Industry Canada Industrie Canada

Canada

The Strategic Policy Sector

IC Insights

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IN THIS ISSUE:

Recent Developments of Interest to IC

The International Monetary Fund (IMF) downgrades global growth forecasts

- In its January 2015 World Economic Outlook (WEO) update, the IMF forecasts global growth in 2015-16 to average 3.5% and 3.7%, respectively. Both have been revised downwards by 0.3 percentage points relative to the October 2014 WEO (see the Hot Chart, page 21).
- The main global upside risk highlighted by the January WEO is a greater boost from lower oil prices, while downside risks relate to shifts in sentiment and volatility in global financial markets. Stagnation and inflation are still concerns in the euro area and Japan.
- Overall, global growth is expected to benefit from lower oil prices. However, the IMF anticipates negative effects from investment weakness to more than offset the benefits in many advanced and emerging economies.
- The IMF downgraded its outlook for Canada, forecasting growth of 2.3% in 2015 and 2.1% in 2016—down 0.1 and 0.3 percentage points, respectively, from the October 2014 WEO.

Small Business Week highlights the role of entrepreneurs and small and medium-sized businesses in Canada's economy

- Every year, the third week of October brings Small Business Week, organized by the Business Development Bank of Canada (BDC).
- Small and medium-sized businesses account for 99% of Canadian businesses and employ over 90% of private-sector workers.
- In 2014, the BDC released several reports during small business week, including "The Five Do's and Five Don'ts of Successful Businesses", highlighting what successful firms do better than other firms.
- The five do's are: innovate; ask for outside advice; have a solid plan and measure progress; hire the best and keep them engaged; and, build strong relationships with key suppliers.

Canada ranked 15th in The World Economic Forum's 2014-15 Global Competitiveness Report.

- This was one position down from last year's report, and Canada's lowest ranking since 2006.
- Switzerland remained the top ranked country, followed by Singapore and the US.
- Canada does well on a number of factors related to institutions and law, healthcare, childhood education, the economy and financial markets.
- However, Canada ranks less well on several measures related to innovation and spending. For example, Canada's private sector spending on research and development (R&D) ranked 27th, university/industry collaboration on R&D ranked 19th, and government procurement of advanced technology ranked 48th.

College Partnerships in Driving Commercialization: A Snapshot of Ontario's College Sector

Highlights

- Not only are Ontario's College-business partnerships contributing to Canada's innovation and commercialization, but they are emerging as a win-win situation for all:
  - Businesses gain access to equipment, technology and expertise, and,
  - Students are provided valuable experience and opportunities for future careers.

Introduction

Canada's weak overall innovation performance has been linked to the underperformance of Canadian firms in research and development (R&D).[1] College-business partnerships are one potential way to address this weakness. Through these partnerships, Ontario colleges are helping businesses overcome barriers to research and innovation.

This article provides a snapshot of Ontario's college sector's partnerships with the business community to accelerate the development of promising technologies. It also points to some successful projects and identifies current challenges in working together. The information gathered for this article comes from meetings and event attendance by Industry Canada staff involving college and business researchers, as well as technology transfer or commercialization officers.

Ontario's College Sector

In Ontario, there are 24 public colleges of applied arts and technology with close to 220,000 full-time and 300,000 part-time students registered throughout the province.

Ontario's top 15 research colleges accounted for 29% (or $117.3 million) of Canada's total college research income in fiscal 2012.

College graduates play a critical role in implementing public priorities such as energy (47% of sector employment), health care (47% of sector employment), transportation, infrastructure, and regional and local development. They are also a source of R&D technicians.

[1] Munro, Daniel and Joseph Haimowitz (Conference Board of Canada). *Innovation Catalysts and Accelerators: The Impact of Ontario Colleges' Applied Research*, November 2010.

College-business partnerships

Because innovation is a social process requiring people to make connections, develop ideas, and orchestrate implementation, colleges have built relationships to help businesses increase their scope of innovative practices, while simultaneously providing students with valuable experiences.

College-business partnerships can include everything from research projects to help businesses grow, support for higher education and training in specific fields, or solution-based projects.

Ontario's colleges work closely with business partners and experts to develop programs that respond directly to labour market needs. The colleges partner with industries and businesses to produce greater numbers of graduates in careers that are in demand. Each college has a *program advisory committee* comprised of business and industry experts to help ensure programs are up to date and effective.

Solving problems and filling labour market needs – some examples

One example is Seneca College's partnership with Jana Laboratories, a leading piping systems knowledge solutions firm. The firm partnered with Seneca's *Centre for Advanced Technologies* to test a technology that prevents catastrophic field failures of plastic piping materials. Seneca students worked with the firm's engineers to design and develop equipment for prototype development and initiated proof of concept for technology. They also machined the parts and equipment components with resources available at Seneca's Jane Campus.

Another example of a College-business partnership is between Centennial College and Bombardier. It includes a new facility at the former de Havilland aircraft manufacturing plant in Toronto to support the College's aviation programs. In addition, the plant houses an innovation and research working group that brings together industry leaders and academic partners across the province.

In 2013-2014, Sheridan College's *Screen Industries Research and Training (SIRT) Centre* completed eight industry research projects including work with William F. White International, Ubisoft Toronto, CinemaSuite and Sinking Ship Entertainment. Projects explored high-speed imaging, facial and performance capture, 3D pre-visualization and game engine application in television.

Policy levers

Different policy levers and programs have been implemented to encourage collaboration between colleges and the private sector.

Government, in particular, has been a strong supporter of college-industry partnerships. At the federal level, the College sector secured $50 million in funding from Budget 2014. This included $40 million in multi-year federal funding for applied research tools and to establish recognized centres of expertise in sectors such as advanced manufacturing, biotechnology, health and services, digital economy, energy, and resources; and $10 million over two years to support social innovation research projects at colleges and polytechnics. These funds will be delivered by the Natural Sciences and Engineering Research Council (NSERC), National Research

Council-Industrial Research Assistance Program (NRC-IRAP), and Employment and Social Development Canada (ESDC) to name a few key federal players.

The College sector has also benefitted from NRC's Business Innovation Access Program (BIAP), which aims to help small and medium-sized businesses (SMEs) access the mentoring and technical services they need to get innovative products and services to market faster. The BIAP, a $20-million investment, will leverage the extensive networks and knowledge within NRC's Industrial Research Assistance Program (NRC-IRAP) to connect SMEs with universities, colleges and other research institutions to address barriers to the commercialization of ideas, products and services. The support available through the program can involve external business services such as planning and marketing as well as technical services such as specialized testing, product prototyping, and process development.

At the provincial level, the *Colleges Ontario Network for Industry Innovation (CONII)* is a consortium of all 24 colleges in Ontario. It aims to facilitate SME-led innovation by helping firms solve their technical problems, adapt new technologies for the marketplace, and develop new or improved products and processes. In 2013, CONII was integrated into the Ontario Centres of Excellence (OCE), which has enabled the colleges to have greater influence over the development of OCE programs and allow greater leveraging of resources. In 2012 through support provided by Ontario's Ministry of Economic Development, Employment and Infrastructure / Ministry of Research and Innovation, CONII co-invested $826,464 to support 43 industry-initiated applied research projects, each addressing an identified business or consumer need. This investment leveraged more than $1.3M in project support by external partners.[2]

Challenges: un-level playing field and burdensome paperwork

Building a partnership comes with several challenges. One potential challenge relates to the size of various colleges. Large institutions may have facilities and labs to encourage pre-market collaboration with a steady flow of industry partners, while smaller institutions may struggle to establish a partnership with a firm due to the lack of information and resources.

[2] CONII 2012/2013 Annual Report.

Where are Ontario's college-business partnerships?

College Centres of Expertise in Ontario

Advanced manufacturing:
- ✓ Real-time Production [Sheridan].

Biotechnology, health and services:
- ✓ Mobilizing Technology Solutions - Health [Centennial];
- ✓ Health & Information Technologies and Health Promotion [George Brown];
- ✓ Bioval orisation [La Cité collégiale];
- ✓ National Electronic Health Records Solution [Mohawk];
- ✓ Food and Culinary Innovation [Niagara];
- ✓ Elder Research [Sheridan].

Digital economy:
- ✓ Full Spectra [Algonquin];
- ✓ User Experience Design [Algonquin];
- ✓ Flight Simulation [Seneca];
- ✓ Open Technology [Seneca].

Energy:
- ✓ Renewable Energy [Durham];
- ✓ Solar Energy Technology [Georgian];
- ✓ Renewable Energy Conversion and Storage [Lambton];
- ✓ Energy Technology [Mohawk];
- ✓ Sustainability Energy [St. Lawrence].

Resources:
- ✓ Phyto-extraction of Heavy Metals from Contaminated Sudbury Soils [Cambrian];
- ✓ Sustainable Environments [Fanshawe];
- ✓ Alternative Wastewater Treatment [Fleming];
- ✓ Sustain Niagara: Supporting Innovation in Agricultural Land Management [Niagara].

Source: Colleges Ontario, Investing in Prosperity, 2012

Challenges have also been identified in working with intermediary organizations that deliver funding on behalf of the province or federal government. Application processes can be time-consuming and resource-intensive. It can also be challenging to navigate through the maze of government programs in the province. In an effort to overcome these challenges, the Ontario Centres of Excellence (OCE) has developed a streamlined application process that allows applicants to apply to more than one funding organization with one application.

Conclusion

Colleges in Ontario are increasingly playing a role in R&D and innovation. Going forward, to be able to compete in the global economy, more firms need to become industry leaders and tap into the resources available at their local college.

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Wood Products Manufacturing: Overview and Challenges

Highlights

- The Wood products manufacturing industry is an important part of Canada's economy, but has had to adapt to and overcome a number of challenges in the past decade.
- Yet, for a decade, the Wood products manufacturing industry was a leader in productivity growth.
- Industry Canada research determined that this was a result of firms successfully adapting to a changing and more competitive economic and trade environment in conjunction with a self-initiated change in business strategy.

Introduction

Wood and timber industries have been an integral part of Canada's economy since Europeans first landed in North America. Even now, almost 150 years after Confederation, wood industries continue to be an important part of Canadian heritage and the economy.

This article examines wood product manufacturing's contribution to the Canadian economy and its strong past productivity performance despite having faced important challenges in recent years.

Chart 1: Real GDP share of Wood Products Manufacturing Industry subsectors (May 2014)

What is wood product manufacturing?

The Wood Products Manufacturing industry consists of three sub-industries: Sawmills and wood preservation; Veneer, plywood and engineered wood product manufacturing; and Other wood product manufacturing. The three sub-industries are engaged in manufacturing products from wood. They saw logs into lumber and similar objects (or preserve these objects), make products that improve the natural characteristics of wood (like veneers, plywood, reconstituted wood panel

products or engineered wood assemblies), and make other wood products (such as millwork, wood containers and pallets).

As of mid-2014, sawmill and wood preservation held the largest share of wood product manufacturing's real GDP share at 44%, while other wood product manufacturing had 31% and veneer, plywood and engineered wood product manufacturing had 25% (Chart 1).

Over time, the distribution of the sub-industries within wood products has changed, as has the wood product industry itself. In particular, from 1997 to 2006, veneer, plywood, and engineered wood grew faster than the other two industries pushing the sub-industry from representing about 17% of wood products manufacturing to about 25%.

Overall, the wood products manufacturing industry has faced many challenges – some natural, such as pine beetles, some economic, such as the global financial crisis – which have had an impact on real GDP (Chart 2) and employment (Chart 3). For the past four years, employment has remained constant but at historically low levels, while GDP has risen but has not reached pre-recessionary levels.

Chart 2: Real GDP

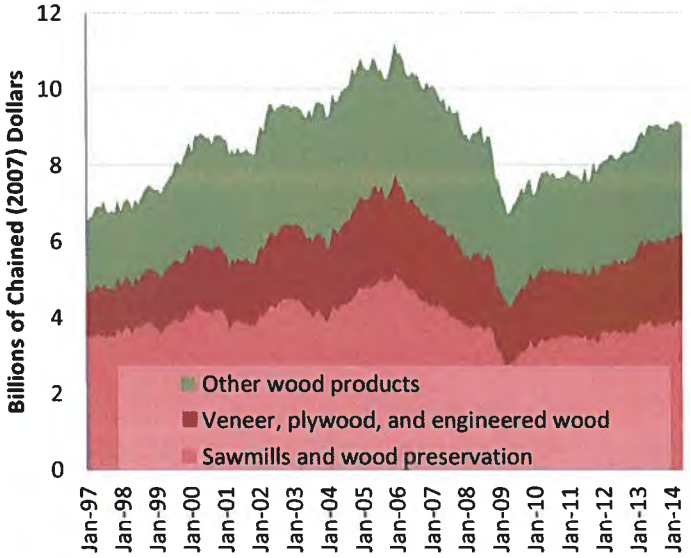
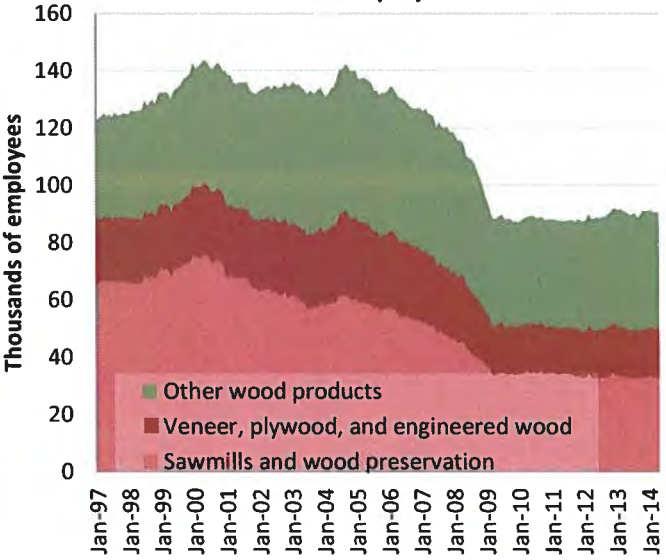


Chart 3: Employment



Exports

The bulk of wood product manufacturing exports are from the sawmills and wood preservation sub-industry (Chart 4). Across all three sub-industries, wood product manufacturing exports fell sharply during the global financial crisis and, in 2013, exports had only recovered to 55% of the peak level reached in 2004.

Most of wood product manufacturing exports are destined for the US; however, other countries are becoming more important to the industry. In 2005, the share of wood product manufacturing exports that went to the US peaked at nearly 90%, but decreased since the recession to reach 70% in 2013. China is a good example of a country that has increased in importance as an export destination. Twenty years ago, less than 1%

of wood product manufacturing exports went to China, or about $10 million. In 2013, 12% of wood product manufacturing exports were destined for China, worth nearly $1.5 billion (Chart 5).

Challenges

Since 2004, a number of challenges hit the wood products manufacturing and other timber-related industries in quick succession – mountain pine beetles, exchange rate appreciation, the global financial crisis and the collapse of the U.S. housing market.

First, the infestation of mountain pine beetles resulted in a loss of an estimated 710 million cubic metres of commercially valuable pine timber in British Columbia (BC), which contributes around a third of all wood products manufacturing industry GDP every year. Some BC operations have experienced a diminished grade and volume of lumber recovered from beetle-killed logs and increased production costs. The effects of the deterioration of beetle-killed logs could include increased costs, reduced operating rates due to shortages of commercially consumable timber and mill closures.

Second, from 2004 to 2007, the Canadian dollar appreciated vis-à-vis its US counterpart. This impacted the competitiveness of Canadian wood exporters.

Third, the 2008 recession was also a significant contributor to the decrease in overall employment as a high share of wood products are sold to wholesalers, home centres and home builders. For instance, the collapse of the US residential housing market took a serious toll on the subsector's demand and led to further employment losses, overcapacity and mill closures. With the drastic drop in housing starts in the US, there was a sharp decrease in Canadian wood product manufacturing exports to the US (Chart 6). However, US housing starts are forecast to strengthen from 1.0 million units in 2014 to about 1.2 million in 2015 and 1.3 million in 2016.[3]

[3] Consensus Forecasts, Feb. 2015.

Chart 4: Exports

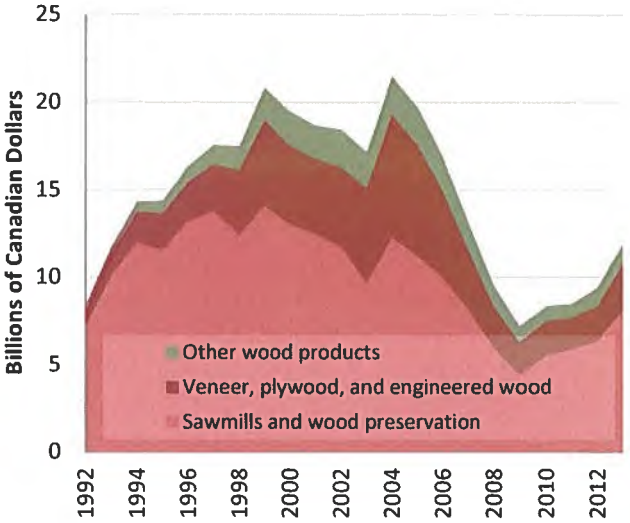


Chart 5: Wood Manufacturing Exports to China

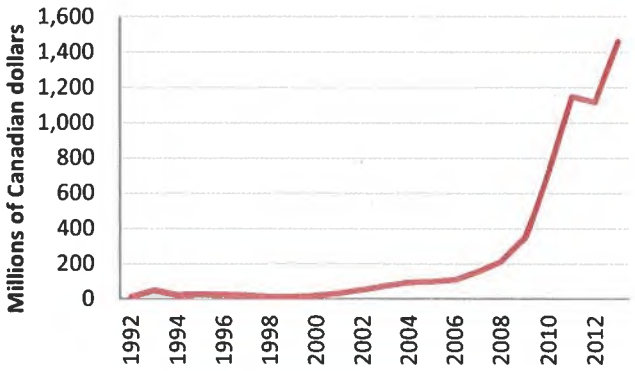


Chart 6: US Housing Starts and Canadian Wood Product Manufacturing Exports to the U.S.

Finally, wood products operations rely on the availability of both skilled and unskilled workers. Because operations are generally located away from major urban centres, the industry often faces strong competition for workers, particularly skilled workers, from its competitors and other industries such as oil and gas production and mining. Shortages of workers affect operations by reducing production or increasing costs.

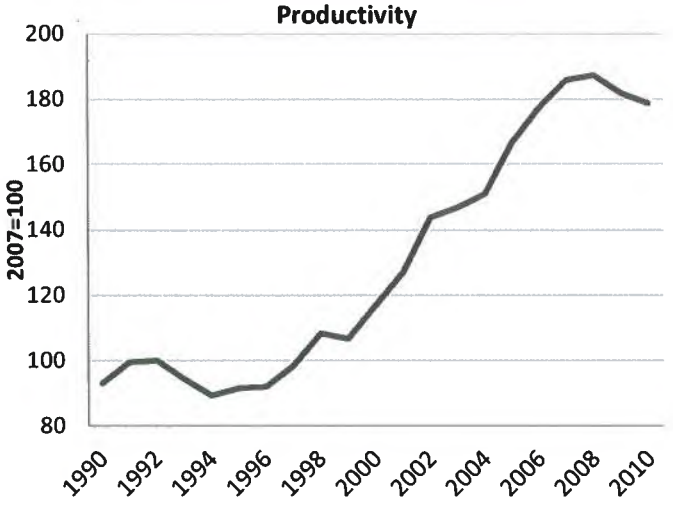
Yet, despite these challenges, or maybe because of them, prior to the financial crisis the wood products manufacturing industry had strong productivity growth.

Productivity

Labour productivity in Canada's wood product manufacturing industry registered a decade of strong performance of labour productivity prior to the recession (Chart 7). During these years, labour productivity in the wood products manufacturing industry grew an average of 6.6% per year – faster than the Canadian manufacturing sector (2.2%) and faster than wood product manufacturing in the US (2.7%). Since the recession, however, with the burst of the US housing bubble and the global recession, productivity growth levelled off and declined.

This strong productivity performance of the wood products subsector was the result of firms successfully adapting to a changing and more competitive economic and trade environment, in conjunction with self-initiated changes in business strategy. Indeed, wood products manufacturing took advantage of opportunities during the time frame: a boom in North American residential construction and the post-2001 appreciation of the Canadian dollar, while at the same time was able to face challenges such as the collapse of the Japanese residential construction market and the Mountain Pine Beetle epidemic. IC research points to two important factors in the sector's strong productivity performance. First, growth in multifactor productivity was fuelled by a consolidation of operations that enabled the realisation of economies of scale as well as more intensive utilization of existing capacity. Second, investments in capital, especially machinery and equipment, contributed to capital deepening, as new and higher service-producing capital replaced older stock.

Chart 7: Wood Product Manufacturing Labour Productivity



Changes to the public policy environment followed the initial burst of productivity growth. British Columbia was the sole province to introduce significant policy changes in this subsector and these were implemented more than seven years after the beginning of the productivity boom. Nonetheless, they were designed to facilitate consolidation and increase competition and thus likely contributed to productivity growth in BC. In addition, recent changes to provincial tenure systems in Ontario and Quebec should also help the subsector acquire greater flexibility to better respond to future opportunities and challenges.

At the federal level, the government currently supports productivity innovation in the wood industry via the Investments in Forest Industry Transformation (IFIT) program. The IFIT provides direct support to individual forest products companies to help them implement new technologies leading to non-traditional high-value forest products and renewable energies at the pilot to commercial scale. Forest products companies have also taken advantage of the SR&ED tax credit, which is cited by the Forest Products Association of Canada (2011) as the single most important program in terms of supporting the sector.

Future Opportunities

The future of the subsector hinges on the capacity of firms to adapt to a competitive environment by seizing opportunities to expand markets and adjust their product mix to changing needs and growing environmental concerns. As the industry begins to grow again, it will continue to face a number of challenges including an uncertain global economy, skills shortages, as well as fibre supply and quality challenges due to the mountain pine beetle epidemic.

A renewed focus on strategic innovation investment will be key to the industry's future as the sector moves from an established commodity industry to a value-added approach driven by new emerging technologies (e.g., biotechnology). In recent years, the industry has been transforming its export markets by building on the strength of the sector's traditional high quality wood fibre products. For example, China and other Asian countries have become increasingly significant new markets for these products helping offset the declines seen in traditional markets over recent years. Recent free trade agreements with Europe and South Korea could lead to more opportunities for export growth in this sub-sector, as it continues to diversify its forest products and broadens trade relationships with the rest of the globe. Finally, the US housing market has been rebounding, and could be a significant opportunity for future growth.

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A Portrait of Canadian Goods Trading Firms (Part One)*

Highlights

- Using firm level data, new Industry Canada researcher finds that trading is rare, highly concentrated, and dominated by multi-product and multi-market firms.
- In addition, most of the exporters are also importers, and,
- Foreign-controlled firms contribute substantially to Canada's trade.

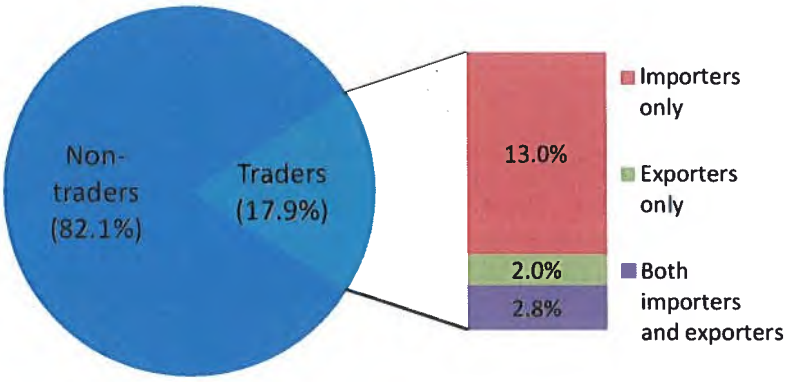
Introduction

With recent access to firm-level data, we are now able to gain a better understanding of trading firms' characteristics and activities. This article presents some of the main findings from a newly completed study, "Exporters and Importers: A Portrait of Canadian Goods Trading Firms"[4].

Trading is a rare activity

Of approximately one million firms in the Canadian business sector, only 18% of them are goods traders (Figure 1). Most of these traders only import. Less than 5% export, and within this group of exporters, even fewer also engage in importing activities.

Figure 1 : Distribution of business sector firms in Canada by trading activity, 2008



Despite being a rare activity, goods trade is made up of firms across industries, including services. Within services, wholesalers especially, as intermediaries, play an important role in Canada's trading activity, representing 23% of firms that export. Results also show that an overwhelming share of trade is intermediate inputs, as opposed to final goods. In 2008, 70% of goods exports and 54% of goods imports were intermediate inputs in 2008.

* This is a summary of Acharya (forthcoming, 2015).

[4] Acharya, 2015 (forthcoming).

Trade value is very concentrated

Trade is highly concentrated. The top 1% of exporters accounts for less than 1% of all firms and employ only 7% of workers, but perform nearly 80% of exports (Table 1). The top 1% of importers also represents less than 1% of all firms, account for about 20% of employment, but import nearly 80% of goods. The top 5% of traders contribute 92% of trade.

Table 1: Export and import concentration across firms, 2008

	Firm counts	% of all firms	% of employment	% of trade
Exports				
Top 1 percent	486	0.1	7.0	78.9
Top 5 percent	2,434	0.2	16.9	92.1
Imports				
Top 1 percent	1,586	0.2	20.1	79.5
Top 5 percent	7,932	0.8	34.5	92.6

A large share of these top 1% of traders are those that both import and export (called "globally trading firms" or GTFs in the research paper). Indeed, these 28,000 GTFs account for approximately 3% of business sector firms, but generate about 80% of the total export and 83% of import value. In addition, foreign-controlled firms account for almost half of two-way trade value in Canada.

Trade is dominated by multi-product firms and multi-market firms

Canadian firms export about 5,500 products (Harmonized System - HS8 code) to about 230 countries, while the importing firms import about 8,000 different types of products also from about 230 countries.

Among exporters, 60% were multi-product who contributed 90% of the export value (Table 2). Among importers, 71% were multi-product, contributing 90% of import value. On average, the number of products exported by a foreign-controlled firm is higher than for a Canadian-controlled firm (9 versus 3). In 2008, domestically-controlled firms imported nearly 14 products per firm, while foreign-controlled firms imported 90 products.

Just over 70% of exporters in Canada only go to one market (i.e., foreign country), but they contribute less than 30% of the export value. The remaining 30% of exporters export to 2 or more markets and contribute more than 70% of the export value. More than half of employment in exporting firms are in those firms that export to more than one market, indicating that in these firms per employee value is low. A similar, but more extreme, pattern emerges for importers.

Table 2: Traders by number of products traded and number of markets traded to (%), 2008

	Exporters			Importers		
Number of products	**Share of firms**	**Share of value**	**Share of employment**	**Share of firms**	**Share of value**	**Share of employment**
1	40.2	10.5	19.8	28.6	0.5	10.5
2 or more	49.8	89.6	80.1	71.4	99.5	89.5
Number of markets						
1	71.0	28.9	54.2	52.6	2.7	18.2
2 or more	29.0	71.1	45.8	47.7	97.4	81.8

GTFs are more productive than exporters, who are more productive than importers

The literature has shown that firms have differing productivity levels even within a narrowly defined industry. A theory of selection process has emerged: the least productive ones exit the domestic market, slightly more productive firms serve domestic markets, even more productive ones export to foreign markets and the most productive ones become multinationals, and are the main driver of trading activities. Over the last decade, studies using US micro-data provide clear evidence for this selection process. The evidence from the new Industry Canada research also supports this theory. It finds that GTFs are more productive than exporters-only, which are more productive than importers only. More specifically:

- Compared to exporters-only, GTFs are 73% larger, export 50% more, pay 1% higher wages, have 10% higher labour productivity and 8% higher total factor productivity.
- Compared to importers-only, the GTFs are 95% larger, import 173% more, pay 4% higher wages, have 24% higher labour productivity and 21% total factor productivity.
- Exporters-only, when compared to importers-only, are 22% larger in employment, pay 3% higher wages, have 24% higher labour productivity and 13% higher total factor productivity.

In addition, differences are found by the country of control of the firm. Foreign controlled firms have 63% higher labour productivity and 60% higher total factor productivity, as well as export more, pay higher wages, have higher capital per worker than Canadian-controlled firms. However, one has to interpret these differences with caution as we are comparing foreign multinationals with the universe of Canadian traders (rather than with Canadian multinationals), and, as reasoned above we know that multinational are more productive.

Conclusion

With access to firm-level data, the characteristics of Canada's trading firms can be uncovered. As shown in this portrait of Canadian trading firms, trading is rare, concentrated, and dominated by multi-product firms and firms that go to multiple markets. Some of the trade is carried out by firms that are wholesalers – the intermediaries. As well, not all exporters are the same – there are productivity differences between GTFs, exporters-only and importers-only.

Knowing more about Canada's trading firms allows for a better understanding of the Canadian economy and the role of trading firms in Canada's productivity performance. This is only the tip of the iceberg of what has been and what can be uncovered from this dataset. Look for more on Canada's trading firms in future editions of *IC Insights*.

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The Fragmentation of Business Activities in GVCs – A Source of Performance for Canadian Enterprises*

Highlights

- Does it matter if an enterprise is involved in global value chains (GVCs) for innovation performance and productivity?
- While there is solid theoretical rationale for why GVCs should be conducive to growth, there is still little empirical evidence at the firm level.
- Recent Industry Canada research using new firm-level datasets shows that enterprises involved in GVCs are significantly more productive and innovative than those keeping all their business activities in Canada.

Background

The nature of trade has changed. In the past, trade consisted mostly of end-goods crossing borders. Now firms and countries are increasingly linked through value chains. In the last decade, not only has the world-wide volume and frequency of trade increased drastically, but the way enterprises engage in international activities has changed. One of the most significant changes has been the increase in business activities' fragmentation as a result of the increased trade of intermediate products in the global value chain (GVC). Business strategy starts with where it locates various aspects of its functions and participating in GVCs can be a powerful source of increased efficiency.

What is fragmentation?

Fragmentation of business activities takes place when an enterprise chooses to either relocate or outsource some of its activities outside of its walls.

This could be within the enterprise but in a foreign location (offshoring), outside of the enterprise but within the country (domestic outsourcing), or outside the enterprise in a foreign country (outsourced offshoring).

Source: Görg(2000)

* This is a summary of Rosa and Jetté (forthcoming, 2015).

The fragmentation of business activities can create opportunities for enterprises seeking to specialize in specific activities. For instance, they can focus on activities where they have a technological advantage and outsource or offshore other activities to benefit from lower costs or localized expertise (Görg, 2000). It is generally accepted that such fragmentation of business activities should lead to better economic performance; however, there is currently little empirical evidence to support this claim.

In their recent paper "*The Fragmentation of Business Activities in Global Value Chains as a Source of Performance for Canadian Enterprises*", Industry Canada economists Julio Rosa and Stephane Jetté review how Canadian enterprises participate and organize their business activities in GVCs and its relationship with innovation and economic performance. They examine the association between the fragmentation of business activities and labour productivity and innovation intensity of Canadian enterprises. This is an important avenue of research for Industry Canada with potential policy implications related to our mandate: to help make Canadian industry more productive and competitive in the global economy.

Global Value Chains

Enterprises are involved in Global Value Chains (GVCs) if they offshore some of their business activities.

Outsourcing versus Insourcing

Outsourcing refers to firms contracting some of their business activities to non-affiliated firms.

Insourcing refers to the activities carried out within the firm's own operational infrastructure independent of the geographic location of the affiliated firms (domestic or abroad).

The Data

Various Statistics Canada databases were used for this study. Key variables on business fragmentation and innovation come from the *Survey of Innovation and Business Strategies* (SIBS) 2009. In this survey, enterprises were asked to locate where 14 different business activities were performed in 2009. More specifically, it asked whether some production (e.g. production of good or provision of services) or some support business activities (e.g. call centers, accounting, legal services, data processing, software development, research and development (R&D)) were performed in Canada alone, in Canada and abroad, or abroad only. It also asked whether each of these business activities were outsourced or performed in-house. Note that SIBS is a survey of 6,233 Canadian enterprises with at least 20 employees and revenues above $250,000.

Production versus Support

Production activities are directly linked to the production of goods or the provision of services.

Support activities are not directly linked to the production of final goods or services, and include things such as distribution, marketing, financial management and research and development.

To draw a profile of firms participating in GVCs, information from other databases were also used. For instance, R&D expenditures were derived from the survey of Research and Development in Canadian Industry; employment information was taken from the Longitudinal Employment Analysis Program database; and enterprises' total sales and capital assets were taken from the General Index of Financial Information dataset.

Descriptive statistics

In the sample, 35% of firms were involved in GVCs (Table 1). This means that they were performing some of their production or support activities abroad (offshoring). These GVC-involved firms were more likely to contract-out these offshored activities (81%) than to perform them in their own offshore facilities (19%). Finally, almost half of the GVC-involved firms offshored both production and support activities, while 37% of them offshored only some support activities and 14% of them offshored some production activities only.

Of note, the proportion of enterprises offshoring some activities was relatively higher in the manufacturing sector (37%) than in the service sector (30%).

A profile of GVC-involved enterprises revealed that these enterprises were more likely to employ a higher share of skilled workers and to spend more on R&D and innovation activities than non-GVC firms. While size and industry also mattered – GVC-involved firms were more likely to be larger and to be in the high-tech sector – age was not a factor. Indeed, enterprises in all age categories were participating in GVCs.

Table 1: Descriptive statistics of firms

Activity	Percent of total sample
GVC	35%
Of which	
Insourcing	*19%*
Outsourcing	*81%*
Production activities only	*14%*
Support activities only	*37%*
Both production and support activities	*49%*

Main results

Four main messages emerge from the study[5]:

1. Enterprises participating in GVCs were more productive and innovative compared to those that performed all their business activities in Canada.

   - For instance, enterprises that offshored some business activities (GVC participants) were 18 percent more productive than enterprises that performed all their business activities in Canada.

From the result above, the researchers wanted to assess whether this higher productivity and innovation performance was derived from the type of activities performed abroad or from the business structure (outsourced or not). These results showed that:

2. For enterprises participating in GVCs, there was no statistical difference in innovation and productivity performance whether the activities offshored were kept within the enterprise or outsourced.

[5] To derive robust results, the authors run econometric models on the relationship between different types of business fragmentation and innovation and productivity. See the end of the article for more details on the econometric procedure.

3. Enterprises that offshored some production activities and some support activities were more productive and innovative than enterprises that offshored only production or only support activities.

   - For instance, enterprises that offshored some production and some support activities were about 10 percent more productive than those that offshored only support activities or only production activities.

Finally, the researchers also wanted to assess whether the effects were similar by industrial sector. These results showed that:

4. The productivity gap between GVC and non-GVC enterprises is larger for enterprises in the services sector than the manufacturing sector.

Conclusion

The results presented in the paper offer insight into the economic and innovation performance of firms engaged in GVCs and the associated strategies related to business activity fragmentation. Since this study was completed, a second wave of SIBS (2012) has been released. Linking SIBS 2009 with SIBS 2012 will allow further study to assess the transition of enterprises that move in or out of GVCs.

References

Görg, H. (2000). "Fragmentation and Trade: US Inward Processing Trade in the EU", *Review of World Economics (Weltwirtschaftliches Archiv) 136*(3), 403-422.

Rosa, J. and Jetté, S. (2015). "The Fragmentation of Business Activities in Global Value Chains as a Source of Performance for Canadian Enterprises", Forthcoming.

The Econometric Procedure

The authors used a two-step model to assess whether firms engaged in the fragmentation of business activities were associated with higher economic performance. First, the relation between enterprises' business activities organization and their innovation intensity was estimated. A Tobit procedure was used with innovation total expenditures per employee as the dependant variable. The GVC variable as well as other firm's characteristics such as size, age, industry, head office location, the percentage of university holders in the firm's workforce and a lagged variable of R&D expenditures were used as explanatory factors. A predicted innovation intensity was then computed from this regression and used in the second estimation step.

In the second step, a labour productivity (sales over employment) equation was modelled using the Ordinary Least Squares estimator. The following variables were used as explanatory factors: the predicted innovation intensity, capital investment per employee, country of control of the firm, size, age, industry, and of course, whether the firm was involved in a GVC.

Different combinations of GVC variables were tested. First, involvement in a GVC was defined as offshoring any business activities. It was then decomposed by type of activities offshored (production vs. support) or by the business structure (performed by their own offshored facilities or contracted-out) (Table 2).

Table 2: Business activities fragmentation models*

Model	Estimation
A1	Estimation of "GVC" on enterprises' performance
A2	Estimation of "GVC by type of activities (production vs. support)" on enterprises' performance
A3	Estimation of "GVC by business structure (insourcing vs. outsourcing)" on enterprises' performance

* A fourth model has also been tested dealing with outsourcing in Canada. Results are not discussed in this brief but are available in the research paper.

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IC Insights Data Table

Monthly Economic Indicators

		Month-over-month growth (at monthly rates)			Q-o-q growth	Year-over-year growth	
	Reference period	Latest month	Prev. month	2 Months before	2014 Q3	2013	2012
Mfg sales (current $)	Dec '14	1.7	-1.3	-1.2	2.1	0.3	3.4
Mfg sales (constant $)	Dec '14	2.9	-1.3	-1.0	2.0	-0.9	2.9
Retail trade (current $)	Nov '14	0.4	0.0	0.9	1.2	3.2	2.5
Retail trade (chained $)	Nov '14	0.8	0.0	0.9	1.1	2.9	1.8
Real GDP	Nov '14	-0.2	0.3	0.4	0.6	2.1	2.0
-Services	Nov '14	0.0	0.3	0.2	0.8	2.0	1.8
-Manufacturing	Nov '14	-1.9	0.6	0.7	1.2	-0.3	1.9
Exports (bop) (current $)	Dec '14	1.5	-2.6	-0.7	1.6	3.5	1.4
Imports (bop) (current $)	Dec '14	2.3	-3.1	1.1	1.2	2.6	4.0
All-items CPI	Dec '14	-0.1	-0.2	0.1	0.3	1.0	1.5
Core CPI	Dec '14	0.2	0.1	0.2	0.5	1.2	1.7
LFS employment (Δ in 000s)	Jan '15	35.4	-11.3	-16.3	45.6	125.7	312.1
Unemployment rate (%)	Jan '15	6.6	6.7	6.7	7.0	7.1	7.3
US employment (Δ in 000s) (CPS)	Jan '15	759.0	111.0	71.0	360.0	1,391.0	2,390.0
US unemployment rate (%)	Jan '15	5.7	5.6	5.8	6.1	7.4	8.1

Financial Indicators

			Monthly average			Annual average	
	Reference period	Current value	Latest full month	Prev. month	2 Months before	2013	2012
Bank rate (%)	Feb 12 '15	1.00	1.00	1.25	1.25	1.25	1.25
Exchange rate	Feb 12 '15	124.6	121.2	115.3	113.3	103.0	99.9

Quarterly Economic Indicators

		Quarter-over-quarter growth (at annual rates)			Year-over-year growth	
	Reference period	Latest quarter	Prev. quarter	2 Quarters before	2013	2012
Real GDP	2014Q3	2.8	3.6	1.0	2.0	1.9
Final consumption expenditure	2014Q3	2.0	3.4	1.0	1.9	1.7
Gross fixed capital formation	2014Q3	5.3	3.1	-2.7	0.4	4.8
-Machinery & equipment	2014Q3	5.2	1.4	-5.0	-1.7	1.9
Exports	2014Q3	6.9	19.0	0.9	2.0	2.6
Imports	2014Q3	4.0	9.8	-4.8	1.3	3.7
Final domestic demand	2014Q3	2.8	3.3	0.1	1.5	2.5
Labour productivity	2014Q3	0.4	8.1	-0.1	1.1	0.0
Unit labour cost	2014Q3	1.0	-0.1	1.7	1.3	3.0
Industrial capacity utilization (%)	2014Q3	83.4	82.8	82.1	81.2	81.5
Real US GDP	2014Q4	2.6	5.0	4.6	2.2	2.3

Abbreviation Guide	
GDP	*Gross Domestic Product*
BOP	*Balance of Payments*
CPS	*Consumer Price Index*
LFS	*Labour Force Survey*
CPS	*Current Population Survey*
000s	*Thousands*
Q-o-q	*Quarter-over-quarter*
IMF	*International Monetary Fund*
OECD	*Organisation for Economic Co-operation and Development*
WTO	*World Trade Organisation*

Sources for the IC Insights Databoard	
Statistics Canada	www.statcan.gc.ca
Bank of Canada	www.bankofcanada.ca
US Bureau of Economic Analysis	www.bea.gov
US Bureau of Labour Statistics	www.bls.gov

IC Insights Hot Chart

January 2015 IMF WEO Update Projections (Percent Change)

			Projections		Difference from October 2014 WEO	
	2013	2014	2015	2016	2015	2016
World Output	3.3	3.3	3.5	3.7	-0.3	-0.3
Advanced Economies	1.3	1.8	2.4	2.4	0.1	0.0
United States	2.2	2.4	3.6	3.3	0.5	0.3
Euro Area	-0.5	0.8	1.2	1.4	-0.2	-0.3
Germany	0.2	1.5	1.3	1.5	-0.2	-0.3
France	0.3	0.4	0.9	1.3	-0.1	-0.2
Italy	-1.9	-0.4	0.4	0.8	-0.5	-0.5
Spain	-1.2	1.4	2.0	1.8	0.3	0.0
Japan	1.6	0.1	0.6	0.8	-0.2	-0.1
United Kingdom	1.7	2.6	2.7	2.4	0.0	-0.1
Canada	2.0	2.4	2.3	2.1	-0.1	-0.3
Other Advanced Economies	2.2	2.8	3.0	3.2	-0.2	-0.1
Emerging Market and Developing Economies	4.7	4.4	4.3	4.7	-0.6	-0.5
Russia	1.3	0.6	-3.0	-1.0	-3.5	-2.5
China	7.8	7.4	6.8	6.3	-0.3	-0.5
India	5.0	5.8	6.3	6.5	-0.1	0.0
ASEAN-5	5.2	4.5	5.2	5.3	-0.2	-0.1
Brazil	2.5	0.1	0.3	1.5	-1.1	-0.7
Mexico	1.4	2.1	3.2	3.5	-0.3	-0.3
South Africa	2.2	1.4	2.1	2.5	-0.2	-0.3