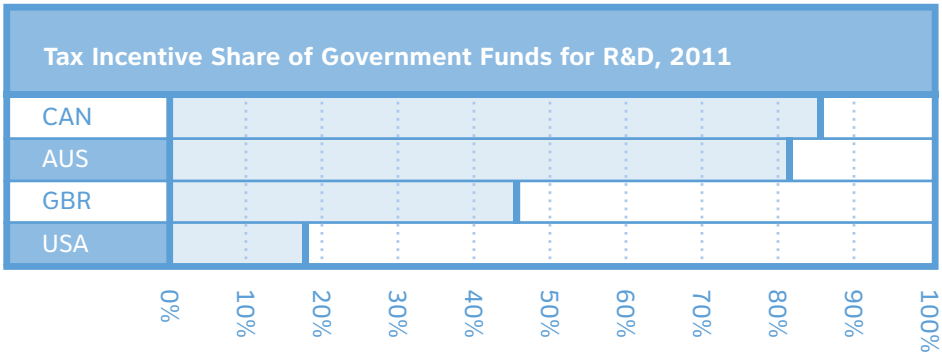
Part IV. Cultivating Success: A Cross-Jurisdictional Review of Domestic Policy Efforts

Figure 3: Tax Incentive as Share of Government Support for R&D



Source: OECD Science and Technology Database

Within the comparative sample, Canada provides the most generous level of tax support to all firms, while Australia provides the most generous treatment to SMEs. The Australian incentive includes both a 45 percent refundable tax offset available to eligible entities with an aggregated turnover less than AUS$20 million per year, which is equivalent to a 15 percent net tax benefit. For larger businesses that do not qualify for this offset, Australia offers a 40 percent non-refundable tax offset available equivalent to a 10 percent net tax benefit. Unused tax credits can be carried forward indefinitely.

In February 2013, the Australian government announced that firms earning over AUS$20 billion would no longer be eligible to receive the R&D tax incentive as of July 1, 2013. This legislation only applies to domestic firms, as foreign firms will be assessed only on the portion of their incomes generated in Australia. The revenues saved by this cut will partly go to the creation of 10 industry hubs that will focus on collaboration between research institutions and industries with high-export growth potential, as well as increased funding for innovative businesses. Still, the Australian policy mix has shifted markedly toward tax incentives since 2006. While tax incentives accounted for approximately 65 percent of government spending on R&D in 2006, by 2011, that number had risen to just under 82 percent.

In the United Kingdom, SMEs with fewer than 500 employees and an annual turnover of less than €50 million or a balance sheet less than €43 million may qualify for R&D tax relief equal to 225 percent of eligible costs. Larger firms may qualify for relief equal to 130 percent of eligible R&D expenditures. In order to qualify, large firms are required to spend a minimum of £10,000 annually on R&D activities. Tax relief, in the form of cash credits up to 24.75 percent of qualified expenditures, is also available to SMEs who have realized a loss in a particular year. While there are no caps on the amount of tax relief available to large firms, SMEs will only be awarded a maximum of €7.5 million per project. Finally, SMEs can claim 65 percent of contract costs incurred through R&D activities.

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The United States also offers tax credits for R&D activities. The traditional credit offered in the United States is equal to 20 percent of expenditure in excess of a calculated base amount. The base amount is derived from an estimation of gross expenditures on qualified research. The United States also offers an alternative, simplified credit equal to 14 percent of excess research expenditures above fifty percent of the average of the prior three years' expenditures. In addition, the United States offers special credits for basic research (i.e., research conducted in universities), payments to an energy research consortium, and research relating to orphan drugs.

Both Sweden and Germany provide a relatively high level of direct government funding for BERD as a percentage of GDP. Sweden ranks ninth in the OECD in direct government funding, while Germany ranks fifteenth. In Germany, most R&D incentives are paid out as cash grants, which may cover up to 50 percent of project costs. In some cases, SMEs may be eligible for a greater share. R&D loans are also available and are not contingent on a specific area of research. In 2005, Germany agreed to a combined public and private R&D expenditure target of three percent of GDP through the Lisbon Strategy, and gross domestic expenditure on R&D reached 2.88 percent in 2011. In 2012, federal spending grew to over €13.8 billion, which was an increase of 63 percent over 2000. Industry-financed R&D accounts for two-thirds of R&D funding in Germany and they tend to work closely with research organizations.

Other Corporate Incentives and Policy Initiatives

In addition to tax measures and R&D incentives, all jurisdictions in the sample provide a variety of additional programs and incentives intended to catalyze growth and job creation. In some cases the incentives are available across all sectors. In other cases, the initiatives are targeted to particular sectors deemed strategic by the government. The initiatives catalogued below by no means represent an exhaustive list of country-specific corporate growth initiatives; rather, our snapshot selectively highlights a series of what we have identified as interesting policy initiatives in each jurisdiction that merit further investigation in order to assess both their effectiveness in accomplishing the intended goals and their appropriateness for potential implementation in Canada.

Australia

- The Australian government provides duty-free tariff concessions for imported goods that are used in the production of goods valued at AUS$10 million or more, in particular those destined for export. The imported items must be used in mining, resource processing, food processing and packaging, agriculture, manufacturing, gas and water supply, and power supply.

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Part IV. Cultivating Success: A Cross-Jurisdictional Review of Domestic Policy Efforts

- Over AUS$58 million has been committed to the "Buy Australian at Home and Abroad" initiative. The programs supported by this initiative offer support for SMEs in the resource sector who are looking to expand by giving them tools and networking connections to improve competitiveness, sustainability, and productivity. Participating firms receive tailored advice and support.

- The government has set up a Critical Skills Investment Fund, which provides co-funding for industry partnerships so that training programs and employment opportunities can be created in critical industry sectors. The fund is also used to upgrade the skill sets of existing workers so that they can meet new demands.

- In addition to R&D tax credits, a tax reduction may also occur when R&D activities result in the output of a marketable product. To qualify, the product must be used by the firm, or sold to another firm for profit.

Germany

- The German Ministry of Economics and Technology offers non-repayable grants and other incentives to help cover investment costs under a joint task program. These funds, which are available to both domestic and foreign investors, include cash, R&D incentives, interest-reduced loans, and export guarantees. The incentives are granted to new firms in order to reduce facility set-up costs. The incentive rates will vary depending on geographic location. Areas that offer the highest rates, which are mostly in East Germany, provide grants of up to 30 percent of eligible expenditures for large-sized firms, 40 percent for medium-sized firms, and up to 50 percent for small firms.

- The German government also offers specific incentives for investors investing in East Germany. The grant is offered to encourage investments in Berlin, Brandenburg, Mecklenburg-Vorpommern, Saxony, Saxony-Anhalt, and Thuringia. Investors automatically receive funding when investing in these states, and may also be eligible for the joint task program.

- Labour-related incentives are also offered to reduce operational costs incurred by new firms. The incentives offered include recruitment support, training support, wage subsidies, and on-the-job training.

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Part IV. Cultivating Success: A Cross-Jurisdictional Review of Domestic Policy Efforts

Sweden

- Vinnova, the Swedish innovation agency, provides direct grants to firms in four sectors that it defines as "strategically important for Sweden." The four sectors are health and health care, transportation and environment, services and ICT, and manufacturing and working life.

- Sweden received structural funds from the European Union worth over CAN$2.6 billion. All funds received require public co-funding by the government. According to the Swedish Agency for Economic and Regional Growth, just under CAN$59 million is being invested in Stockholm. The main focus of the Stockholm program is small businesses and strengthening international competitiveness.

- The government offers incentives for firms to relocate to areas with minimal job opportunities and high unemployment rates. The size of the grant received will depend on factors such as the firm's contribution to employment and economic growth in the region.

United Kingdom

- As of April 2013, a new patent box policy allows firms to apply a lower 10 percent corporate tax rate on profits earned using their own patented inventions.

- The government will also be offering tax breaks for firms in the creative industries, such as television, animation, and video game sectors. Relief will either take the form of a 100 percent deduction for qualifying expenses or, if the company realizes a loss, it may be qualified to receive a tax credit equal to 25 percent of the losses.

- Incentives have also been created to encourage firms to engage in business activities in an area classified as a declining industry. Firms entering a declining industry with profits up to £275,000 may be exempt from corporate tax rates for five years. In addition, if the firm is investing in new plant or equipment, it may be eligible to claim 100 percent enhanced capital allowances.

- The UK Financial Conduct Authority has so far allowed the development and implementation of crowdfunding platforms that aim to marry SME demand for capital and financing with investor demand for alternative investment vehicles.

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Part IV. Cultivating Success: A Cross-Jurisdictional Review of Domestic Policy Efforts

United States

- The advanced technology program funds early-stage research at the industry level. This partnership with the private sector is intended to promote research in high-risk areas that will have broad national economic benefits. Sectors that have received funding include manufacturing, biotechnology, electronics, information technology, and advanced materials and chemistry.

- Under the Advanced Technology Vehicle Manufacturing Loan Program, the US government provides loans to automobile and automobile parts manufacturers. The vehicle must be manufactured and sold in the United States in order to qualify for the loan. The loan is designed to help auto companies expand or re-establish their US manufacturing facilities.

- Under the American Jobs Act of 2004, a new deduction was created for firms engaging in domestic production activities. The allowable deduction has recently increased to nine percent of the lesser of qualified production activities income or taxable income.

Conclusions and Recommendations

Our analysis of growth-related policies across the set of comparative economies suggests that Canada's taxation rates and corporate incentives for R&D are competitive and well positioned to stimulate that growth. That Canada's relative rank on productivity and innovation-related measures has not moved in tandem with reform in these policy areas clearly deserves attention. Indeed, the apparent lack of impact on key economic measures begs the question as to whether other structural factors, or even social and geographic factors, are inhibiting Canada's performance in these domains.

One area that demands further investigation is Canada's preference for using tax incentives to support R&D rather than direct funding mechanisms. That Sweden and Germany far outrank Canada on measures of BERD, despite the lack of tax incentives, provides cause to fully revisit Canada's R&D policy framework. The generally negative assessments of Canada's R&D policies from the leading corporate executives interviewed for this report provide further ammunition for rethinking our national approach to innovation.

Moreover, given that Canada ranks last in measures of BERD across the six economies studied, it would be well worth conducting a deeper comparative analysis of the entire array of corporate incentives that Canada offers to foster growth in knowledge-intensive sectors and to stimulate investments in

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productivity enhancing technologies and equipment.[15] While allocating cause and effect in measuring the impact of boutique policies is near impossible, several initiatives across the jurisdictions studied merit attention.

In particular, three such policies are highlighted for further study:

- Australia's "Buy Australian at Home and Abroad" program may provide a model for the ongoing development of linkages between Canada's high-growth energy sector and firms in other, lower-growth sectors.

- Investment facilitation policies managed by the German Ministry of Economics and Technology may provide a means of addressing the demand for investment assistance requested by interview subjects in Part II of this report.

- "Declining industry" support as designed by the British government, notably in its treatment of capital investment, may offer an additional means of stimulating R&D and capital investment in Canada's manufacturing sector.

A suite of additional sector-specific policy measures are reviewed in Part V.

It should be emphasized that while no single policy will promote the development of globally competitive firms, it is also clear that Canada needs to offer much more than just favourable tax treatment in order to create an economic environment that facilitates ongoing growth and competitiveness. The comparative analysis provided in Part III, together with the country case studies reviewed in Part V, suggest that there is both cause and ample opportunity for Canadian policy-makers to investigate and experiment with a variety of other means for stimulating investment into technology, capital and research. In Part V of this report, we offer detailed sector-based case studies to help build a keener appreciation of how Australia, Germany, Sweden, the United Kingdom, and the United States are fostering growth and boosting the competitiveness of their global enterprises.

[15] Conference Board of Canada, "Business Enterprise R&D Spending," April 2013.

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Part V. Country Case Studies: Lessons for Canada from a Comparative Review of the Policies that Enable Sector-Specific Growth

In Part IV, we studied the domestic policy environments in Australia, Germany, Sweden, the United Kingdom, and the United States and considered whether specific tax, R&D and corporate growth policies can help explain their performance in generating globally competitive enterprises. In this section, we dig deeper into a series of country case studies that highlight one sector of interest in each comparable economy. In so doing, we identify a series of key policies and programs in each jurisdiction that were developed to facilitate sector-specific growth, particularly in life sciences, manufacturing, and technology. The country case studies are as follows:

1. **Australian Life Sciences.** In Australia, we examine the policies, including strong R&D incentives, that have facilitated two decades of growth and export success in the Australian life sciences and biotechnology sectors.

2. **German Manufacturing.** In Germany, we review the country's multi-faceted approach to manufacturing success, including its vocational programs, export promotion strategies and its world-renown network of research and innovation centres.

3. **Swedish Biotech Clusters.** In Sweden, we explore the important role that clusters play in distinguishing Sweden as world leaders in promoting R&D-intensive industries, particularly in biotechnology and life sciences.

4. **British Manufacturing Renaissance.** In the United Kingdom, we evaluate British efforts to instill a renaissance in industrial manufacturing.

5. **American Leadership in Technology.** In the United States, we explore the institutional roots and policy drivers of its decades-long preeminence in information technology and related services.

Collectively, the country studies are helpful in identifying valuable policy initiatives that have the potential to address recognized gaps in the current Canadian policy framework for innovation and growth, and therefore merit further investigation. Indeed, we have noted numerous instances where Canadian executives have called for the kinds of policies and support programs that appear to have contributed to significant sector-specific growth in our comparator countries.

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Key Findings from the Country Case Studies

While the conclusions to each country case study provide a detailed series of insights and recommendations for Canadian policy-makers, a handful of lessons gleaned from the country studies merit special attention.

1. **Industrial-academic partnerships.** As demonstrated by leading US institutions such as Stanford University and the Massachusetts Institute for Technology (MIT), entrepreneurial, research-driven universities can act as vital hubs for launching successful ventures. Commercialization pathways between industry and academia are underdeveloped in Canada and need to improve in order to enable long-term growth. Moreover, it is essential that these pathways are accessible to SMEs. Short-term secondments of academic researchers to private industry projects and more active government participation in networking of academic and industry stakeholders could help catalyze the growth of SMEs by enhancing their access to path breaking research.

2. **Intellectual property rights.** Australia's Innovation Patent, which provides fast and relatively cheap avenue to patent protection, and the UK patent box initiative both offer models worthy of study, insofar as they provide stronger and more expedient incentives to translate research into marketable products and services.

3. **Government procurement.** Sweden's policy of "development pairs" between public and private bodies demonstrates a viable model for using of public procurement as a means to facilitate the development and application of new domestic products and services and is worthy of additional study.

4. **Integrated export promotion.** Germany's successful export promotion strategy integrates all levels of government and non-government actors into a coordinated international approach. This strategy, particularly the role of Germany's network of Chambers of Commerce Abroad, has been an important component in the continued success of the country's manufacturing exports, and provides a potential model for Canada to emulate.

5. **Collaborative research and innovation centres.** In light of the success of the Fraunhofer Gesellschaft in Germany and ongoing copycat initiatives in the United Kingdom, Brazil, and the United States, Canada should seriously consider the costs and potential benefits of adopting a similar approach to advanced manufacturing and other industry-specific research and innovation clusters.

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Evaluating the Role of Focused Industry Support in the Australian Life Sciences Sector

Australia's life sciences sector is, in many ways, comparable to that of Canada. Both countries are home to a relatively small number of life sciences firms recording over $1 billion in revenue. Australia has two publicly traded life sciences/pharmaceutical companies with revenues over the billion-dollar plateau. Canada also hosts two life sciences/pharmaceutical companies with billion-dollar revenues, although only one of them is publicly traded. While this small number of mega-large firms may infer weakness, aggregate industry trends suggest that the life sciences are, in fact, an increasingly important component of both Australia's and Canada's knowledge-based economies.

At the same time, there are a variety of factors that positively differentiate the Australian life sciences sector from Canada's. For example, in 2011–2012, the Australian pharmaceutical industry exported AUS$4.06 billion, making it Australia's top high-tech exporter. The sector also employs over 40,000 workers, as compared to 27,000 in Canada.[16] Moreover, while Canadian data on pharmaceutical exports indicates meek overall growth over the 2006–2012 period, Australia's export sector has sustained 20 percent growth over the same period. Similarly, while Canadian pharmaceutical BERD spending has dropped by 1.4 percent over the 2000–2012 period, the Australian pharmaceutical sector has more than tripled its BERD spending over the same time period.[17]

A detailed review of the industry's evolution reveals that the sector would not likely be where it is today without the government's concerted, multi-decade effort to create the conditions for its growth. Since the late 1980s, the Australian government has implemented a number of programs intended to promote growth within the sector. The government's Factor f Scheme (1988–1999) provided nearly AUS$1 billion to pharmaceutical companies for R&D, export, and manufacturing activities. The implementation of the scheme coincided with significant industry growth in these areas, supported by strong domestic and export demand.[18]

[16] "Australian Pharmaceuticals Industry Data Card 2013," Australian Department of Industry, www.innovation.gov.au/INDUSTRY/PHARMACEUTICALSANDHEALTHTECHNOLOGIES/PHARMACEUTICALS/Pages/PharmaceuticalsIndustryDataCard.aspx See also Lawrence Villamar, "Australia's Medicines Industry Tops Nation's Hi-Tech Exporters," International Business Times, February 6, 2012, http://au.ibtimes.com/articles/293420/20120206/australia-s-medicines-industry-tops-nation-hi.htm#.Uv0icPldUhM

[17] "Australian Pharmaceuticals."

[18] "Australian Pharmaceutical Industry at a Crossroads?" Report of the 2007 Medicines Australia Member Economic Survey, http://medicinesaustralia.com.au/files/2009/12/Australian-Pharmaceutical-Industry-Report-2007.pdf

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Following the conclusion of the Factor f Scheme, the Australian government launched the Pharmaceutical Industry Investment Program (1999–2004), which provided funding to encourage R&D and manufacturing activities. Evaluations of the program generally praised its effectiveness in spurring R&D activity within Australia.[19] Finally, in 2004, the government launched its Pharmaceuticals Partnership Program, which provided further funding for pharmaceutical R&D. These programs coincided with significant export growth in the Australian life sciences.[20] The Australian incentive system appears to have had some success in attracting R&D activity to the country. Osprey Medical CEO Mike McCormick, for example, has noted that "Australia is pro life sciences and that's why [Osprey Medical] will continue to move our [R&D] spending here."[21] Osprey, a US-based medical device company, has benefitted from both direct government support and preferential tax treatment of R&D activities in Australia.

These sector-specific programs complement a broader R&D policy that seeks to stimulate knowledge-intensive sectors in Australia. Among OECD countries, Australia trails only Canada in its use of tax incentives as a share of overall government funding for R&D.[22] Particular initiatives include the 2001 Backing Australia's Ability strategy, which saw the Australian government introduce a premium 175 percent tax concession on R&D expenditures. This concession allowed for a reduction of 125 percent for eligible companies and activities, and allowed for a further reduction of up to 175 percent for incremental spending "above a rolling three year average of expenditure."[23] In 2011, an R&D tax credit system was introduced in an effort to simplify and streamline Australia's R&D incentive process.

Australia has also drawn praise for the strength of its intellectual property rights regime. In addition to its standard patent, Australia offers an innovation patent, which provides fast and relatively cheap access to patent protection. In addition to speed and efficiency, innovation patents require a lower level of "inventiveness" to be awarded. Proponents argue that "Innovation patents are particularly useful tools in supporting first to market advantage and are

[19] "Evaluation of the Pharmaceutical Industry Investment Program," Australian Productivity Commission, www.pc.gov.au/projects/study/pharmaceutical-investment/docs/finalreport

[20] Villamar, "Australia's Medicines Industry."

[21] Matthew Smith, "US Should Copy Australia for Life Sciences Funding, Says Osprey Medical Boss," BRW, June 11, 2013, www.brw.com.au/p/business/medical_should_copy_australia_boss_OBfTRAM5si3lwW26ItusxH

[22] "The Generosity of R&D Tax Incentives," OECD, www.oecd.org/sti/rd-tax-stats.htm#design

[23] "Tax Concession for Research and Development: Overview," AusIndustry, www.ausindustry.gov.au/programs/innovation-rd/RD-TaxConcession/Documents/RDTaxConcession-Overview.pdf

strategically valuable assets in protecting and enforcing patent rights."[24] Still, some have suggested that the innovation patent has encouraged abuse of the Australian patent system; in response to these concerns, the government is currently undertaking a review of the system.

The Australian biotech sector has also benefitted from focused support from the governments and the sector's success in recent years merits special attention. Ranking slightly ahead of Canada in the 2013 Scientific American Worldview Scorecard, Australia's biotech sector has an advantage over Canada in both education and workforce skills metrics. Moreover, the Australian sector ranks top in the world for "best growth in public markets." The Australian Stock Exchange now hosts 100 life sciences firms, as compared to 41 listed on the Canadian TSE. The Australia Biotech, the country's biotech industry association, notes that over 600 federal and regional grants are available for firms in the sector.

These include:

- Skills and knowledge grants, up to AUS$50,000, available on an 80:20 fund-matching basis, where the participant funds 20 percent of costs, to access expert advice and services.

- Proof of concept grants, up to AUS$250,000, to test the commercial viability of a new product, process or service.

- Early-stage commercialization repayable grants, up to AUS$2 million, to develop a new product, process or service to the stage where it can be taken to market.

- Experienced executive grants, up to AUS$350,000 over two years, on a 50:50 fund-matching basis, to engage an experienced CEO or other executive.

Taken as a whole, Australia's policy environment for life sciences and biotechnology firms offers a series of targeted incentives that complement a broad R&D policy second only to Canada in terms of its generosity. While Australia has not produced a far greater share of billion-dollar firms in this sector, the aforementioned growth of the industry and associated export success highlight the potentially catalytic role of Australia's sector-specific policy initiatives.

[24] http://www.mondaq.com/australia/x/261486/Patent/Australias+innovation+patent

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Lessons for Canada

- **Canada should consider alternative vehicles for enhancing intellectual property protection.** Australia's innovation patent initiative is worthy of additional study, insofar as the program may make the country a more attractive location for R&D activity. The patent box tax incentive, currently implemented by the United Kingdom, is another potential approach worthy of attention. Canada should closely evaluate the success of both policies in generating domestic R&D activity, particularly in light of the criticism of Canada's SRED tax credit.

- **Canada needs to evaluate opportunities to provide stronger economic leadership and focused industry support.** Strong sector-specific support programs are viewed by Australian sources as key to the sector's growth. While policy-makers may eschew sector-specific incentives, the Australian life sciences sector provides valuable direction as to how such programs can foster growth and long-term competitiveness in desirable industries. Many Canadian executives interviewed for this report suggested that Canada lacks such a vision and would benefit from more concentrated efforts to build industry specific clusters in areas where Canada can be competitive on the global stage.

- **Canada needs to help high-growth start-ups to gain access to sophisticated management talent.** The experienced executive grants available to young Australian firms provide an innovative means of facilitating the attraction, recruitment, and retention of sophisticated management talent by young-growth firms. As noted in Part II, Canadian start-ups and SMEs identified the ability to recruit seasoned "go-to-market" as their number one growth challenge, citing the small pool of such individuals as a competitive disadvantage for Canada.

Explaining Germany's Manufacturing Success

In comparing the distribution of billion-dollar companies across comparative economies, one can't help but note the continued success of the German manufacturing sector. The country's continued ability to nurture and maintain both national champions and competitive SMEs in manufacturing has spawned numerous attempts by other developed states to understand and imitate the German model. A complex array of factors—some more replicable than others—underpins the country's continued dominance in the sector.

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A central component of Germany's continued success in manufacturing is its strong education and training system. Germany's vocational training system, which combines classroom education with apprenticeship-style on-the-job training, continues to produce a highly skilled workforce capable of feeding demand in the manufacturing sector. The system—based on an ethos of public-private partnership—has maintained a high participation rate by both companies and students. Germany's largest companies, such as Siemens, invest significant resources in the system, while also extracting significant benefits.

Germany's success has compelled other countries to adopt educational reforms based on the German model, though success in exporting and duplicating the system remains mixed, at best. Recent efforts to imitate the system in the United Kingdom, for example, have drawn mixed reviews.[25] In particular, the UK government's push to expand its university technical colleges has not been embraced as enthusiastically by potential pupils as program supporters initially hoped. The failure to attract students, in turn, raises questions about possible cultural and societal barriers to the expansion of vocational training programs in other jurisdictions. Despite this, many in the United States are also calling on domestic institutions to introduce educational reforms based explicitly on the German model.[26]

In addition to producing a skilled workforce oriented toward manufacturing, German policy-makers at all levels of government have consistently acted to support the sector. Manufacturing success is seen as the product of a complex network of both government and non-government support, including employer associations, unions, universities, and research centres.[27] German SMEs, for example, can access stable financing from KfW, a government-owned development bank. SMEs also tend to solidify long-term relationships with local (and private) hausbanks, which often provide long-term, stable financing in exchange for significant ownership shares.[28] The availability of such financing for SMEs may reflect the often-cited tendency of German industry and financial institutions to adopt a longer-term view of business and investment decisions as compared to their Anglo-Saxon competitors.

[25] Graeme Paton, "Ministers Could Block Expansion of Technical Schools," The Telegraph, November 25, 2013, www.telegraph.co.uk/education/educationnews/10474257/Ministers-could-block-expansion-of-technical-schools.html

[26] Thomas Schulz, "'We Need to Learn from Germany: How the German Economy Became a Model," Spiegel Online International, March 21, 2012, www.spiegel.de/international/business/the-us-discovers-germany-as-an-economic-role-model-a-822167.html

[27] "What Is New in the Industrial Policy? A Manufacturing Systems Perspective," Oxford Review of Economic Policy 29 (2): 432–462, doi:10.1093/oxrep/grt027.

[28] Susan Helper, Timothy Krueger, and Howard Wial, "Why Does Manufacturing Matter? Which Manufacturing Matters? A Policy Framework," Brookings Metropolitan Policy Program Research Paper, www.brookings.edu/~/media/research/files/papers/2012/2/22%20manufacturing%20helper%20krueger%20wial/0222_manufacturing_helper_krueger_wial.pdf

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German governments at various levels also facilitate and support a variety of collaborative R&D networks and practical programs as a means to increase the technical capabilities of German workers and firms. Germany, for example, provides direct funding for BERD through both loans and grant programs, particularly to SMEs. The federal and subnational governments also fund a series of research institutes, often in collaboration with the private sector, which contribute to the formation of dense R&D networks. Germany's Fraunhofer Gesellschaft network of research institutions is an important and effective hub for applied research within Germany, and a linchpin between industry and institutions of higher education.[29]

In the German model, the government provides a broader governance structure and an overarching strategic vision to coordinate the work of a large number of semi-autonomous research institutes. Many observers credit the system as an important component of German manufacturing success.[30] Recently, the United Kingdom launched a series of technical and innovation centres in an attempt to emulate the German model, and the United States is now establishing of a series of manufacturing innovation centres. So, too, are emerging market nations such as Brazil, which is on course to establish its own research and innovation centres.[31]

Another feature of Germany's manufacturing success is the high proportion of manufacturing sales that are attributable to exports rather than domestic consumption. The country now ranks as the world's second largest exporter, and the largest by exports as a share of GDP. Germany has benefitted both from demand within the eurozone and, in the wake of the ongoing European debt crisis, from the declining value of the euro. In this regard, German manufacturers face a currency situation diametrically opposed to that of Canadian industry. Whereas German export competitiveness has benefitted from the economic malaise elsewhere within the European Union—and the consequent drag on the currency—Canadian firms have had to contend with a strong Canadian dollar resulting from the boom in the resource sector.

[29] In addition manufacturing, the Fraunhofer institutes coordinate and conduct research in health and life sciences, information and communications technologies, transportation and mobility, safety and security, and resource production. See: *www.fraunhofer.de/en/research-topics.html*

[30] Benjamin Reid et al., "Technology Innovation Centres: Applying the Fraunhofer Model to Create an Effective Innovation Ecosystem in the UK," The Work Foundation, December 2010, *www.theworkfoundation.com/Assets/Docs/KnowledgeEconomy%20newsletters/TICs%20-%20Applying%20the%20Fraunhofer%20model%20to%20create%20an%20effective%20Innovation%20Ecosystem%20in%20the%20UK.pdf*

[31] Luisa Massarani, "Brazil Puts $680m into Innovation Centres," Chemistry World, June 4, 2013, www.rsc.org/chemistryworld/2013/06/brazil-puts-680m-science-innovation-centres.

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Still, Germany's manufacturing and export success, particularly in the aftermath of the 2008 financial crisis, cannot solely be attributed to the favourable export conditions brought about by the country's integration in the eurozone. German policy-makers have also taken positive steps to solidify and enhance the country's competitiveness in this area. In 2003, then-Chancellor Gerhard Schröder introduced Agenda 2010, a series of labour market reforms intended to increase the flexibility and dynamism of the German labour market. Concretely, the reforms included tax reductions and a series of cuts to social services and public-sector spending. Although the reforms initially met by significant public hostility, their success has subsequently been cited as a key factor contributing to Germany's relatively low unemployment, both during and after the 2008 financial crisis, as well as the continued success of the manufacturing sector.

In addition, the German government has adopted export promotion policies, particularly for the manufacturing sector. The most obvious manifestation of the country's export promotion strategy is the advocacy undertaken by high-level political officials. More subtly, the country operates an elaborate network of export promotion offices through the German Chambers of Commerce Abroad. Situated in 80 countries, these offices work to develop new markets and facilitate acceptance of the country's manufacturing exports.

Lessons for Canada

- **Canada should consider increasing its emphasis on vocational training programs.** Although wholesale adoption of the German model may prove difficult, it is notable that other countries, including the United States and the United Kingdom, are currently working to implement aspects of the German model domestically. In light of ongoing debates regarding a shortage of skilled labour in Canada and other OECD states, expanding options for vocational skills training has the potential to enhance the competitiveness of Canadian manufacturing.

- **Canada should learn from Germany's successful export promotion strategy.** Although Canadian officials have periodically offered similar support for Canadian industry, a more sustained and coordinated strategy would likely prove beneficial. In addition, Germany's network of Chambers of Commerce Abroad has been an important component in the continued success of the country's manufacturing exports, and provides a potential model for Canada. In fact, several Canadian business leaders interviewed

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for this project called for closer cooperation with government in promoting international expansion opportunities and for more skilled, business-savvy staff on the ground to broker key opportunities.

- **Canada should consider the applicability of the Fraunhofer Gesellschaft model domestically.** The United States and the United Kingdom are moving to establish equivalent networks of research and innovation centres domestically, and so too are emerging nations such as Brazil. In light of the success of the Fraunhofer Gesellschaft in Germany and the ongoing initiatives of comparator countries, Canada should seriously consider the costs and potential benefits of adopting a similar approach. Indeed, Canadian executives repeatedly highlighted the need for an overarching innovation agenda to guide Canada's investments and called for better integration and collaboration between industry, government and academia in implementing such a vision. A Canada-wide network of innovation centres could provide the vehicle required both to formulate a strategic vision and bring a complementary set of partners together to strengthen Canada's innovation ecosystem.

Learning from Sweden's Network of Life Sciences and Biotech Clusters

Among the comparative economies examined in this study, Sweden evinces considerable strength in R&D-intensive industries, most notably life sciences and biotechnology. In addition to being an OECD leader on gross R&D expenditure across its entire economy, Sweden boasts the world's highest per capita concentration of life sciences firms.

Sweden's continued success in this area is partially attributable to its long history of research and expertise development in the life sciences field, nurtured through world-class educational institutions. This history is rooted in a national culture that is highly supportive of scientific research, a high level of investment in education and, as a result, a high concentration of scientific expertise.[32] Sweden has been particularly successful in developing a competitive advantage in the area of clinical trials for pharmaceutical products. Successive Swedish governments have worked to enhance the country's advantage in the life sciences by supporting the development of biotechnology clusters. Sweden currently hosts four major biotechnology clusters: Medicon Valley, Stockholm-Uppsala Life Science, GoteborgBIO and BioTech Umea.

[32] Pablo D'Este and Janaina Costa, "BioPolis – Inventory and Analysis of National Public Policies that Stimulate Research in Biotechnology, Its Exploitation and Commercialisation by Industry in Europe in the Period 2002–2005," National Report of Sweden, March 2007, http://ec.europa.eu/research/biosociety/pdf/biopolis_sweden_en.pdf

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The Swedish (and Danish) public sector was, and continues to be, an active participant in the development of the Medicon Valley cluster, located in the Øresund Region on the Swedish-Danish border. Beginning in the early 1990s, policy-makers sought to enhance the region's existing strength in the biotechnology field, stemming from the presence of existing pharmaceutical companies as well as two universities—the University of Copenhagen and Lund University—with strong research capacities. Swedish and Danish policy-makers focused heavily on branding and public relations strategies in the development of the Medicon Valley project. A key component of the project was the creation of a cluster networking organization, the Medicon Valley Alliance, which encourages R&D within the cluster and promotes Medicon Valley internationally. As a result, it has become one of the largest biotechnology clusters in Europe, hosting more than 400 biotechnology, medical technology, and pharmaceutical companies.[33]

In addition to strategic cluster development, the Swedish government has focused on improving the domestic environment for scientific research, entrepreneurship and innovation. Historically, the Swedish government provided direct support for domestic firms through the establishment of long-term partnerships, known as development pairs, between public bodies and private firms.[34] In particular, public procurement policies have been used strategically by the Swedish government as a means of supporting investment in innovation and promoting the growth of large domestic firms.[35] More recently, shifts in international rules and broader understandings about the appropriate role of the state in promoting industrial development have, to some extent, circumscribed the ability of the Swedish state to promote investment and development through the strategic use of public procurement. It is worth noting, however, that Swedish policy-makers are re-examining this issue in the aftermath of the 2008 financial crisis. In this context, Swedish innovation agency VINNOVA has undertaken a series of pilot projects focused on public innovation procurement, including a funding program for public procurers launched in 2010–2011.[36]

[33] Tohru Noji and Yuka Omiya, "Life Sciences and Biotechnology Industry Clusters in Europe," Mizuho Industry Focus 122 (2013), www.mizuhobank.com/fin_info/industry/pdf/mif_122.pdf

[34] Sarfraz A. Mian (ed.), Science and Technology Based Regional Entrepreneurship: Global Experience in Policy and Program Development (Cheltenham: MPG Books Group, UK), http://books.google.ca/books?id=CA5AroNAcm0C&dq=%22development+pairs%22+sweden&source=gbs_navlinks_s.

[35] Ibid.

[36] "PCP Related Initiatives in Countries Around Europe," CORDIS, http://cordis.europa.eu/fp7/ict/pcp/msinitiatives_en.html

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Despite its consistently high levels of educational investment and commitment to regional cluster development, a clear national strategy for Swedish innovation did not emerge until the late 1990s.[37] Unlike many OECD countries, Sweden does not provide any form of R&D tax incentive, though the large firms that dominate the country's BERD benefit more broadly from favourable tax treatment on reinvestment. Since its establishment, Sweden's evolving innovation strategy has been particularly focused on what is known as the Swedish paradox: the fact that the country's high level of spending on R&D was not being matched by an equally high level of innovation and product commercialization.

To address this concern, the Swedish government overhauled the institutions engaged in funding and support for domestic R&D in 2001.[38] The most relevant change for Sweden's biotechnology industry was the creation of VINNOVA, an agency tasked with promoting the development of effective innovation systems and networks and fostering needs-driven research. The agency has identified health care as one of its strategically important knowledge areas. In comparative terms, VINNOVA's budget is small, with less than half the funding of comparable agencies in Finland and Austria.[39] VINNOVA has compensated for this small scale by establishing strategic partnerships with other funding agencies. In practice, VINNOVA has provided significant seed funding for high-growth and high-potential start-ups.[40] More broadly, VINNOVA splits its research funding between firms and higher education institutions, and acts as an intermediary and facilitator between these groups. Finally, VINNOVA is explicitly committed to the mission of "internationalizing" Sweden's innovation ecosystem, including identifying collaborative opportunities for Swedish researchers and their international counterparts.[41]

Sweden's excellence in life sciences research may also be linked to particular qualities within its intellectual property rights regime. Unlike other OECD countries, Sweden provides a "professors' privilege," which allows researchers working in public institutions to maintain the intellectual property rights over their discoveries. Some have argued that the professors' privilege provides an incentive for academic entrepreneurship, while others argue that it stifles

[37] D'Este and Costa, "BioPolis."
[38] Ibid.

[39] OECD Reviews of Innovation Policy: Sweden 2012 (Paris: OECD Publishing, 2013), http://books.google.ca/books?id=sTjsUDYCGzoC&dq=%22Co-operation+between+the+state,+large+industrial+firms+and+labour+unions+has+been+a+pillar+of+Sweden%E2%80%99s+development%22&source=gbs_navlinks_s.

[40] Lennart Elg and Staffan Håkansson, "Impacts of Innovation Policy: Lessons from VINNOVA's Impact Studies," VINNOVA Analysis VA 2012:01, www.vinnova.se/upload/EPiStorePDF/va-12-01.pdf

[41] "EU and International Co-operation," VINNOVA, www.vinnova.se/en/EU-and-international-co-operation/

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commercialization activity by Swedish universities and generates perverse incentives for both academics and academic institutions. For example, individual researchers may not possess the necessary knowledge to successful commercialize their discoveries, particularly if they lack sufficient institutional support. In this context, the Swedish system is highly unusual within the OECD, with Germany abandoning its own version of the professors' privilege in 2002. A recent study indicates that this policy change resulted in a shift away from individual and firm-owned patents toward university-owned patents, but did not lead to a broader shift in patenting activity.

In addition, most Swedish universities have created technology transfer offices in an effort to increase commercialization. The Swedish government has officially mandated the country's universities with a "third mission" of public engagement and knowledge diffusion.[42] In light of the strong role played by Swedish universities in the country's science and research communities, emphasis continues to be placed on developing networks and partnerships between higher education institutions, research institutes, and firms.

Lessons for Canada

- **Canada should explore the use of public procurement as a means to foster domestic innovation and growth.** Sweden's success in developing large companies, both within and outside the life sciences sector, has been tied to long-term government-business partnerships and strategic use of public procurement policy. Although international rules and norms have circumscribed the policy space of the Swedish state in this area, Sweden's innovation agencies continue to see procurement as a means of fostering investment in innovation. While Canada's ability to use such tools is limited by agreements such as NAFTA, the country should examine all available options within this context and remain aware of the strategies currently being adopted by other countries. Executives in Canadian start-ups and SMEs repeatedly mentioned that they enhanced access to public procurement opportunities could be as or more important than access to venture financing.

- **Canada should develop a cross-jurisdictional approach to leveraging the strength of its biotech clusters.** While Canada boasts its own collection of vibrant biotechnology clusters, most notably in Ontario and Quebec, the fact that Sweden hosts four thriving biotechnology clusters is impressive, given the its comparatively small economy. Canada should

[42] Mark O. Sellenthin, "Who Should Own University Research?" Swedish Institute for Growth Studies Report, June 2004, www.innovation.lv/ino2/publications/A2004_013.pdf

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consider whether it could bolster the performance of its clusters by fostering greater integration, networking, and sharing of knowledge and resources across its many disparate hubs of life sciences activity.

- **Canada should evaluate the impact of its intellectual property rights regime in the performance of the life sciences sector.** Overall, the evidence related to intellectual property policies such as Sweden's professors' privilege is insufficient to support wholesale policy change. However, Canada should undertake a more thorough inventory of the relationship between its current intellectual property rights regime and the success of domestic life sciences firms. Recently, some have argued that weak intellectual property rights protections are a barrier to firm growth in this sector, and are prompting Canadian companies to relocate activities to the United States.[43]

- **Canada should emphasize the importance of global engagement and participation in its innovation policies.** The Canadian executives interviewed often remarked that Canadian businesses were hampered by too much insularity, a preoccupation with exporting to the United States and an insufficient global orientation. In light of these concerns, and Sweden's relative success in tapping international life sciences innovation, there is some room for policy-makers to consider whether the government could do more to promote global engagement in Canada. In particular, Canada should consider how to enhance the focus on internationalization in its innovation policy mix to ensure that Canadian researchers and firms are embedded in growing transnational innovation networks.

Assessing the United Kingdom's Efforts to Instill a Renaissance in Manufacturing

As the seat of the industrial revolution, the United Kingdom has always had a strong association with manufacturing. Our analysis shows that it is home to 57 manufacturing firms recording over CAN$1 billion in revenue, in contrast to 11 firms in Canada. At 23 percent, manufacturing is also strongly represented as a percentage of the country's total population of firms in this category. More broadly, the United Kingdom ranked 7th in global manufacturing output in 2012.

Nevertheless, the relative decline of the UK manufacturing sector is also evident. Manufacturing as a share of its national output has declined precip-

[43] Robert Atkinson and Michelle Wein, "Canada Must Protect Intellectual Property," Ottawa Citizen, January 6, 2014, www.ottawacitizen.com/business/Canada+must+protect+intellectual+property/9355861/story.html

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itously since the 1970s. In 1970, Britain ranked 15th globally in its share of manufacturing as a percentage of total economic output. By 2011, the country's ranking had dropped to 108th, reflecting a broader economic transition toward the services sector. As such, while the country's gross manufacturing output remained relatively constant over this period, the sector's share of the total economy has declined significantly.[44]

In light of the country's deep historical ties to manufacturing and the ongoing importance of the sector to aggregate employment, UK policy-makers have undertaken a series of initiatives intended to reverse the sector's decline. Debate about the future of UK manufacturing grew in salience following the 2008 global financial crisis, which raised concern about its growing dependence on the services sector and, particularly, on financial services. Since 2010, the UK government has committed to "rebalancing" the economy through an increased emphasis on manufacturing.[45] In his 2011 budget speech, UK Chancellor George Osborne called for a "march of the makers" to reinvigorate the sector and the UK economy as a whole.

The UK government has undertaken a number of policy measures to facilitate this economic rebalancing. Three parts of the recently introduced plan are particularly notable: funding to establish research centres, promoting export goods, and investing in youth and skills development.

First, the government has committed significant funding to establish a series of technology and innovation centres. Of particular interest is the establishment of the High Value Manufacturing Catapult, intended to act as hub to "help accelerate new concepts to commercial reality to create a sustainable high value manufacturing future."[46] Proponents of the centre highlight its role as one that "ties all of the members of the UK supply chain together—from the global original equipment manufacturers..., prime contractors...and tier-one suppliers providing both expertise and investment, through tier- two, three and four suppliers, to academia."[47] The Catapult incorporates a number of centres focused variously on manufacturing technology, advanced man-

[44] Chris Rhodes, "International Comparisons of Manufacturing Output – Commons Library Standard Note," UK Parliament Standard Note No. SN05809, January 24, 2014, www.parliament.uk/briefing-papers/SN05809/international-comparisons-of-manufacturing-output

[45] Janan Ganesh, "The Death and Life of Britain's Market Economy," Financial Times, January 24, 2014, www.ft.com/intl/cms/s/0/d45ed5c6-842b-11e3-b72e-00144feab7de.html?siteedition=intl#axzz2tJULisU8

[46] "HVM Catapult Business Plan Summary, 2013–2014," High Value Manufacturing Catapult, https://hvm.catapult.org.uk/documents/2157642/8460628/HVMC+Business+Plan+Summary+2013+%281%29.pdf/625930a9-ce5d-43dc-809c-1ae1d46a3a9e

[47] Matthew Staff, "Driving Growth with Manufacturing Innovation: Part One," Manufacturing Digital, December 12, 2013, www.manufacturingdigital.com/innovators/driving-growth-with-manufacturing-innovation-part-one

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ufacturing research, advanced forming research, and composites.[48] As of October 2013, it had invested £350 million, engaged with 771 businesses on various programs and collaborated with clients on more than 700 projects.[49] Following both the German and UK models, the United States has also begun to embrace manufacturing-innovation centres based on a public-private partnership model.[50]

The UK government has also pledged to prioritize the export promotion of manufactured goods at the highest levels. For example, the UK's Export Working Capital Scheme provides partial guarantees to facilitate export transactions, particularly for SMEs.[51] The government also provides a bond support scheme and a foreign exchange credit support scheme.[52]

Finally, the government's manufacturing strategy provides a new focus on youth and skills development. The 2010 Dyson Report on UK manufacturing highlights cultural barriers to the sector's success, noting a need to foster broader cultural esteem for science, engineering, and manufacturing. To counteract negative perceptions of the sector among the country's youth, the government has introduced a See Inside Manufacturing policy, which aims to transform students' perception of manufacturing in strategic sectors by granting them access to manufacturing firms. In addition to attempting to foster a cultural shift, the government has increased its emphasis on vocational training, although the program has recently encountered some barriers to implementation.[53] The government has also increased investment in apprenticeship programs.

[48] The centres at Catapult include: the Advanced Forming Research Centre, the Advanced Manufacturing Research Centre, the Centre for Process Innovation, the Manufacturing Technology Centre, the National Composites Centre, the Nuclear Advanced Manufacturing Centre, and the WMG Centre. See: https://hvm.catapult.org.uk/home

[49] Dick Elsy, "High Value Manufacturing Catapult: Experience from the First Launched Catapult," Inside Government, October 2013, www.insidegovernment.co.uk/new-upload/dickelsy.pdf

[50] "President Obama Announces Two New Public-Private Manufacturing Innovation Institutes and Launches the First of Four New Manufacturing Innovation Institute Competitions," White House press release, February 25, 2014, www.whitehouse.gov/the-press-office/2014/02/25/president-obama-announces-two-new-public-private-manufacturing-innovatio.

[51] "Quick Guide for Exporters to the Export Working Capital Scheme," UK Export Finance, March 2013, www.gov.uk/government/uploads/system/uploads/attachment_data/file/210639/quick-guide-to-ewcs.pdf

[52] "Trade and Investment White Paper: New Support for Exporters from ECGD," UK Export Finance, February 9, 2011, www.gov.uk/government/news/trade-and-investment-white-paper-new-support-for-exporters-from-ecgd

[53] Paton, "Ministers Could Block."

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As yet, it is too early to judge the overall success of the UK manufacturing strategy. However, indicators appear increasingly positive. The UK automotive industry saw sales growth of 10.8 percent in 2013, though overall growth in manufacturing exports has been less robust than some policy-makers had hoped. The manufacturing sector as a whole has experienced strong growth,[54] although the trend slowed slightly in January 2014.[55] Overall, the UK manufacturing industry appears to have weathered, with a relatively high degree of success, the negative impacts of the recession, which has weakened other sectors of the UK economy. Future prospects for UK manufacturing remain generally optimistic.[56]

Lessons for Canada

- **Canada should consider its strategic vulnerability in relying heavily on the energy sector to promote growth, just as the United Kingdom is evaluating its dependence on financial services.** Both the quantitative data and qualitative interviews reinforced the absolutely vital role that Canada's energy sector has played in the past decade in generating jobs and growth, both within the sector itself and within complementary sectors such as engineering, construction, and transportation. In that strength, however, lies a potential vulnerability if, for any combination of reasons (e.g., international climate change policies, US energy independence, lack of domestic support for pipeline construction, etc.), the energy sector fails to perform at the level that it has over the past decade. Of course, Canada is not solely dependent on the energy sector, but neither is the United Kingdom solely dependent on financial services. Nevertheless, it has recognized that overreliance on financial services poses a risk and has appropriately set out to diversify or "rebalance" its economic base. Canada would do well to undertake a similar rebalancing exercise.

[54] "UK Manufacturing Growth Remains Strong," BBC News, January 2, 2014, *www.bbc.co.uk/news/business-25575511*

[55] "UK Manufacturing Growth Eases in January but New Orders Surge – PMI," Reuters, February 3, 2014. *http://uk.reuters.com/article/2014/02/03/uk-pmi-idUKBREA120EB20140203*

[56] "From Crisis to Growth – UK Manufacturing Outsmarts the Recession," PWC, 2012, *www.pwc.co.uk/manufacturing/publications/from-crisis-to-growth-uk-manufacturing-outsmarts-the-recession.jhtml*

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- **Canada needs to boost its policy focus on manufacturing or risk falling further behind.** While the manufacturing sector as a whole is being radically reshaped by technology and globalization, there is sense among Canadian executives in the sector that there are definite niches within which Canada continue to be very competitive. But as recognized by governments in other mature economies, there is a need for leadership in providing the essential ingredients for manufacturing success. The primary lesson to take from the United Kingdom is the degree to which strategic policy initiatives to improve the competitiveness of domestic manufacturing are being created and implemented. In this context, Canadian firms may increasingly find themselves at a competitive disadvantage relative to firms in other jurisdictions.

- **Canada could do more to prepare young people for a future in advanced manufacturing.** One the of critical ingredients for success in manufacturing is a highly skilled pool of young people who can be leaders the advanced manufacturing systems of the future. Canadian business executives worry that young people in Canada lack sufficient inspiration to pursue these opportunities and called for more mentors to instill a passion for innovation in manufacturing. The United Kingdom is tackling the problem head on, with a concerted effort to build interest in the sector, enhance skills development, and expose young people to the opportunities in advanced manufacturing—an example which Canada should follow.

Understanding US Success in Sustaining Global Technological Leadership

Our analysis of billion-dollar firms in the United States yields an interesting comparative finding, insofar as that country has a far larger proportion of technology firms represented in the sample of billion-dollar firms than any of the comparable jurisdictions. This competitive advantage in the development of large technology firms is nurtured by: an abundance of world-class universities (e.g., Stanford and MIT) that excel in technology and regularly spin-off successful ventures; numerous clusters in urban centres such as Austin, Boston, New York, and San Francisco, which provide ready access to venture financing and high-quality business services; and a robust public support system for R&D activity across both SMEs and larger firms.

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US entrepreneurial universities—particularly Stanford and MIT—play a crucial role in the country's innovation ecosystem. Over the past two decades, these institutions and others have focused heavily on generating and supporting technology entrepreneurship. The Martin Trust Center for MIT Entrepreneurship, for example, focuses on entrepreneurship education, support for student entrepreneurship and innovation, and commercialization. MIT's ongoing success in these areas is now well established. A recent study concluded that, at the end of 2006, MIT alumni had established approximately 25,800 active companies, with the majority of company revenues coming from technology firms.[57] More broadly, studies of US entrepreneurial universities highlight their important role in generating spin-off companies, providing highly trained graduates for both regional clusters and national labour markets, and developing, patenting, and licensing knowledge.[58]

On the cluster development side, Stanford has played a key role in the development of Silicon Valley, the world's largest concentration of technology companies.[59] Their collective rise to prominence in this area is partly the result of a long history of university-private sector collaboration and a focus on multidisciplinary research. The growing concentration of industrial and research capacity in the region paved the way for important innovations, particularly the creation of the Apple I personal computer. As Chistophe Lécuyer notes, this development was "made possible by practices, skills, and competencies that had accumulated in the [Silicon Valley] area for more than 40 years. Critical for [Steve] Jobs' and [Steve] Wozniak's success was their access to networks of engineers, entrepreneurs, and financiers in Silicon Valley."[60] Innovation and growth in the region has produced a snowball effect, multiplying the cluster's status and success in the technology sector. The cluster's dynamism continues to attract technology specialists and entrepreneurs, and approximately 350,000 Canadians currently reside in the area.

The US federal government supports technological innovation through tax incentives as well as direct funding. A 2013 OECD policy brief indicates that the United States was ranked third among comparative economies in terms

[57] "New Survey Measures MIT's Economic Impact," MIT Sloan School of Management Newsroom, December 1, 2011, http://mitsloan.mit.edu/newsroom/2011-economic_impact_alumni.php

[58] Alison Bramwell, Nicola Hepburn and David A. Wolfe, "Growing Innovation Ecosystems: University-Industry Knowledge Transfer and Retional Economic Development in Canada," Munk School of Global Affairs Knowledge Synthesis Paper, May 15, 2012, www.utoronto.ca/progris/presentations/pdfdoc/2012/Growing%20Innovation%20Ecosystems15MY12.pdf

[59] Henry Etzkowitz, MIT and the Rise of Entrepreneurial Science (London: Routledge, 2003) http://books.google.ca/books?id=dRCCAgAAQBAJ&source=gbs_navlinks_s.

[60] Christophe Lécuyer, Making Silicon Valley: Innovation and Growth of High Technology (Cambridge, MA: MIT Press, 2007), 1.

of direct funding of R&D as a percentage of GDP in 2011.[61] The direct funding of R&D activities made up a significantly larger proportion of their total R&D funding, at roughly 0.26 percent of GDP, as compared to 0.06 percent for indirect tax incentives. To put this in perspective, Canada provided only 0.04 percent of GDP in the form of direct funding, and 0.21 percent as tax incentives during the same time period.

The US federal government also supports small technological start-ups through the US Small Business Administration (SBA). Through the SBA, the federal government runs the Small Business Innovation Research Program (SBIR), where small firms are provided with funding to engage in federal R&D with the potential of commercialization. Each year, federal agencies with extramural benefits exceeding US$100 million are required to allocate 2.8 percent of their R&D budget to this program.

Three phases of funding are provided, with each subsequent phase dependent on the fulfillment of benchmark achievements. The program has funded US$21 billion in research, where 15,000 firms have been granted awards. In 2010, 55 percent of phase I recipients received phase II funding.

In addition to SBIR, the Small Business Technology Transfer (SBTT) program facilitates the commercialization of theoretical research by funding collaborative industry/research partnerships. Federal agencies with extramural R&D budgets over US$1 billion are required to set aside 0.3 percent of their R&D budgets for SBTT funding. The program is designed to facilitate the transfer of research between the two sectors, and in so doing, move technology development from the theoretical stage into the realm of practical application and commercialization. Five agencies are involved in this process, including the Department of Defense, the Department of Energy, and the National Science Foundation. For both the SBTT and SBIR programs, firms must have less than 500 employees to qualify. Approximately US$2.4 billion is invested in the SBIR/SBTT programs each year across all industries.

The impact of such funding programs is significant. For example, the Defense Advanced Research Projects Agency (DARPA), administered by the Department of Defense, receives over US$2.8 billion in funding toward the development of new technologies, with an estimated 43 percent of the funds received being directed toward advanced technology development. DARPA research has contributed to the development of key, foundational technologies that have underpinned the success of US technology giants such as Microsoft, Google, and Apple. The commercialized products and services that

[61] "Maximizing the benefits of R&D tax incentives for innovation," OECD. 2013.

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have been transferred into private hands via DARPA include Apple's Siri speech recognition application, mapping applications now popularized by Google, and the applications underpinning the initial Microsoft Windows program.

While SBIR and SBTT provide a broad source of funding for firms of all sizes and risk profiles, DARPA pursues R&D projects with a "high risk, high reward" strategy. It is believed that between 85 percent and 90 percent of its projects fail to meet their full objectives.

Lessons for Canada

- **Canada should re-evaluate the size and design of its current R&D incentives.** In particular, Canada should consider adjusting the policy mix to provide greater direct support for R&D activities. While it is unlikely that Canada can replicate the sophistication and funding levels of US government agencies such as DARPA, it could examine how other government policies, particularly public procurement, can encourage innovation.

- **Canada needs to better exploit the commercial potential of research conducted in leading universities.** While a focus on the commercialization of basic research sometimes creates public and political tensions, Canada's technology ecosystem would be more robust if a greater number of our research-intensive universities had the entrepreneurial development capabilities of MIT, Stanford, or the University of Waterloo. Of course, universities should continue to be centres for conducting research free from commercial motivations or corporate influences, but there is nothing contradictory in working harder to foster an entrepreneurial spirit on university campuses, to celebrate the cultivation of companies that can bring innovative research to market and to encourage the ongoing development of commercialization pathways for both students and academic researchers.

- **Canada could do a better job of ensuring that Canadian SMEs have opportunities to tap into university research networks.** Innovative models of industry-academic partnerships should be entertained as a means of stimulating the development and sustainable growth of Canadian technology companies, notably those in the SME segment. The executives at Canadian start-ups and SMEs who expressed frustration at trying to navigate the maze of government support programs are equally baffled by the lack of a clear and effective entry point for accessing the research capabilities of leading Canadian universities. The lack of entry points and clear pathways for knowledge exchange result in many lost opportunities

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for potential synergy and economic value creation. Potential means for facilitating these connections include short-term secondments of academic researchers to private-industry projects and an active government role in brokering networks among academic and industry stakeholders.

Concluding Observations and Recommendations

The country case studies and the review of associated policies and support programs reveal an incredible diversity of initiatives that are being undertaken to facilitate entrepreneurship, growth, and job creation in comparable jurisdictions. While Canada has its own roster of federal and provincial economic development initiatives, it is clear from the comparative review that there are many things that competitors are doing well, and numerous areas where Canada could clearly improve. Significantly, we have identified policies and programs in comparator countries that mirror the kinds of support requests frequently made by Canadian executives in our qualitative survey.

Some of the themes worth emphasizing from the analysis include:

- The desire for greater economic leadership in setting an innovation agenda for Canada and mobilizing stakeholders behind that vision—something that United Kingdom has undertaken in the aftermath of the 2008 financial crisis in response to its perceived economic dependence on financial services.

- The need for a coordinated strategy and more focused support for industry clusters and innovation centres across a variety of sectors that could be modeled after the Swedish biotech clusters and the Fraunhofer Gesellschaft in Germany.

- The importance of nurturing global engagement by encouraging Canadian researchers and firms to pursue aggressive internationalization and to participate in international innovation networks.

- The need for more robust export development support in line with the efforts undertaken by German agencies, including the greater integration of efforts across agencies and jurisdictions in Canada, and greater collaboration with industry.

- The desire for improved support to gain access to sophisticated management talent, something that Australia is currently doing with its matching grants that help young firms recruit experienced executive talent.

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- The importance of evaluating Canada's approach to intellectual property protection. Both Australia and the United Kingdom have implemented new programs that merit attention.

- The need for a more dynamic entrepreneurial environment in Canada's leading research universities and clearer pathways for SMEs to participate in university research networks, following the examples set by leading US institutions such as MIT and Stanford.

- The importance of inspiring young people to pursue careers in advanced manufacturing following the UK lead, and the need for new approaches to vocational training in order to help Canadian manufacturers succeed in a more competitive global environment.

No single jurisdiction can be good at everything, but among the five jurisdictions chosen for this comparative analysis with Canada, there are a number of policies that correspond directly to the needs identified, which therefore merit further investigation. Casting a wider net to study a larger sample of European countries and a selection of Asian and Latin American countries would no doubt yield an even more diverse set of policies tools for strengthening growth and innovation in Canada.

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Part VI. Conclusions, Recommendations, and an Agenda for Future Research

How does the Canadian economy perform in the creation of billion-dollar firms? Does firm size make a significant difference in shaping the performance of the Canadian economy? What are the key drivers of growth among Canada's largest firms? And what can the Canadian government do to bolster the ability of small, mid-tier and large firms to achieve success in the global economy?

This report has sought to answer these questions with a five-part analysis of the growth and evolution of Canada's largest firms and a comparative quantitative and qualitative analysis of the policy environment and growth dynamics in comparative jurisdictions, including Australia, Germany, Sweden, the United Kingdom, and the United States. In this conclusion, we summarize our findings as they relate to the four key questions posed. We also summarize the many recommendations for policy-makers identified throughout the report. Finally, we spell out a number of unanswered questions that have been raised in the process of researching this report—questions that we think frame a worthy agenda for further research.

Canada's Performance in the Creation of Billion-Dollar Firms

On the question of performance, Part I of this report demonstrates that on a comparable basis (both population and economy), Canada has developed an aggregate population of billion-dollar firms that compares favourably to those found in the other five economies. While adding 23 firms on aggregate, churn and transactions amongst billion-dollar firms actually saw 68 new entrants added to the list. In particular, Canada has excelled in developing large resource firms over the past decade, notably in the energy sector—a development that should not surprise, given the confluence of growing global demand and Canada's abundant natural resource endowments. The consumer retail, engineering and construction, and transportation sectors have also seen their respective cohort of billion-dollar firms grow significantly. On the other hand, the manufacturing sector has seen its population of mega-large firms and related employment shrink significantly, while knowledge-intensive sectors of the economy such as health care and technology have seen no change in the number of billion-dollar firms over the past decade.

While the sector-by-sector analysis yields a mixed performance, what is perhaps more interesting is the finding that, on aggregate, Canada relies far more on sub-billion-dollar firms in the overall share of revenues produced than do the other economies included in this study, save Australia. For example, we find the Canadian manufacturing sector is significantly more reliant on sub-billion-dollar firms—nearly four times more so than the comparative average. In consumer retail, Canada is double the comparative average with the exception, once again, of Australia, which is more reliant on smaller firms than Canada. Given the trends toward size elsewhere, this begs

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an important question about whether Canada's comparative performance reflects the presence of either structural or strategic inhibitors to growth. Moreover, while a reliance on smaller firms is by no means negative—it could, for example, indicate that smaller Canadian firms have simply been good at identifying profitable niches in their sectors—it could also infer weakness in their capacity to achieve global reach. These factors require further research.

The Impact of Firm Size on Economic Performance

On the question of whether firm size makes a significant difference in shaping the performance of the Canadian economy, several insights emerge. First, employment growth in both billion-dollar resources and manufacturing firms are found to be significantly higher than the averages found across the respective industries, indicating that scale is an important factor in sector competitiveness and in job creation. Conversely, among technology firms, we find the opposite: large Canadian technology firms have recorded far less employment growth than the aggregate sector. While this is explained, in part, due to churn within the ranks of billion-dollar firms in the sector, it also speaks to a high reliance on international revenues (and hence the need to establish significant foreign operations), and greater reliance on SMEs and start-ups in this sector of the economy.

The Key Drivers of Growth for Canadian Firms

The answer to key drivers of growth differs according to firm size. For the billion-dollar firms and several of the mid-tier firms, it is clear that high-growth leaders in Canada increasingly view themselves as global enterprises with significant overseas operations. Reflecting this increasingly international orientation, Canadian business leaders consistently talked about striving to be the number one or two global provider in their industry sector. Staying globally competitive, for this cohort of executives, means investing in technology, reaching new levels of efficiency, aggressively acquiring high-potential companies, participating in emerging market growth, and getting access to the best talent, wherever it may be found in the world. Indeed, the most consistent factor driving growth of Canada's largest firms was their success in acquiring firms that helped expand their business offerings, and/or gave them a presence in key growth markets.

Among the young Canadian firms seeking to achieve billion-dollar status, there is a general sense of optimism that exciting growth opportunities are within reach. Their optimism is fuelled by their ability to identify niche markets where they feel confident they can offer world-class products and services. They share an intensely global outlook and feel strongly about the importance of internationalizing their firms. Most do not feel constrained by access to finance, but they do feel constrained by a lack of access to sophis-

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ticated management talent. A key success factor going forward will be their ability to attract the talent required to exploit the niche opportunities they have identified and expand them both geographically and across verticals.

Policy Recommendations for Achieving Success in the Global Economy

Our research on billion-dollar firms has generated a lengthy list of recommendations. We summarize 10 such recommendations here. These recommendations are influenced by three factors: our reflections on what we observed in the quantitative and qualitative research for this study; specific calls for assistance and support from Canadian executives leading small, mid-tier and large firms across the country; and finally, our comparative review of growth and innovation policies, including the specialized incentives that jurisdictions are deploying to boost growth in targeted sectors. All considered, the breadth of potential mechanisms that Canada could leverage to amplify growth and innovation suggests there is ample opportunity for greater policy experimentation.

There are two caveats to the summary below. First, we have not restated all of the recommendations from the report; it is worth referring back to Parts II, IV and V for a more comprehensive list of recommendations. Second, we are unable to provide a thorough account of the either the effectiveness of the various policy measures we have identified, or their appropriateness in the Canadian context. We have flagged particular measures that we believe merit further analysis.

1. **Evaluate opportunities to provide stronger economic leadership and focused industry support.** Strong sector-specific support programs are evident across all of the comparator nations studied. While policy-makers may eschew sector-specific incentives, the country case studies in Part IV provide valuable direction about how such programs can foster growth and long-term competitiveness in desirable industries. Many Canadian executives interviewed for this report suggested that Canada lacks an overarching innovation agenda and would benefit from more concentrated efforts to build industry specific clusters in areas where Canada can be competitive on the global stage.

2. **Foster industry-academic partnerships.** As demonstrated by leading US institutions such as MIT and Stanford, entrepreneurial, research-driven universities can act as vital hubs for launching successful ventures. Commercialization pathways between industry and academia are underdeveloped in Canada and need to improve in order to enable long-term growth. Moreover, it is essential that these pathways are accessible to SMEs. Short-term secondments of academic researchers to private

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industry projects and more active government participation in networking of academic and industry stakeholders could help catalyze the growth of SMEs by enhancing their access to path breaking research.

3. **Consider the potential for a nation-wide network of collaborative research and innovation centres.** In light of the success of the Fraunhofer Gesellschaft in Germany and ongoing copycat initiatives in the United Kingdom, Brazil, and the United States, Canada should seriously consider the costs and potential benefits of adopting a similar approach to advanced manufacturing and other industry-specific research and innovation clusters. A Canada-wide network of innovation centres could provide the vehicle required both to formulate a strategic vision and bring a complementary set of partners together to strengthen Canada's innovation ecosystem. Canada could also bolster the performance of its clusters by fostering greater integration, networking, and sharing of knowledge and resources across disparate hubs in specific sectors such as technology, manufacturing, and life sciences.

4. **Re-evaluate Canada's R&D incentives and intellectual property rights regime.** Very few large firms see Canada's SRED program as a major incentive for investment, and virtually all firms describe the program as costly and bureaucratic. As an alternative, some executives called for accelerated capital cost allowances to support their investments in technology. But the general sentiment was that government should go back to the drawing board and think about better ways to facilitate innovation in Canada. Another alternative could be to look to Australia's Innovation Patent, which provides a fast and relatively cheap avenue to patent protection, and the UK patent box initiative. Both offer models worthy of study, insofar as they provide stronger and more expedient incentives to translate research into marketable products and services.

5. **Provide integrated export promotion.** Germany's successful export promotion strategy integrates all levels of government and non-government actors into a coordinated international approach. This strategy, particularly the role of Germany's network of Chambers of Commerce Abroad, has been an important component in the continued success of the country's manufacturing exports, and provides a potential model for Canada to emulate. In fact, several Canadian business leaders interviewed for this project called for closer cooperation with government in promoting international expansion opportunities and for more skilled, business-savvy staff on the ground to broker key opportunities. Small firms also called for greater inclusion in international trade missions as way to help kick-start their international growth.

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Part VI. Conclusions, Recommendations, and an Agenda for Future Research

6. **Reduce trade and regulatory barriers for Canadian firms operating abroad.** As Canadian business leaders strive to survive in an increasingly competitive global environment, many argue that their foreign competitors have a much easier time operating in Canada than they do when operating internationally. Mega-large firms would like greater assistance in creating what they describe as a level playing field with their international competitors. In particular, they would like government to continue to prioritize free trade deals and they are seeking more vigorous assistance in eliminating the regulatory barriers and restrictions that hamper their access to or success in emerging markets.

7. **Rethink how Canada prepares young people for the economy of the future.** One of the critical ingredients for success in any economy is a highly skilled pool of young people who can be leaders in the industries of the future. There are several facets to this problem and many potential solutions. Some champion the need for educators to encourage young Canadians to think globally and entrepreneurially by using foreign exchange programs and overseas work placements as a means to foster a global outlook and to provide young Canadians with more international experience. Others suggest greater emphasis on vocational training programs in Canada using the German system as a model, as the United States and the United Kingdom are doing.

8. **Facilitate access to experienced management talent.** There is a widely shared perception that Canada's pool of seasoned management executives is very small and in high demand, which presents a significant challenge for fast growing small firms searching for the talent required to execute their growth strategies. Targeted immigration policies could help attract the "go-to-market" talent that start-ups desperately need. Another suggestion is to provide short-term "experienced executives" grants to provide high-growth start-ups with funds to compete for high-end executive talent. Australia's experienced executives grants may serve as a model for such a program.

9. **Assist early-stage companies in securing anchor customers, particularly through public procurement.** More than access to finance, executives at numerous firms talked about the importance of anchor customers and suggested that both the government and Canada's business community could be more supportive of Canadian SMEs. Sweden's policy of "development pairs" between public and private bodies demonstrates a viable model for the use of public procurement as a means to facilitate the development and application of new domestic products and services and is worthy of additional study. While Canada's ability to use such tools is limited by agreements such as NAFTA, policy-makers should examine

all available options within this context and remain aware of the strategies currently being adopted by other countries.

10. **Reduce the fragmentation of government support functions and increase business input.** While small firms in Canada have welcomed the support they receive from various levels of government, many have noted that it takes considerable time and resources to identify sources of support and to navigate application processes. Several entrepreneurs called for a cross-jurisdictional interface to government for small businesses and for streamlined processes that soak up fewer resources. Executives at larger firms also called for reduced institutional fragmentation, less bureaucracy, and a better two-way dialogue with business—and not just through the usual task forces and round tables. It would be better, it was suggested,
if there was one central hub for ongoing business support, policy development, and business engagement.

An Agenda for Future Research

Throughout the process of conducting the research on billion-dollar firms, we have repeatedly surfaced new questions that merit further investigation. The questions posed below are beyond the scope of this study, but additional research on any one or some combination of the eight themes identified below would enhance and complement the findings of this report.

- **Industry dynamics and growth.** While our analysis highlights a positive growth story for Canada's population of billion-dollar firms—especially with respect to resource, retail, and engineering and construction firms—we have several unanswered questions about Canada's industry dynamics and growth profile. Is the absence of a significant number of new billion-dollar entrants outside of the resource, retail, and construction sectors evidence of a general pattern of economic stagnation outside of these sectors? Is there a longer-term economic risk inherent in the fact that so much of the growth of the Canadian economy is linked, directly and indirectly, to Canada's energy sector? Or is there sufficient evidence to suggest that the growing clusters of sub-billion-dollar life sciences and technology firms will strengthen Canada's economic diversity and growth in the decades to come?

- **Market structure.** Many Canadian executives remarked on the fact that the domestic market in Canada is small and geographically fragmented, making it harder to generate mega-large revenues without aggressive international expansion. While the high-growth firms in our sample have consistently pursued a strategy of internationalization, does the size of the domestic market in Canada make it harder to catalyze the creation of

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large, globally competitive firms in certain sectors? Do small and mid-tier firms in manufacturing, technology, and life sciences lack other critical ingredients, such as access to capital or talent required to grow into substantial global players? Moreover, are vital sectors encumbered by a small number of entrenched market leaders with an insufficient amount of competition and/or market disruption to spur ongoing investment in innovation and productivity-enhancing technologies?

- **Acquisitions.** Our research demonstrates the enormously important role of acquisitions in fuelling growth and enabling international expansion. For Canada's most successful firms it is often a matter of "acquire or be acquired." But are there downsides to industry consolidation and acquisitions? Have foreign acquisitions of promising firms limited the pool of Canadian companies with the potential to compete on the world stage? And, in particular, have acquisitions played a role in the comparatively poor performance in producing large manufacturing firms?

- **Internationalization and Canadian employment.** The data reveals that a variety of sectors showcase strong Canadian employment growth over the past decade. But decreases in employment amongst the majority of goods-producing manufacturing and food production firms in the sample highlight potential concerns regarding the evolution of labour demand in Canada. For example, will rapid technological advances and growing competitive pressures to increase efficiencies dampen demand for labour in Canada? And how will the growing internationalization of Canadian firms impact the domestic employment picture? While the internationalization of Canadian firms is generally viewed as a significant net positive to the Canadian economy, data collected for this report underscores large differentials between non-Canadian and Canadian employment growth in sectors that are highly dependent on international revenues. There is no doubt that Canadian firms must go global to grow. However, what are the consequences for Canada if firms move operations, and potentially headquarters, closer to large sources of demand? Which segments of the labour market are positioned to benefit from these trends, and which segments might lose out?

- **R&D and innovation.** The data reveals that Canada underperforms in R&D spending, and Canadian executives were not especially fond of Canada's R&D incentives. What impact is this having on our overall economic performance? Do we have an accurate picture of R&D spending in Canada, given that the data used to calculate BERD spending is influenced by non-reporting of R&D expenditures and/or the aggregation of R&D expenditures into other non-operational budgets? If the portrayal is indeed accurate, has Canada's underperformance in R&D undermined our perfor-

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mance in the creation of large knowledge-intensive firms? Are Canada's lower rates of productivity and weak performance on BERD a driving force in limiting innovation and dampening global competitiveness?

- **Canadian risk aversion and entrepreneurialism.** Given repeated suggestions that Canadian firms are risk averse and lack the entrepreneurial hunger found in firms south of the border, we wonder to what degree these perceptions are based on a genuine empirical reality? Are there really shared cultural traits in Canada—like politeness, humbleness, and non-assertiveness—that undermine our economic performance?

- **Global engagement.** Similarly, we have repeatedly heard assertions that Canadian firms are insufficiently globally engaged and too insular. We have also heard that Canadian management talent is less globally experienced and therefore less capable of leading Canadian firms to success in a globalizing economy. Are these assertions supported by data? If so, what could be done to correct these deficiencies? Should we be fostering entrepreneurialism at an early age and encouraging young people seek out global experience, as some executives have suggested? At the same time, are Canadian executives correct in asserting that Canadian firms operate under more demanding rules and regulations than their foreign competitors?

- **The Canadian brand.** Despite some success in generating a collection of billion-dollar firms that are active in international markets, this success has not translated into the creation of a significant pool of globally recognized firms. Rather, according to Interbrand, only one Canadian consumer company, BlackBerry, ranked among the top 100 global brands in 2012, and its recent struggles have seen it drop to the bottom of the list. Consulting firm Millward Brown's ranking of North American brands shows no Canadian companies in the top 10. Another Millward Brown review of the fastest growing brands shows a similar dearth of Canadian presence, and a 2010 report by Credit Suisse on the 27 "brands of tomorrow" also lists no Canadian companies. While Canada's relative weakness in the production of globally recognized firms is tangential to the core research questions posed here, its congruency with our findings on the sectoral composition of Canada's population of billion-dollar firms gives us cause to interrogate potential reasons for this weakness. Why are there so few globally recognizable companies and billion-dollar consumer brands made in Canada? Is this a failure of marketing, or simply a reflection of the particular sectors that Canada excels in? Like all of the questions raised above, these conundrums merit further investigation.

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Part VI. Conclusions, Recommendations, and an Agenda for Future Research

As the breadth of the agenda above illustrates, the research conducted for this report is far from exhaustive. Much more work remains to be done to achieve a complete understanding on the factors shaping the performance of Canada's largest, high-growth firms and the Canadian economy as a whole. Nevertheless, this report serves as a useful starting point and our recommendations should stimulate a vigorous debate over how Canada could improve its efforts to facilitate innovation, job creation, and growth.

Appendix I: 2012 Billion-Dollar Firms by Sector

37 - Oil and Gas Related (Production, Pipelines, Service)

Suncor Energy AB	38,788,000
Imperial Oil AB	31,189,000
Enbridge Inc. AB	25,617,000
Husky Energy AB	23,358,000
Cenovus Energy AB	17,756,000
Canadian Natural Resources AB	16,236,000
TransCanadaPipelines AB	8,349,000
Talisman Energy AB	7,312,000
Harvest Operations AB *	5,946,900
Encana Corp. AB	5,267,000
Gibson Energy AB *	4,935,944
Canadian Oil Sands AB *	3,930,000
Pacific RubialesEnergy ON *	3,885,339
Penn West Petroleum AB	3,850,000
Pembina PipelineCorp. AB *	3,461,455
Westcoast Energy AB *	3,378,000
Keyera Corp. AB *	2,954,542
Crescent Point Energy Trust AB *	2,805,451
Trican Well Service AB *	2,215,612
Ensign EnergyServices AB	2,197,825
Precision Drilling AB	2,043,432
Calfrac WellServices AB *	1,602,674
Pengrowth Energy AB *	1,526,748
AltaGas Ltd. AB *	1,516,857
ShawCor Ltd. ON *	1,507,177
Enerflex AB *	1,505,568
ARC Resources AB *	1,475,900
Enerplus Corp. AB *	1,474,741
Baytex Energy AB *	1,458,322
InterOil Corp. TX *#	1,320,747
Petrominerales Ltd. AB *	1,215,700
Inter Pipeline Fund AB *	1,187,023
PetroBakken Energy AB *	1,132,826
MEG Energy AB *	1,121,184
Vermilion Energy AB *	1,076,117
Secure Energy Services AB *	1,029,440
North American Energy Partners AB *	1,006,545

* DENOTES NEW ENTRANT RELATIVE TO 2003 POPULATION
# DENOTES REGISTERED IN CANADA DESPITE FOREIGN HEADQUARTERS

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Appendix I: 2012 Billion-Dollar Firms by Sector

22 - Financial Services (Banking, Insurance, Management)

Royal Bank of Canada ON	34,505,000
Power Corp. of Canada QC	33,027,000
Power Financial QC	32,546,000
Toronto-Dominion Bank ON	30,334,000
Great-West Lifeco MB	30,115,000
Manulife Financial ON	30,038,000
Onex Corp. ON	27,511,000
Bank of Nova Scotia ON	26,852,000
Bank of Montreal ON	20,967,000
Brookfield Asset Management ON	19,940,000
Sun Life Financial ON	18,012,000
Canadian Imperial Bank of Commerce ON	17,130,000
Fairfax Financial Holdings ON	8,022,800
Industrial Alliance Insurance QC	7,481,000
National Bank of Canada QC	7,102,000
Intact Financial ON *	7,096,000
E-L Financial Corp. ON	2,867,859
IGM Financial MB	2,577,507
Aimia QC *	2,264,876
Co-operators General Insurance ON	2,244,241
CI Financial ON	1,457,742
Laurentian Bank of Canada QC *	1,440,979

* DENOTES NEW ENTRANT RELATIVE TO 2003 POPULATION

17- Consumer Retail and Wholesale

Loblaw Co. ON	31,710,000
Alimentation Couche-Tard QC	23,020,300
Empire Co. NS	16,329,500
Metro Inc. QC	12,085,600
Canadian Tire Corp. ON	11,189,800
Shoppers Drug Mart ON	10,781,848
Rona Inc. QC	4,919,441
Parkland Fuel AB *	4,127,739
Tim Hortons ON	3,138,511
Jean Coutu Group QC	2,740,800

* DENOTES NEW ENTRANT RELATIVE TO 2003 POPULATION

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Appendix I: 2012 Billion-Dollar Firms by Sector

17- Consumer Retail and Wholesale *(CONTINUED)*

Dollarama Inc. QC *	1,858,818
Uni-Select Inc. QC *	1,821,479
North West Co. MB *	1,517,742
Toromont Industries ON *	1,511,147
Wajax Corp. ON *	1,466,014
AutoCanada Inc. AB *	1,105,861
Reitmans QC *	1,006,137

* DENOTES NEW ENTRANT RELATIVE TO 2003 POPULATION

13 - Domestic Energy Utility Companies (Gas, Hydro, Other)

TransCanada Corp. AB	8,349,000
Atco Ltd. AB	4,379,000
Fortis Inc. NL	3,685,000
Superior Plus AB	3,551,600
Canadian Utilities AB	3,186,000
Just Energy Group ON	2,693,655
TransAlta Corp. AB	2,269,000
Emera Inc. NS	2,156,700
CU Inc. AB	1,859,000
Union Gas ON	1,662,000
Capital Power AB	1,347,000
Brookfield Renew.Energy Part. BERMUDA #	1,320,000
Nova Scotia Power NS *	1,262,800

* DENOTES NEW ENTRANT RELATIVE TO 2003 POPULATION
# DENOTES REGISTERED IN CANADA DESPITE FOREIGN HEADQUARTERS

12 - Manufacturing, Industrial, Chemical

Magna International ON	31,006,000
Bombardier Inc. QC	17,445,000
Agrium Inc. AB *	16,784,000
Potash Corp. of Saskatchewan SK *	8,012,000
Cascades Inc. QC	3,667,000
Linamar Corp. ON	3,224,614
Russel Metals ON	3,001,800
MartinrealInternational ON *	2,902,260

* DENOTES NEW ENTRANT RELATIVE TO 2003 POPULATION

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Appendix I: 2012 Billion-Dollar Firms by Sector

12 - Manufacturing, Industrial, Chemical *(CONTINUED)*

Methanex Corp. BC	2,673,463
Dorel Industries QC	2,490,710
Gildan Activewear QC *	1,948,850
CCL Industries ON *	1,311,755

* DENOTES NEW ENTRANT RELATIVE TO 2003 POPULATION

11 - Metals and Mining

Barrick Gold ON	14,645,000
Teck Resources BC	10,537,000
Goldcorp Inc. BC *	5,665,000
Kinross Gold ON *	4,310,200
First Quantum Minerals BC *	4,194,900
Yamana Gold ON *	2,391,483
Cameco Corp. SK	2,388,227
Agnico-Eagle Mines ON *	1,915,325
Sherritt International ON	1,861,400
Iamgold Corp. ON *	1,737,000
Eldorado Gold BC *	1,157,191

* DENOTES NEW ENTRANT RELATIVE TO 2003 POPULATION

9 - Transportation and Logistics

Air Canada QC	12,263,000
Canadian National Railway Co. QC	10,235,000
Canadian Pacific Railway Ltd. AB	5,704,000
Transat A.T. QC	3,724,777
WestJet Airlines AB	3,440,818
TransForce Inc. QC	3,165,097
CAE Inc. QC *	1,849,000
Chorus Aviation NS *	1,719,614
Mullen Group AB *	1,433,765

* DENOTES NEW ENTRANT RELATIVE TO 2003 POPULATION

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Appendix I: 2012 Billion-Dollar Firms by Sector

8 – Food & Beverage Production

George Weston Ltd. ON	32,873,000
Saputo Inc. QC	6,932,737
Maple Leaf Foods ON	4,895,793
Cott Corp. ON	2,248,800
Canada Bread Co. ON *	1,569,178
Colabor Group QC *	1,466,848
SunOpta Inc. ON *	1,092,110
Lassonde Industries QC *	1,024,076

* DENOTES NEW ENTRANT RELATIVE TO 2003 POPULATION

8 - Telecommunications

BCE Inc. QC	20,242,000
Rogers Communications ON	12,509,000
Telus Corp. BC	10,944,000
Shaw Communications AB	5,123,000
Manitoba Telecom Services MB	1,704,100
Cogeco Inc. QC *	1,406,353
Cogeco Cable QC *	1,277,698
Astral Media QC *	1,021,926

* DENOTES NEW ENTRANT RELATIVE TO 2003 POPULATION

6- Media and Broadcast

Thomson Reuters Corp. NY	14,236,000
Quebecor Inc. QC	4,353,900
Transcontinental Inc. QC	2,144,800
Lions Gate Entertainment CA *	1,609,710
Torstar Corp. ON	1,482,649
Yellow Media QC *	1,138,520

* DENOTES NEW ENTRANT RELATIVE TO 2003 POPULATION

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Appendix I: 2012 Billion-Dollar Firms by Sector

6 – Engineering and Construction

SNC-Lavalin Group QC	8,104,392
Aecon Group ON	2,968,703
Bird Construction ON *	1,458,941
Churchill Corp. AB *	1,223,268
Stantec Inc. AB *	1,558,159
Genivar Inc. QC *	1,258,500

* DENOTES NEW ENTRANT RELATIVE TO 2003 POPULATION

6 - High-Technology Products and Services

Research In Motion ON	11,088,000
Catamaran Corp. IL #	9,940,120
Celestica Inc. ON	6,507,200
CGI Group QC	4,786,857
Open Text Corp. ON *	1,211,022
Softchoice Corp. ON *	1,067,141

* DENOTES NEW ENTRANT RELATIVE TO 2003 POPULATION
# DENOTES REGISTERED IN CANADA DESPITE FOREIGN HEADQUARTERS

5 – Service Related

Finning International AB	6,635,597
Extendicare Inc. ON	2,045,801
Progressive Waste Solutions ON	1,895,608
MDC Partners ON *	1,071,087
Cineplex Inc. ON *	1,093,048

* DENOTES NEW ENTRANT RELATIVE TO 2003 POPULATION

4 – Real Estate Development and Related

First Service Corp. ON *	2,308,993
Brookfield Office Properties NY #	2,396,000
RioCan REIT ON	2,041,000
Brookfield Residential Properties AB	1,350,252

* DENOTES NEW ENTRANT RELATIVE TO 2003 POPULATION
# DENOTES REGISTERED IN CANADA DESPITE FOREIGN HEADQUARTERS

Appendix I: 2012 Billion-Dollar Firms by Sector

4 – Forest Products

West Fraser Timber Co. BC	3,008,000
Canfor Corp. BC	2,674,600
Tembec Inc. QC	1,680,000
Norbord Inc. ON	1,149,000

* DENOTES NEW ENTRANT RELATIVE TO 2003 POPULATION

1 – Life Sciences

Valeant Pharmaceuticals QC *	3,572,333

* DENOTES NEW ENTRANT RELATIVE TO 2003 POPULATION

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Appendix II: Transactions 2003–2012

Company	2003 Revenue	Sector	Transaction Detail
Alcan Inc.	24,885,000	Metals & Mining	Takeover by RioTinto (Australia) 2007
Petro-Canada	14,442,000	Oil & Gas	Merger with Suncor (CAN) 2009
Shell Canada	11,288,000	Oil & Gas	Privatized by Royal Dutch Shell (Neth.) 2006
Sobeys Inc.	11,046,800	Retail	Acquired by Empire Co. (CAN) 2007
Noranda Inc.	7,002,000	Metals & Mining	Merged with Falcon bridge (CA) 2005
Abitibi-Consolidated Inc.	6,079,000	Forestry	Merged with Bowater (US) 2007
Canada Life Financial	5,876,000	Financial Services	Acquired by Great-West Life (2004)
Nova Chemicals	5,276,000	Manufacturing	Acquired by International Petroleum Investment Company (AD) 2009
Domtar Inc.	5,121,000	Manufacturing	Merged with Weyerhauser TIA (US) 2006
Inco Ltd.	4,320,000	Metals & Mining	Acquired by VALE CVRD (BR) 2006
Dofasco	4,235,400	Manufacturing	Acquired by Arcelor (Lux) 2006
Nexen Inc.	3,884,000	Oil & Gas	Acquired by CNOOC (CHN) 2013
CP Ships	3,672,000	Services	Acquired by TUI AG (GR) 2005
Gerdau Ameristeel	3,154,390	Manufacturing	Acquired by parent-co Gerdau S.A. (BR) 2010

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Appendix II: Transactions 2003–2012 *(CONTINUED)*

Company	2003 Revenue	Sector	Transaction Detail
Falconbridge Ltd.	3,070,000	Metals & Mining	Acquired by Xstrata (SW) 2006
Agricore United	3,048,135	Services	Merged with Saskatchewan Wheat Pool to create Viterra (2007)
Molson Coors Canada	2,527,100	Food & Beverage	Merged with Coors (US) 2005
IPSCO Inc.	2,458,893	Manufacturing	Acquired by SSAB Swedish Steel (SW) 2007
Royal Group Technologies	2,335,131	Manufacturing	Acquired by Georgia Gulf Corporation (US) 2006
Lafarge Canada	2,233,940	Manufacturing	Privatized by parent co. Lafarge (FR) 2006
Aliant Inc.	2,046,554	Telecom	Merged with Bell (Can) 2006
ATI Technologies	2,000,974	Technology	Acquired by AMD (US) 2006
Terasen Inc.	1,957,000	Oil & Gas	Acquired by Kinder Morgan (US) 2005
Placer Dome	1,946,000	Metals & Mining	Acquired by Barrick Gold (CAN) 2006
Algoma Steel	1,816,000	Manufacturing	Acquired by Essar (IN) 2007
Gaz Metro LP	1,782,934	Oil & Gas	Merger with Valener (CAN) 2010
PetroKazakhstan Inc.	1,652,346	Oil & Gas	Acquired by China National Petroleum Corporation (CN) 2005

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Appendix II: Transactions 2003–2012 *(CONTINUED)*

Company	2003 Revenue	Sector	Transaction Detail
Intrawest Corp.	1,551,704	Services	Privatized by Fortress Investment Group (US) 2007
Saskatchewan Wheat Pool	1,407,297	Services	Acquired by Glencore International (SW/UK) 2012
Northbridge Financial	1,335,064	Financial Services	Acquired by Fairfax Financial (CAN) 2008
Xerox Canada	1,229,939	Technology	Privatized by parent co Xerox (US) 2006
Provident Energy Trust	1,201,280	Oil & Gas	Acquired by Pembina (CAN) 2012
Fording Canadian Coal Trust	1,173,700	Oil & Gas	Acquired by Teck Cominco (CAN) 2008
Alliance Atlantis Communications	1,044,600	Broadcast & Media	Acquired by Canwest Global (CAN) 2007
Retirement Residences REIT	1,021,664	Services	Privatized by Public Sector Pension Investment Board (CAN) 2006
Forzani Group	985,054	Retail	Acquired by Canadian Tire (CAN) 2011
Ainsworth Lumber Co.	983,737	Forestry	Acquired by Louisiana Pacific (US) 2013
Call-Net Enterprises	840,400	Telecommunications	Acquired by Rogers (CAN) 2005
Cognos Inc.	833,011	Technology	Acquired by IBM (US) 2007
FP Ltd.	808,814	Food & Beverage	Privatized (CAN) 2008
Husky Injection Molding Systems	774,374	Manufacturing	Privatized by Onex CAN) 2007

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Appendix II: Transactions 2003–2012 *(CONTINUED)*

Company	2003 Revenue	Sector	Transaction Detail
Fairmont Hotels & Resorts	771,600	Services	Privatized by Colony Capital / Kingdom Hotels (SA) 2006
Novamerican Steel	768,939	Manufacturing	Privatized by Symmetry Capital (US) 2007
Legacy Hotels REIT	754,200	Services	Privatized by LGY Acquisition LP (CAN) 2007
Flint Energy Services	743,841	Oil & Gas	Acquired by URS Corp. (US) 2012
Cossette Communication Group	729,750	Services	Privatized by Mill Road Capital, L.P (US) 2009
Western Oil Sands	675,261	Oil & Gas	Acquired by Marathan Oil Corp (US) 2007
CoolBrands International	642,820	Food	Merger with Swisher Hygiene (CAN) in 2010
Camco Inc.	642,696	Manufacturing	Acquired by GE/MABE (US/MEX) 2005
Creo Inc.	636,712	Technology	Acquired by Kodak (US) 2005
Rothmans Inc.	626,397	Manufacturing	Acquired by Philip Morris International (US) 2008
GSW Inc.	582,135	Manufacturing	Acquired by A.O. Smith (US) 2006
CHUM Ltd.	561,433	Broadcast & Media	Acquired by BCE (CAN) 2007
Inmet Mining	553,806	Metals & Mining	Acquired by First Quantum Minerals (CAN) 2013
Olco Petroleum Group	551,639	Oil and Gas	Acquired by Morgan Stanley (US) 2007

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Appendix II: Transactions 2003–2012 *(CONTINUED)*

Company	2003 Revenue	Sector	Transaction Detail
PrimeWest Energy Trust	534,300	Oil and Gas	Acquired by Abu Dhabi National Energy Co (AD) 2007
Acetex Corp.	531,631	Manufacturing	Acquired by Blackstone Group (US) 2004
Acclaim Energy Trust	521,514	Oil and Gas	Acquired by PennWest (CAN) 2007
Astral Media	519,485	Broadcast & Media	Acquired by BCE (CAN) 2013
Teknion Corp.	496,715	Manufacturing	Privatized by A-Tean Holdings (CAN) 2008
Atlas Cold Storage I.T.	487,575	Services	Acquired by VersaCold (ICE) 2007
Vincor International	476,383	Food	Acquired by Constellation Brands (US) 2005

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