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Developing an extended and more agile external accounts program[1]

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Statistics Canada

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[1] This paper and presentation were prepared for the meeting. The views expressed are those of the author and do not necessarily reflect the views of the BIS, IFC, BoP, ECB or the central banks and other institutions represented at the meeting.

Developing an extended and more agile external accounts program

Jennifer Withington, Statistics Canada

Traditionally, the conceptual framework of the external accounts has been focussed on better understanding the size and nature of products, services and investment exchanged between countries. While measuring economic activity between countries is and will remain crucial in the future, policy needs have evolved rapidly in recent years towards assessing the impact of global activity within domestic economies and better measuring the extent to which local economic agents benefit, or could benefit further, from this activity. Access to more sub-national level data is required to support this analysis.

In order to better address these evolving needs, a number of initiatives have been launched at the international level in the context of a broader external accounts framework. Several countries have started to develop new products that can be seen as extensions to their core external accounts program. Statistics Canada has put in significant effort in modernizing to better reflect the changing world and meet users' needs.

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A Changing World

The world in which we live is rapidly changing. It's becoming more complex and intertwined. With the globalization of our economy and changing views of societal issues – more than ever – objective quality data must drive evidence-based policy and decision making.

At the same time globalization has changed the way firms operate, with complex corporate structures and operational arrangements which allow funds to move through multiple jurisdictions before reaching their final destinations and maximizing operational profits.

Canada has a relatively small open economy, and over the last 90 years, Statistics Canada has developed and disseminated a rich set of data that measures Canada's transactions with the rest of the world. While these data have served policy makers, academics and citizens well, the data are losing their relevance in the globally interconnected world in which firms and individuals find themselves. Until recently, our statistics did not tell the full story of Canada's role in the global economy.

Changing Users

It is clear that as the world changes, users require stronger tools to enable them to understand these highly complex international transactions. At the same time big data is growing, data users are more literate and are looking to data to guide innovation and make business decisions. While globalization has made users focus on the international market, they also want to do so with increasing granularity.

It is no longer enough to simply report what we trade and where it goes or where it comes from. Policy makers want to know who is trading, what Canada's value added is in the global value chain, how exposed we are to global financial markets and what the outcome of foreign direct investment is—both inside and outside of Canada. Simply, Canadians are no longer satisfied with the what and where, but are asking Statistics Canada about the who and the why.

This is an important story to tell since roughly a third of our GDP is related to international trade in goods and services. More than 12% of all Canadian jobs are linked to foreign direct investment in Canada. Non-residents hold more than $1 trillion in Canadian government and corporate bonds. If we do not have the proper tools to examine that changing role, we cannot develop appropriate policy that leads to a strong and stable Canadian economy.

Changing Statistical Agency

Over the last decade, Canadians and businesses increasingly want to be informed and expect to have high quality, real time data. There is a growing cadre of data savvy users while at the same time, the public is consuming information in an entirely different manner. There is also a proliferation of data providers who are ready to furnish data that have traditionally been the domain of Statistics Canada.

Statistics Canada is well aware of the rapidly changing world and evolving need of users. In response, Statistics Canada has recognized the importance of modernizing its operations and its approach as a statistical agency. Statistics Canada's modernization initiative is centred of 4 basic pillars; User centric delivery service, leading-edge methods and data integration, statistical capacity building and leadership and sharing and collaboration.

User centric delivery means that users have the data they need when they need it with the tools and knowledge required to full leverage the information.

A focus on leading edge methods has brought about a shift from relying primarily on surveys as a collection vehicle to taking an "administrative data first" approach. This involves looking internally and externally to all possible administrative data sources.

Leading edge methods also implies a focus on new methods such as machine learning, data linking, modelling and "nowcasting" which increase the scope and quality of data that can be produced.

Statistical capacity building is more outward oriented and focuses on ensuring that users have the tools and knowledge to understand and use our statistics to their greatest advantage. Many government departments in Canada recognize the importance of data and are in the process of developing data strategies. Statistics Canada would like to play a leadership role in these data strategies and would like to help users have the tools and knowledge necessary to full leverage our data.

This is underpinned by the notion of a modern and flexible operation which will reduce costs, streamline processes to allow for a more agile corporation.

An Enhanced Balance of Payments

While the primary focus of the Balance of Payments remains rooted in the macroeconomic accounts, the need for change has become clear.

As mentioned, the International Accounts and Trade program was created at a time when simple two-way merchandise trade accounted for the vast majority of transactions and was the primary focus of policy makers' interest. Now interest has evolved and users are increasingly interested in a variety of other elements, many of which are complex in nature. The International Accounts program must evolve to reflect this new world.

Statistics Canada has begun to pursue further initiatives that are extensions of the core international accounts, while remaining full grounded in their traditional concepts. The goal of these supplementary data is to better reflect the changing world, and to meet evolving user requirements.

The supplementary nature of these emerging products provides additional flexibility to compilers to construct experimental – but not less relevant – datasets as they are usually not bounded by more stringent statistical frameworks (i.e., the residency or economic territory definitions), as is the case for official external accounts. They also offer the potential to better respond to users' needs for more sub-national data.

To enable the development of supplementary data sources, a project was initiated, enhancing the International Accounts. The importance of this exercise was fully recognized by our government partners and long term funding was secured.

All areas of the Balance of Payments have been enhanced and will continue to be expanded with an ambitious timeline that is in line with users' priorities.

Given the backdrop of modernization, the emphasis was on the creation of an innovative statistical infrastructure maximizing the use of existing micro-data and record linkage techniques while being able to connect the details with established macro aggregates. This approach provides us with the agility required to better meet user needs. Client feedback and developments in international standards have also influenced the setting of priorities.

Over the last years, we have developed a number of innovative data products that help tell the story of Canada's changing role in the global economy.

The outcome of this proposal includes addressing data gaps and enhancing statistics in the following areas:

- International trade in services including international trade in digital services and products – an area of growing importance.

- Properly measuring global production and addressing data gaps associated with global value chains and mismeasurements in Canada's estimate of gross domestic product due to the growing amount of goods production abroad by Canadian producers.

- Providing more detail regarding Canada's foreign direct investment flows including increased industrial, geographic and directional detail.

All of these products are considered extensions of Balance of Payments data and concepts and are based on the original Balance of Payments source data. Development of the extensions, in many cases was made possible by the availability and accessibility of a core Balance of Payments program.

While these data gaps are not specific to Statistics Canada, the centralized nature of the agency and its modern approach has provided some unique opportunities to address these gaps.

The end results are a new set of very granular statistics – including sub-national detail – with high data quality standards at relatively low costs, enhancing the ability of the organization to support evidence-based policy decision making.

While improvements have been made in all areas of the Balance of Payments, the focus for this paper will be put on two products that are more tangential, the programs on Activities of Multinationals Enterprises (AMNEs) and Trade by Enterprise Characteristics (TEC) will be described, focussing on the key enablers of their creation.

Trade by Enterprise Characteristics

Traditional statistics on international merchandise trade provide detailed information on products traded between Canada and the rest of the world and are very timely.

They are crucial for trade negotiations and provide users with an understanding of who our partners are and measure the intensity of trade with these partners.

They, however, do not provide insights such as who is engaged in such activity in the country, what are the characteristics of traders and how these characteristics differ from those who are non-traders could provide additional insights to policy-makers to develop more efficient policies in order to expand and diversify exporting markets for Canadian enterprises.

It is also when these data are combined with other data that they start to reveal a richer perspective and become more useful to understand the importance and the nature of trade in the economy. Once again we have extended our merchandise trade statistics, stayed true to current account concepts and simply expanded them.

Many countries have a trade by enterprise characteristics product. Canada, however, has a trade by importer and exporter characteristics program. This was done purposely to reflect the fact that information is linked at both the establishment and enterprise unit. Enterprise data supports analysis at the national level and allows for the linkage of consolidated financial data. It is at this level that we can link variables such as services, employment, R&D, imports and exports.

Statistics Canada is at an advantage in this regard. Having access to a business register and a number of other indicators allow us to link all the information together and gain a full portrait of our traders. Furthermore, when existing data sources are used, it minimizes the additional costs, both monetary and in terms of response burden.

The Canadian Business Register is a comprehensive, continuously maintained central repository of baseline information on businesses and institutions operating in Canada. As a statistical register, it provides listings of units and related attributes.

The primary point of linkage is the customs data (import and export declarations) which is a census of all merchandise that enters and exits the country. TIC and TEC data are also linked to the Survey of Employment, Payroll and Hours as well as our inward and outward affiliates programs.

Enterprise and establishment data are both included as the establishment level is more suitable for provincial analysis as it more closely reflects the local activity. This is particularly important for a vast and regionally diverse country such as Canada. Data for employment, manufacturing, imports and exports can be linked at this level.

Approximately 400 million transactions are processed per year.

The result is a rich data set that include 20 data tables including the following variables:

- Employment size
- Number of partner countries
- Concentration of exports
- Industry
- Export size
- Related party
- Country of destination
- Number of enterprises

- Firm size

With establishment data we can produce more accurate sub-national data. This subnational data allows users to better understand the regional variability in trade activities and pinpoint opportunities for development. There has been strong user demand for even more granular data, so that in September this year, Trade by importer and exporter data by Census Metropolitan Area (CMA) were produced for the first time for Canada's 35 CMAs. These data provide users with a portrait of traders by major city that can be compared to other cities and even with non-census-metropolitan areas.

While the analytical potential is strong with all these data, having such granularity can be overwhelming. To that end, Statistics Canada developed an interactive tool, using Power BI to help facilitate analysis.[1]

All this work is in line with Statistics Canada's modernization goals of using modern methods and being more clients centric.

At the requests of clients and in the interest of policy-makers, these extensions have been taken even further. For instance, special studies have been done on province to province trade for Canada and China. A study is also under way for sub-Saharan Africa.

Processes have also been modernized so that not only are we linking, but we are linking smarter. While originally much of the linkage was done manually, efforts have been made to automate the linkage process. A process that once required upwards of 10 staff can now be done with a couple of staff and automated linking. Having the information readily available and automated enables Statistics Canada to produce the data 5 months after the reference period, compared to an average of 18 months for other countries.

Multinational Enterprises in Canada Program

Statistics Canada has been publishing estimates of Canada's foreign direct investment abroad and foreign direct investment in Canada since 1926. The traditional view of measuring foreign direct investment was to measure the origin and level of foreign investment. These measures remain important both within and outside the Balance of Payments framework and Statistics Canada continues to refine these estimates in order to produce a more robust capital account.

Today, however, more and more people want to better understand the outcomes associated with foreign investment with respect to jobs, trade and financial stability. This has given rise to a new and expanded set of foreign affiliate statistics which highlight the importance of foreign-owned firms in the Canadian economy. This program has been expanded to measure the economic and financial activity of both foreign and Canadian multinationals in Canada and helps measure the extent of globalization phenomenon within the Canadian economy.

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[1]   https://www150.statcan.gc.ca/n1/pub/71-607-x/71-607-x2019009-eng.htm

While the multinational concept uses the majority owned concept, differing from the FDI threshold of 10% the difference is considered minor since the vast majority of FDI firms in Canada are in fact majority owned.

The multinational enterprise in Canada program is built upon a strong foundation of various data sources which allows for a rich analysis. It provides further insight on the impact of foreign MNEs in Canada and has recently been expanded to allow for the comparison with domestic enterprises both in terms of performance and contribution to the Canadian economy.

Once again, the ability to link together a number of data sources is one of the strengths of this program. In this case data linkages are primarily done at the enterprise level, given that the data are largely financial in nature. The primary data sources used to identify multinationals include the International Investment program, various tax schedules as well as the inter-corporate ownership program and labour statistics. Financial variables are linked to the Annual Financial and Taxation Statistics for Enterprises and are benchmarked to national accounts totals.

The extensive linking provides a comprehensive portrait of multinational enterprises both on an immediate and ultimate basis. Values include:

- Number of employees' assets

- geographic location

- industry

- R&D expenditures

- exports and imports

- operating expenses

- value added.

All these variables allow policy maker's insight into the contribution of multinationals and the outcomes of their presence.

Linking the data is an effective and cost-effective way to add dimensions to datasets. Once the initial work has been done to link at the enterprise level, there are economies of scale to adding extra variables. Quality control work is still done to ensure that any additional variables are well linked are of good quality and are coherent across the series of variables.

While the data series come from a number of different areas at Statistics Canada, the integrated nature of the agency allows for the easy sharing of data sources all on a common infrastructure. Furthermore, the centralized Business Register provides a common identifier for enterprises and clearly details which data sources can be leveraged. For example, the international accounts program has added flags for multinationals and for traders to help enrich the analysis of other survey programs by providing another variable for analysis. Generally program areas are willing to share their data through a common infrastructure and provide their subject matter expertise to the linking exercise.

Recently, Statistics Canada has gone further to complete the picture of multinationals in Canada by adding Canadian multinationals. This enriches the analysis by providing a point of comparison for the performance of foreign multinationals and the benefits that they bring to the Canadian economy. It answers the question of whether these multinationals are bringing jobs to the Canadian

economy along with many others. Who is boosting GDP? Are their profits being reinvested here or going back to their home country? Are they exporting more? Are they concentrated in specific industries, specific provinces? Are we better off supporting Canadian firms? Non-multinationals are also included in the analysis to see the full economic impact and as an extra point of comparison.

Taking the framework and foundation of the FDI program, and extending it by making micro-macro linkages can be beneficial to both the core program and help answer whether domestically engaged firms behave differently from those that are internationally engaged as well. This can be studied by a number of perspectives for instance is certain industries more likely to be internationally engaged and can help identify lost opportunities.

These extensions also help us to further refine our analysis in a way that would not be ideal with the traditional framework alone. For instance, the FDI program is sampled to be as efficient as possible, focusing on larger units. At the same time, policy experts are focused on SMEs and their promotion. Extended programs such as the multinationals can use the micro-macro framework to identify SMEs, thereby allowing breakouts of information by size of firm. Given their flexibility, these programs can be further extended to view the data through other lenses such as Gender-based analysis (GBA), a focus of the current government.

Granularity and Confidentiality

Statistics Canada has developed a number of new products recently to better illustrate Canada's role in the global economy and the impact of trade and foreign investment in the Canadian economy, at the national and provincial level. While the world becomes more and more globally integrated, demand from users is to have access to more granular data, at the provincial, regional and even city level in order to properly assess the impact of globalization in their local economy and to take advantage of the structural and economic changes in their community.

In Canada, the development of these products coincided with the desire of the statistical agency to modernize its operations in order to become more user-centric and make better use of leading-edge methods and data integration. All these new products were developed against the backdrop of the modernization initiative undertaken by Statistics Canada. They involved the creation of an innovative statistical infrastructure maximizing the use of existing micro-data and record linkage techniques while being able to connect the details with established macro aggregates.

At the same time, Statistics Canada is fully committed to respecting the confidentiality of its respondents/administrative data sources. In fact, its reputation and ongoing success rely on how. How do we reconcile the two? How do we provide users with the increased granularity that they require while at the same time continue to respect confidentiality that is central to Statistics Canada's values?

Our approach to confidentiality has also been modernized and the requirements have been looked at in a more nuanced manner. Traditionally, confidentiality has been introduced through a rigid set of rules that took the most conservative approach; the first instinct would be to make the data (and much of the grouping data) confidential. While this approach was safe, and the risk of identifying a firm's

data was nil, this resulted in too much of our data being suppressed, thereby reducing the usability of our data. What is the point of producing all this data if much of it can't be used?

We have tried to move the needle slightly and look at protecting confidentiality in more innovative ways. Random Tabular Adjustment (RTA) is being increasingly applied to our surveys in order to minimize suppression. RTA applies random adjustment to sensitive estimates by perturbing the data with random noise. A balance must be found so that confidential data cannot be identified yet without compromising the overall picture and quality of data. In certain areas such as the National Accounts, it was felt that the many adjustments already made to the data to align with SNA concepts were in fact acting as an RTA and the potential firms engaging in the activity was large.

As a result of these renewed methodologies, many data cells have been made available, greatly enhancing the usability of our data and meeting user requirements for greater granularity. Nonetheless, when linking data, the confidentiality rules of the supplying data program are always protected. We ensure that nothing that has been suppressed by the supplying data program will be revealed through our data linking. This is vital for the ongoing success of our program. Our confidentiality plan was vetted with the source programs and our approach is regularly reviewed to see if we can increase the number of cells released.

Impacts on Core Estimates

While some of the focus has shifted to expanded uses of the international accounts, our priority and primary mandate remain the Balance of Payments. How has this shift towards extensions impacted the core? In many ways the two products are complementary, leveraging data from the financial accounts and adding context. The additional details enable the data compilers to do more coherence analysis and further inspection of the granular data generally lead to better quality aggregates. Nonetheless there are risks associated that without sufficient resources and a proliferation of products, the core products could get less attention.

In creating the micro-macro frameworks discussed in the paper and extending our traditional external account frameworks, we are positioning ourselves to answer the policy questions of the day. In fact, we can look beyond this framework to get a better understanding of those outside the framework. This will help policymakers identify potential opportunities and understand the behaviour of those not engaging in the international sphere.

Statistics Canada will continue to balance various requirements in order to remain relevant in the future. By communicating regularly with users and striving to meet their needs, Statistics Canada will endeavour to continue to evolve while maintaining its reputation for quality information. This can largely be achieved by leveraging extending long-standing programs such as the external accounts. Statistics Canada will do so by continuing to build on the strong foundation of the external accounts and by doing so in an efficient manner leveraging existing resources.

The World is changing and the statistical system must adapt to remain relevant

Growing importance of services in the economy. Way of consuming services has changed.

Canadian firms are highly involved in global value chains. Focus of trade has shifted on Trade in value added.

The 'what' we trade is important but 'who' is trading has become an important question.

Measuring the extent of direct investment is crucial, but assessing the impact of such investment has taken greater importance.

Statistics Canada's Modernization

Statistical Capacity building and leadership

Outcomes

Whole of government, integrated approach to collection, sharing, analysis and use of data is established.

Statistics Canada is the leader in fostering savvy information and critical analysis skills.

Statistics Canada increases statistical literacy of Canadians and facilitates the responsible use of data for decision making.

User-Centric Service Delivery

Outcomes

Users have the information/data they need, when they need it, in the way they want to access it, with tools and knowledge to make full use of it.

Partners and stakeholders use the information provided by StatCan to make informed decisions.

Lower response-burden for Canadians.

Modern workforce and flexible workplace

Outcomes

Organization is agile, flexible and responsive to client needs.

Statistics Canada has the talent and environment required to fulfill current business needs, and remains open and nimble to adapt to future demands.

Sharing and collaboration

Outcomes

Programs and services are delivered taking a coordinated approach with partners and stakeholders.

Partnerships allow for open sharing of data, expertise and best practices.

Barriers to accessing data are removed.

While still protecting privacy and confidentiality, the number of suppressions in data products are minimized.

Leading Edge Methods and Data Integration

Outcomes

Statistics Canada has access to new or untapped data, the role of surveys is modified and greater reliance is placed on modelling and integration capacity thought R&D environment.

Modern approaches are utilized to disseminate data and metadata by providing data through alternate mechanisms that are in line with today's technology.

A culture shift in our thinking.

Collaborative

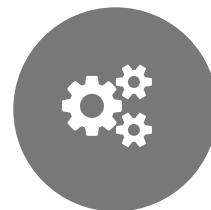Drop the mentality that we are the only ones who can do what we do. .

Process Savvy

Be strategic in the evolution of our business processes rather than letting processes develop hap-hazardly and independently

User-Centric

Put as much effort into user access as we do in the development of the product.

Modern Methods

Accept that an Algorithm is better than a pencil. .

Workforce

Develop new skill sets that leverage the increasing volume of data available to NSOs

Market Oriented

Stop producing technical documents that are verbose and inaccessible.

Modernized Strategy for International Trade and Globalization Measures

Pillar 1
International Trade in Services

Pillar 2
Firm Characteristics

Pillar 3
Foreign Direct Investment

Pillar 4
Economic Globalization

Pillar 5 Survey on Innovation and Business Strategy

Introduction – TIC and TEC

Centralized Business Register (CBR)
- Business number
- Legal entity
- Enterprise
- Establishment
- Number of employee
- Industry
- Province

Trade by Importer Characteristics (TIC): Goods

Trade By Exporter Characteristics (TEC): Goods

Inward Foreign Affiliates Statistics

The population of importers is almost 4 times larger than exporters

- domestics vs. foreign
- importer vs. exporter
- trader vs. non-trader

Sample findings…
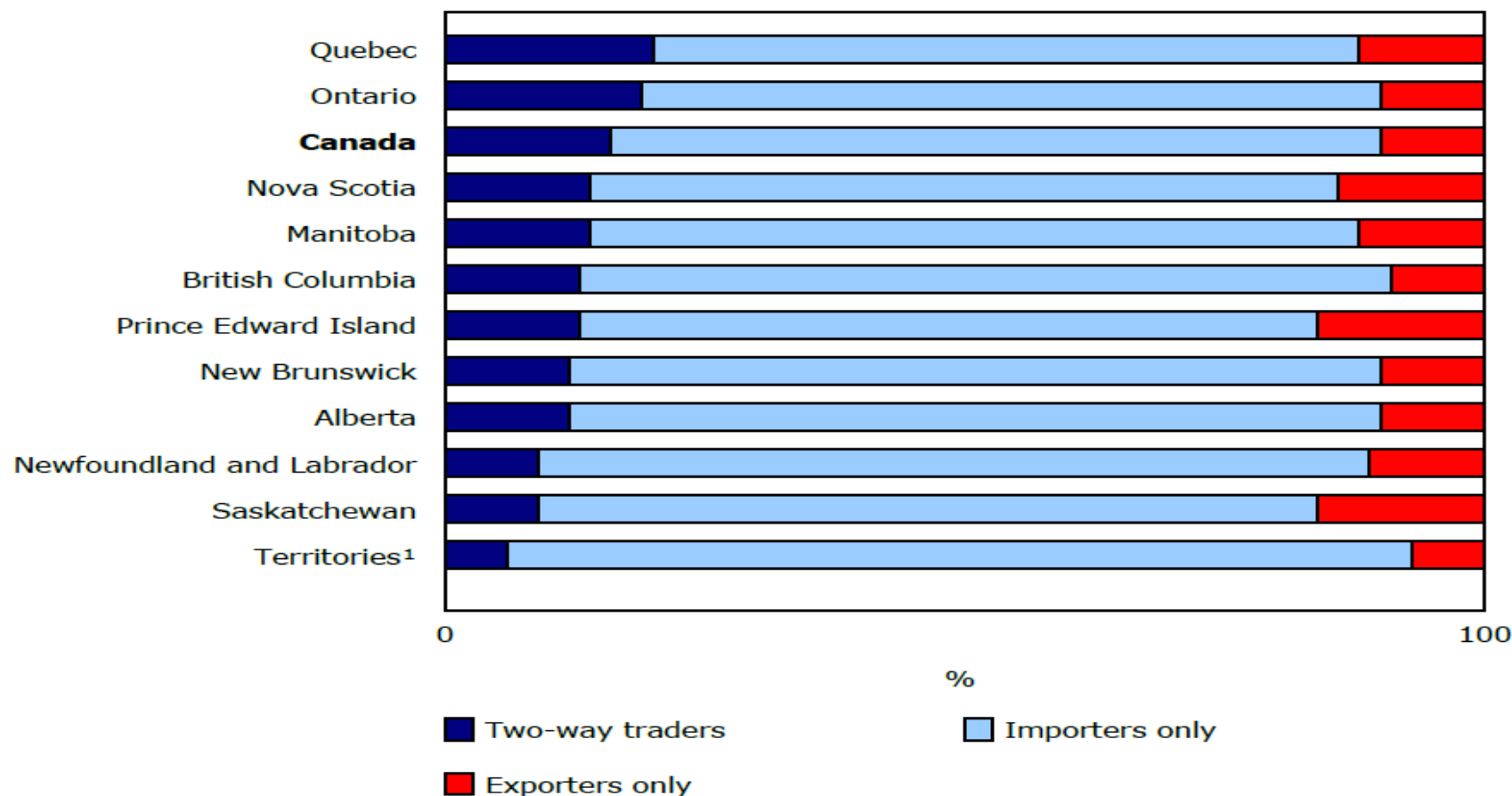
Note(s): Trader types include two-way traders, firms that both export and import goods, and firms that either only export, or only import goods.
Source(s): Trade by Exporter Characteristics – Goods (5124); Trade by Importer Characteristics – Goods (5237).

Sources:

1. Trade by exporter and importer characteristics: Goods, 2018 Daily release, May 14, 2019, Statistics Canada

Sample findings

billions of dollars

☐ Imports ■ Exports
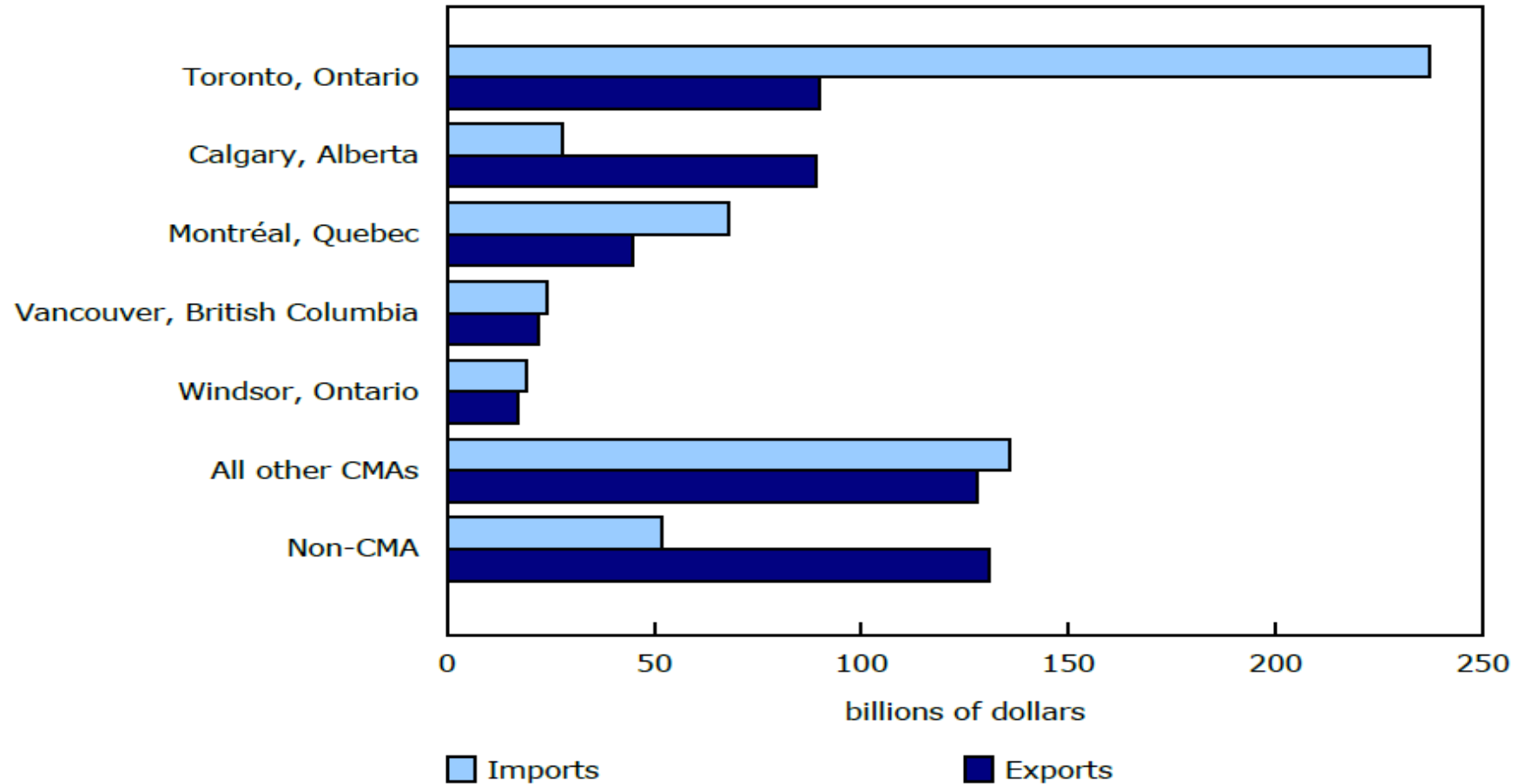
Finding exporters and importers by clicking a map

Infographic 1 – Trade in goods by exporter and importer characteristics - Interactive tool

Source: https://www150.statcan.gc.ca/n1/pub/71-607-x/71-607-x2019009-eng.htm
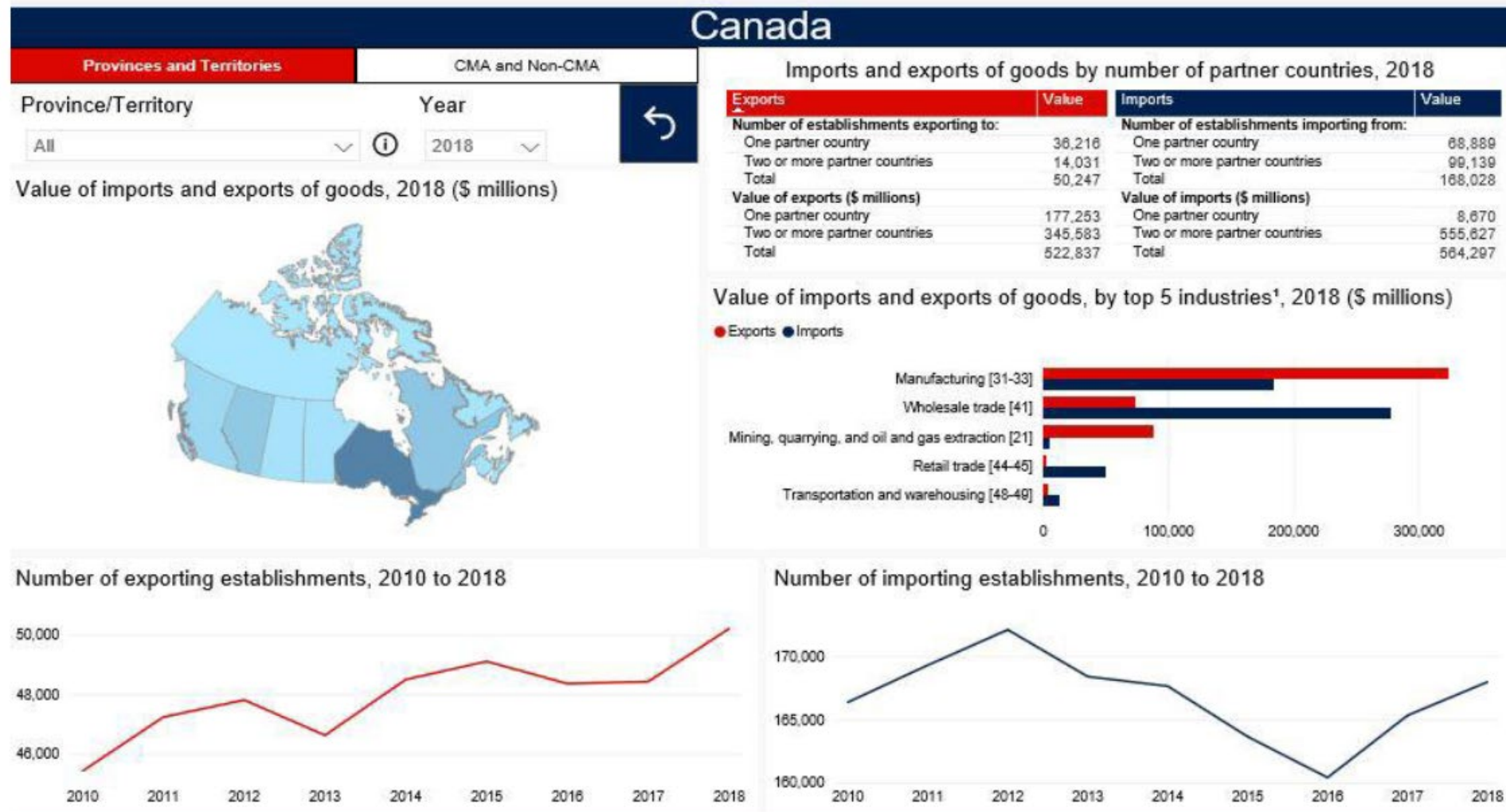
Canadian goods exports to China
Customs basis vs. Consignee basis (value in billions)
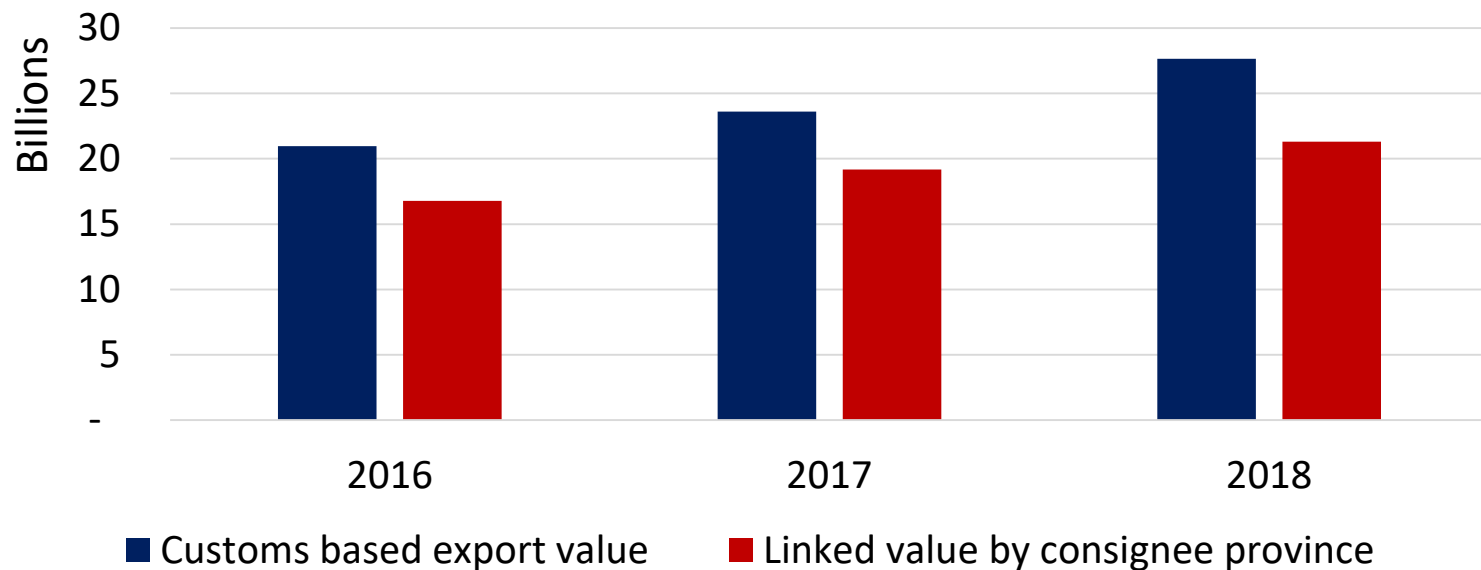
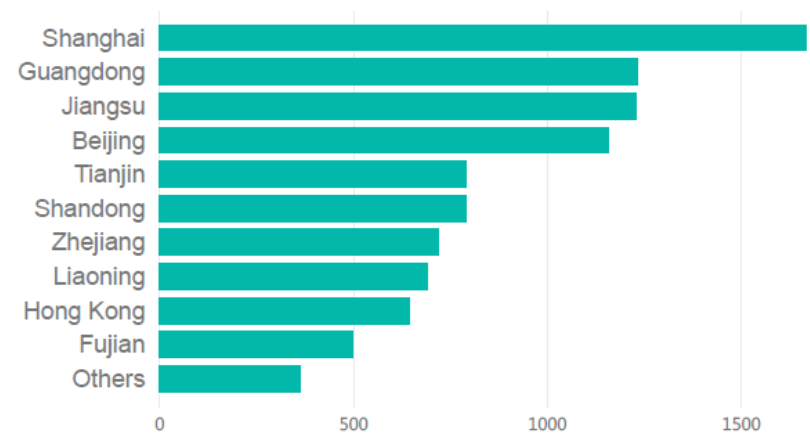# Goods exports from Canadian provinces to Chinese provinces, 2018

Export value by Chinese province

Export value by Canadian province, 2018

Number of exporters by Chinese province

Shanghai
Guangdong
Jiangsu
Beijing
Tianjin
Shandong
Zhejiang
Liaoning
Hong Kong
Fujian
Others

0   500   1000   1500

Scope of AMNE

business number, legal entity, enterprise, establishment, industry, province, sector, count

Trade by Importer Characteristics (TIC): Goods
IATD

Trade by Exporter Characteristics (TEC): Goods
IATD

Gross domestic product (value added)
NEAD

R&D expenditures and personnel
ISTD

Canadian Multinationals in Canada

Foreign Multinationals in Canada

Non-multinationals in Canada

Imports and exports of commercial services
IATD

Financial indicators (assets, revenues)
IOFD

**International technological receipts and payments**
IATD

Number of Jobs
NEAD & SEPH

Number of enterprises
BR

1. Exporters who are importers
2. Exporters and importers that are Canadian- (CMNEs) or foreign-controlled (FMNEs)
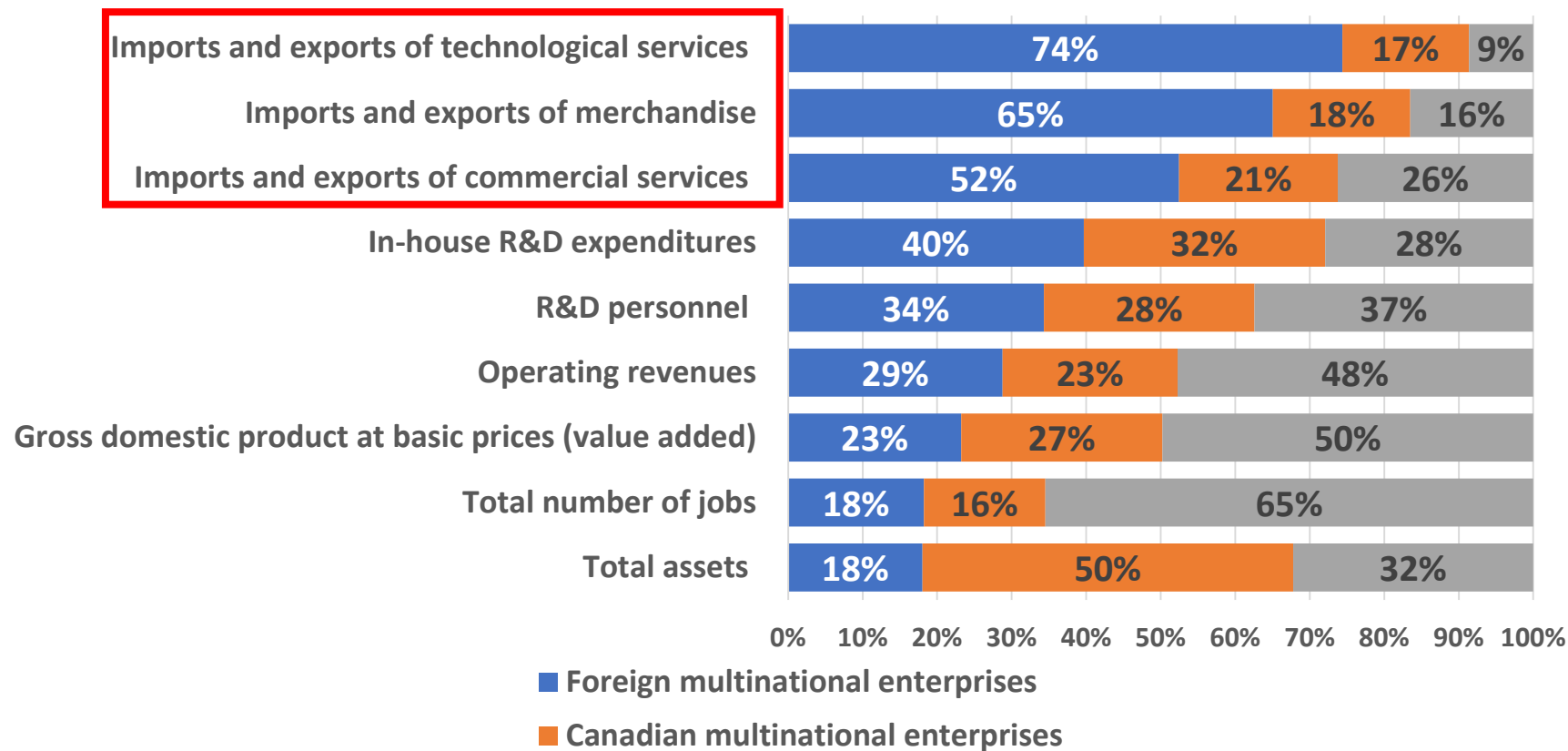3. By sector or by industry
4. SMEs or large enterprises

FMNEs continuously outnumbered CMNEs throughout the 8-year period

Number of multinationals in Canada, 2010 to 2017

Delivering insight through data for a better Canada
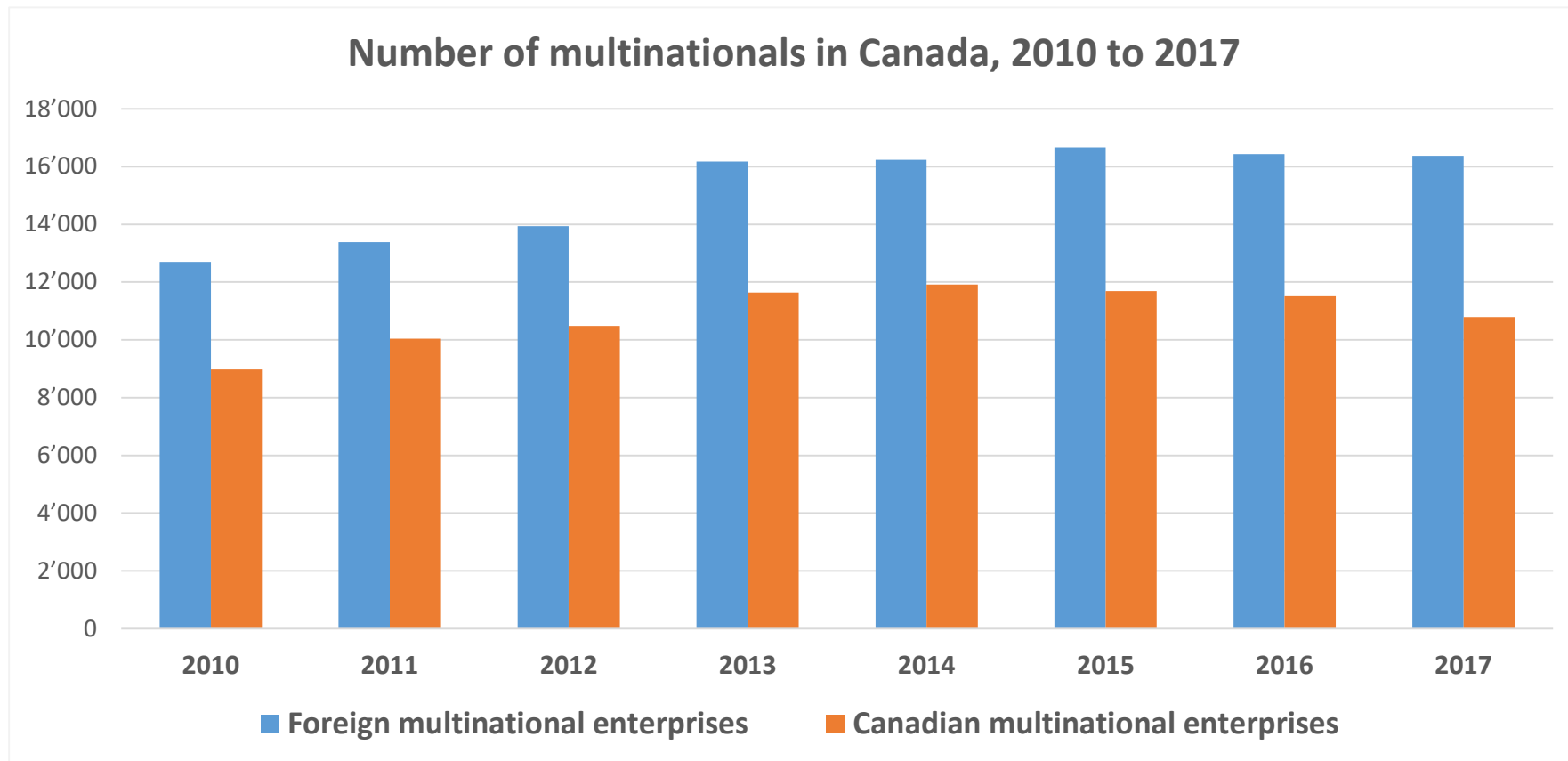
FMNEs accounted for a larger share of most corporate activities compared to CMNEs except for assets and GDP

Activities of multinational enterprises in Canada, as a share of the corporate sector, 2017

	Foreign multinational enterprises	Canadian multinational enterprises	Other
Imports and exports of technological services	74%	17%	9%
Imports and exports of merchandise	65%	18%	16%
Imports and exports of commercial services	52%	21%	26%
In-house R&D expenditures	40%	32%	28%
R&D personnel	34%	28%	37%
Operating revenues	29%	23%	48%
Gross domestic product at basic prices (value added)	23%	27%	50%
Total number of jobs	18%	16%	65%
Total assets	18%	50%	32%

■ Foreign multinational enterprises
■ Canadian multinational enterprises

Note: % of value for all variables except R&D personnel and number of jobs.

Statistics Canada · Statistique Canada

Canadä

MNEs employed one-third of corporate workers

Percent of corporate sector jobs by type of corporation, 2017

- In 2017,
  - ➢ 34.5% of Canada's 12.6 million corporate workers worked at MNEs

  - ▪ Canadian MNEs: 16.3%
  - ▪ Foreign MNEs: 18.2%
    - —American MNEs: 11.6%
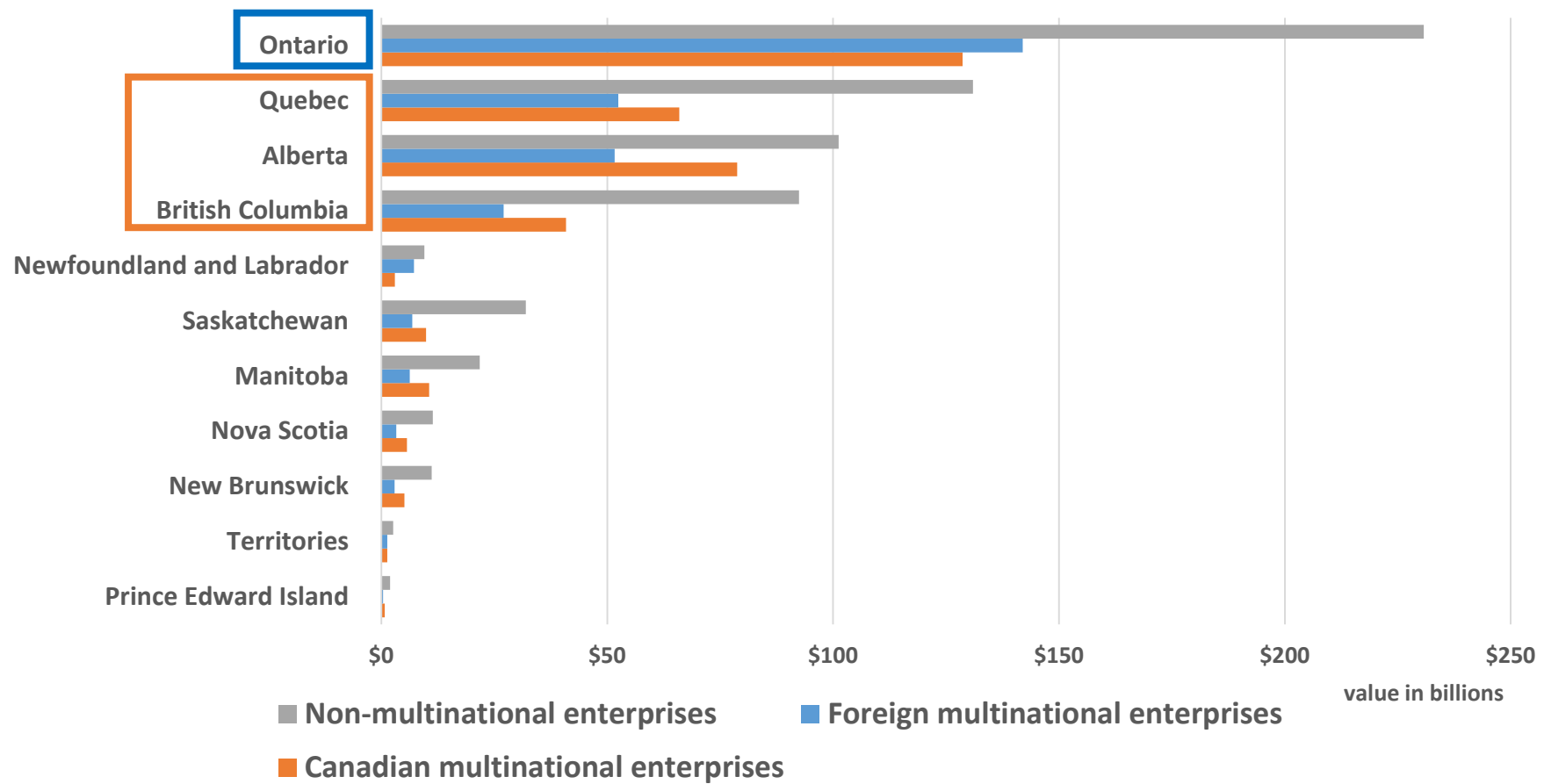   - —Non-American foreign MNEs: 6.6%

18.2%

16.3%

65.5%

■ Foreign MNEs   ■ Canadian MNEs   ■ Non-MNEs
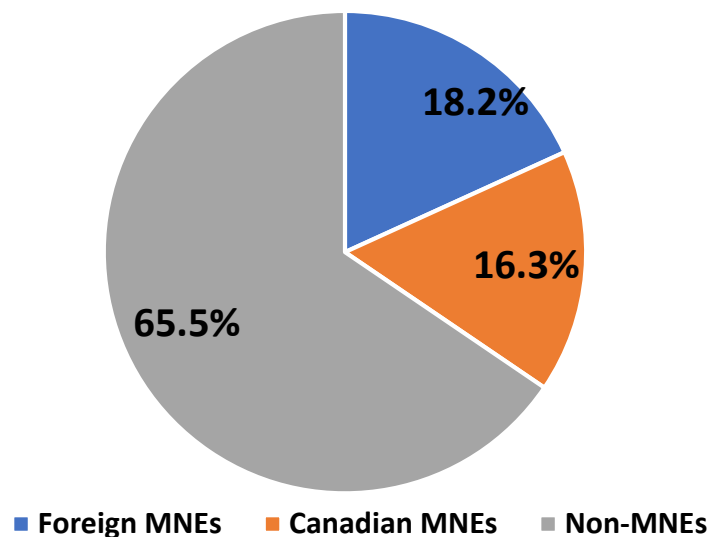
Source: Statistics Canada, 36-10-0356-01

FMNEs generated a larger amount of GDP compared to CMNEs in ON, whereas CMNEs contributed more to GDP in QC, AB and BC

Value of GDP by type of enterprise, by province, 2017

Provinces (top to bottom): Ontario, Quebec, Alberta, British Columbia, Newfoundland and Labrador, Saskatchewan, Manitoba, Nova Scotia, New Brunswick, Territories, Prince Edward Island

X-axis: $0, $50, $100, $150, $200, $250 — value in billions

Legend:
- Non-multinational enterprises
- Foreign multinational enterprises
- Canadian multinational enterprises

AMNE Interactive Tool