The Softwood Lumber Satellite Account: Sources, Methods and Preliminary Results

Table of contents

Executive summary

- This report describes the preliminary release of the Softwood Lumber Satellite Account (SLSA) for reference years 2013 to 2015. The SLSA presents a supply and use table at purchaser prices that provides detail on core industries and products related to the Canadian forestry sector, while aggregating all other industry and product detail.

- The SLSA situates the size and scope of several forestry-related industries and products within the economy as a whole. It integrates several Statistics Canada data products into the coherent macroeconomic framework of a supply and use table.

- The 2013 figures have been benchmarked to the published Canadian supply and use tables (CSUTs). The 2014 and 2015 figures have been benchmarked to the income and expenditure gross domestic product aggregates from the Provincial and Territorial Economic Accounts (CANSIM tables 384-0037 and 384-0038).

- The industries of interest range from loggers through to lumber, pulp and paper processing and finally, construction. These industries cover the major producers and users of products related to Canada's forestry sector. Specifically, NAICS 113, 115, 23, 321 and 322 are included.

- The products of interest range from logs through to lumber and panels and on to secondary converted paper products whose production ultimately depends on feedstock primarily originating in Canadian forests. Several core services, such as log harvesting and construction activities, are also included.

- The SLSA data differ from the Annual Survey of Manufacturing and Logging – Principal Statistics data. The differences are conceptual and methodological in nature. The SLSA uses the same concepts, classifications and structure as the Canadian System of Macroeconomic Accounts. Therefore, SLSA results are directly comparable with macroeconomic measures such as total economy gross domestic product, total output, exports, and final demand.

- The SLSA differs from the Natural Resources Satellite Account (which has a forestry element). The SLSA is built along industry lines (NAICS) whereas the NRSA is an activity-based compilation. Both accounts provide useful perspectives on the forestry sector.

- Gross value added from forestry-related industries increased in the years studied and amounted to roughly $20 billion per year. This $20 billion accounts for slightly more than 1% of Canada's total gross domestic product. In 2015, exports totalled more than $30 billion and imports totalled roughly $10 billion, resulting in a trade surplus of over $20 billion. Softwood products (of all types) were far more important than hardwood products in terms of gross added value. Contract loggers are extremely important components in the sector.

Background

Canada has the third-largest forested area in the world. It supports hundreds of thousands of jobs, and many billions of dollars in GDP and exports.[1] In this way, Canadian forests form the backbone of a large amount of economic activity. It begins with harvesting activities, where raw products are extracted from the forests, employing loggers, transporters, silviculture experts and tree farmers. The products continue through complex supply chains involving lumber producers, wood pellet manufacturers, particleboard and plywood makers, and pulp and paper mills. End users across Canada and the throughout the world benefit. Canadian lumber is used to build our homes, Canadian wood waste is used to heat our homes, and Canadian pulp produces the paper and packaging we see every day.

Canadian forestry supply chains have evolved to ensure that very little of what is harvested goes to waste: the right log for the right purpose. A "saw log" is different from a "pulp log." Sawdust is different from wood shavings, which are different from wood chips. Pulp made from softwoods has different characteristics than pulp made from hardwoods. Logs can be turned into lumber (of a variety of grades for a variety of uses), telephone poles or fence posts. Sawdust can be burned in boilers or used to make particleboard. Wood chips go to pulp mills. Planer shavings can be used for animal bedding. Canadian industry has evolved to make every effort to ensure that the maximum benefit is extracted from the harvested resource.

Management of Canadian forests is the responsibility of provincial governments. Each province takes a slightly different approach to how its forests are managed, though most have "tenure systems", i.e., mechanisms to impart rights to access a given area and harvest from it. Manufacturing end users in each province have also developed different means of acquiring their product. For example, in Nova Scotia, private land plays an important role in supplying products.[2] In British Columbia, nearly 100% of harvested products come from provincial Crown land. However, BC Timber Sales manages nearly 20% of the annual allowable cut, allowing for relatively easy access to the forests for smaller, short-term uses.

The diverse products originating in Canada's diverse landscape of forests, combined with a highly regulated environment for extraction, makes this a very complicated sector on which to generate statistics.

The Softwood Lumber Satellite Account

Statistics Canada produces a wealth of information on the forestry sector and its many supply chains. Statistics related to jobs, output, imports, exports and investment can be found among the many statistical products it releases. The Softwood Lumber Satellite Account (SLSA) complements this information by bringing it together in a consistent national accounting framework. In this way, the SLSA enables us to better understand the size, scope and evolution of the industry and place it in the context of the size, scope and evolution of Canada's total economic activity.

---

1. Natural Resources Canada. *The State of Canada's Forests*: *Annual Report 2016*
2. Nova Scotia Department of Natural Resources. Calendar Year 2014 / June 2015. *Registry of Buyers of Primary Forest Products* (Fig. 14).

Supply and use tables

The SLSA is constructed as a supply and use table.

Supply and use tables (SUTs) are a powerful tool with which to compare and contrast data from various sources and improve the coherence of the economic information system. They permit an analysis of products and industries at a very detailed level within a consistent, internationally recognized economic measurement framework.[3]

SUTs articulate the supply and uses of all products in the economy. A stylized version is shown in Table 1. The supply of a product can originate from domestic *production* or *imports* and is expressed in purchaser prices (the price paid by the final consumer of the good) after including *margins* for transport, trade, sales taxes and tariffs.

There are four broad categories of uses of products. Products can be used by businesses for the production of other goods or services (intermediate consumption); by households, government or non-profit institutions for final consumption; by businesses or governments as an asset for ongoing production (investment or capital formation); or to satisfy non-resident demand via exports.

Table 1: Stylized supply and use table

	Supply			Use			
	Domestic production	**Imports**	**Margins**	**Intermediate consumption**	**Final consumption**	**Capital formation**	**Exports**
Products							

In addition to presenting a complete articulation of product balances in the economy, SUTs bring together three different approaches to calculate gross domestic product (GDP):

1) The **production approach**, where gross value added is the balancing item after subtracting intermediate inputs from output.
2) The **income approach**, where GDP is calculated as the sum of the various types of returns to the factors of production—for example, operating surplus of firms and compensation of employees.
3) The **expenditure approach**, where GDP is measured using the basic macroeconomic formula, GDP = final household consumption + investment + government consumption + exports − imports.

By bringing together the three GDP measures and the product balances, SUTs allow us to compare the share of foreign demand and the share of domestic demand. We can examine how goods are produced. We can link this information with labour market data to understand jobs and compensation. We can build multipliers to understand the impacts of shocks on the economy. In short, SUTs are the most comprehensive analytical tool with which to examine the activities of a nation's economy.

---

3. United Nations Statistical Division. *System of National Accounts, 2008*, item 14.3, p. 271 (printed version), p. 329 (PDF version).

Industry, product and final demand classifications

Table 1 is constructed along two general dimensions: a "product" dimension, expressed in the rows of the SUT, and an "industry and final uses" dimension expressed in the columns. The benchmark Canadian supply and use tables (CSUTs) use the Supply and Use Product Classification (SUPC) for products, the Input-Output Industry Classification (IOIC) for domestic producers and intermediate consumption, and the Supply and Use Final Demand Classification (SUFDC) for disaggregating capital formation and final consumption. Each of these classifications is anchored to an International or North American standard classification system:

SUPC ➜ the North American Product Classification System (NAPCS)

SUPC ➜ the Harmonized System (HS) for trade

IOIC   ➜ the North American Industry Classification System (NAICS)

SUFDC ➜ COICOP for Final Consumption Expenditures by households

The SLSA is composed of 17 industries and 9 final demand categories. There are 57 products (including value-added components). Table 2 shows the relationship between the SLSA industries and their counterpart in the benchmark CSUT. The SLSA industries disaggregate three CSUT industries along NAICS lines, creating 10 new industries.

Table 2 – Concordance between Core CSUT and Satellite Account industries

CSUT-IOIC code	CSUT-IOIC title	SLSA industry code	NAICS 6-digit	SLSA industry title
BS113000	Forestry and logging	BS113110	113110	Timber tract operations
		BS113210	113210	Forest nurseries and gathering of forestry products
		BS113311	113311	Logging (except contract)
		BS113312	113312	Contract logging
BS115300	Support activities for forestry	BS115300	115310	Support activities for forestry
BS321100	Sawmills and wood preservation	BS321111	321111	Sawmills (except shingle and shake mills)
		BS321112	321112	Shingle and shake mills
		BS321114	321114	Wood preservation
BS321200	Veneer, plywood and engineered wood product manufacturing	BS321211	321211	Hardwood veneer and plywood mills
		BS321212	321212	Softwood veneer and plywood mills
		BS32121A	321215	Engineered wood product manufacturing
		BS32121A	321216	Engineered wood product manufacturing
		BS32121A	321217	Engineered wood product manufacturing
BS321900	Other wood product manufacturing	BS321900	Several	Other wood product manufacturing
BS322100	Pulp, paper and paperboard mills	BS322100	Several	Pulp, paper and paperboard mills
BS322200	Converted paper product manufacturing	BS322200	Several	Converted paper product manufacturing

BS23A000	Residential building construction	BS23A000	N/A†	Residential building construction
BS23B000	Non-residential building construction	BS23X000	N/A†	Construction (except residential building construction)
BS23C100	Transportation engineering construction	BS23X000	N/A†	Construction (except residential building construction)
BS23C200	Oil and gas engineering construction	BS23X000	N/A†	Construction (except residential building construction)
BS23C300	Electric power engineering construction	BS23X000	N/A†	Construction (except residential building construction)
BS23C400	Communication engineering construction	BS23X000	N/A†	Construction (except residential building construction)
BS23C500	Other engineering construction	BS23X000	N/A†	Construction (except residential building construction)
BS23D000	Repair construction	BS23X000	N/A†	Construction (except residential building construction)
BS23E000	Other activities of the construction industry	BS23X000	N/A†	Construction (except residential building construction)
All other supply-use industry codes		OTHERIND		All other industries

†Construction industries are not directly equivalent to NAICS in the CSUT. Rather, they are defined by the type of asset produced. In this way, construction is considered "activity-based" in the CSUTs.

The expansion of CSUT-IOIC BS113000 allows the activities of contract loggers to be analyzed separately from those of non-contract loggers. Given the system of forest management in Canada, this separation of activities is of analytical value. Tenure holders are given the right to harvest a certain amount of trees from a given area for a predetermined period of time. In other words, they are given ownership rights over the materials. However, many of these companies employ "contract loggers" to gather and transport the logs from the forest area to the mill that requires the material (e.g., a sawmill or a pulp mill). These harvesting companies do not themselves "own" the logs they harvest. Their revenues are earned by selling a "service." In contrast, companies in the non-contract logging industry are assumed to own the logs they harvest, and thus earn revenue by selling a log.

The expansion of CSUT-IOIC BS321100 allows for the isolation of the activities of sawmills, without mixing the input or output patterns or value added ratios of the other industries contained in the CSUT industry. Although these other NAICS are of relatively lesser size for most provinces, their outputs and inputs can be sufficiently different in nature to make it useful to distinguish their figures.

Finally, the expansion of CSUT-IOIC BS321200 allows for the distinction between hardwood and softwood panel producers and those producing other types of engineered wood products.

Table 3 provides a link between the CSUT products that are disaggregated in the Satellite Account. For the most part, it distinguishes between the hardwood and softwood varieties of the corresponding benchmark CSUT products. This facilitates the analysis of these two very distinct types of forest products.

Table 3 – Concordance between Core CSUT and Satellite Account products

CSUT-SUPC	CSUT description	Satellite product	Detailed title
MPG113001	Logs	MPG113001H1	Hardwood logs and bolts (except fuel wood and pulpwood)
		MPG113001S1	Softwood logs and bolts (except fuel wood and pulpwood)
MPG113002	Pulpwood	MPG113002H1	Hardwood pulpwood
		MPG113002S1	Softwood pulpwood
MPG113004	Rough untreated poles, posts and piling	MPG113004H1	Rough untreated poles, posts and piling of hardwood
		MPG113004S1	Rough untreated poles, posts and piling of softwood
MPG321103	Wood chips	MPG321103H1	Hardwood chips
		MPG321103S1	Softwood chips
MPG321201	Veneer and plywood	MPG321201H1	Hardwood plywood
		MPG321201H2	Hardwood veneer
		MPG321201S1	Softwood plywood
		MPG321201S2	Softwood veneer
MPG321908	Wood products, n.e.c.	MPG321908H1	Hardwood flooring
		MPG321908H2	Hardwood cut stock and dimension and other hardwood millwork products
		MPG321908S1	Softwood flooring
		MPG321908S2	Softwood cut stock and dimension and other hardwood millwork products
		MPG321908X1	Sawn wood fence stock and wood lath, wood mouldings and other wood products, n.e.c.
MPG321X00	Waste and scrap of wood, wood by-products	MPG321X00H1	Hardwood sawdust
		MPG321X00H2	Hardwood shavings
		MPG321X00S1	Softwood sawdust
		MPG321X00S2	Softwood shavings
		MPG321X00X1	Waste and scrap of wood
		MPG321X00X2	Hog fuel
MPG322101	Wood pulp	MPG322101H1	Sulphate hardwood pulp (including soda)
		MPG322101S1	Sulphate softwood pulp (including soda)
		MPG322101X1	Other wood pulp
ENE32A000	Solid fuel products, n.e.c.	ENE32A000X1	Fuel products of wood waste
		ENE32A000X2	Other solid fuel products, n.e.c.

There are 28 other products within the SLSA but these products are equivalent to the products in the benchmark CSUT. They include contract logging services, hardwood and softwood lumber, as well as paper and paperboard products, among others.

The nine final demand categories delineate household final consumption (PEC00), non-profit institution and government final consumption (CE000), gross fixed capital formation (GFCF0), changes in inventories (INV00) and trade: international exports (INTEX), international re-exports (INTRX), international imports (INTIM), interprovincial exports (IPTEX) and interprovincial imports (IPTIM).

Data sources and methodology

The SLSA is based on two key Statistics Canada data products: the Annual Survey of Manufacturing and Logging (ASML)[4] and customs and balance of payments data from the International Accounts and Trade Division (IATD). The ASML is the core information used to build the industries in the SLSA (other than the construction industries). The IATD data are used to generate international imports and exports estimates.

To generate the SLSA industry estimates, ASML information must be transformed and adjusted to align with macroeconomic concepts. This introduces differences between what is published as part of the ASML principal statistics[5] and what is captured in the Satellite Account. Conceptually, the Satellite Account covers operating activities, whereas several of the ASML principal statistics include non-operating revenues and expenses. Furthermore, valuation adjustments are made to inventories in national accounts, which are not made in the survey data. Methodologically, some items are combined and presented differently. For example, finished goods inventory changes are netted out against sales revenues as part of Satellite Account output. Purchases of goods for resale are netted out against sales of goods for resale and called a margin output in the SUT.

The Satellite Account incorporates published ASML and IATD data for all reference years. For reference year 2013, the benchmark CSUTs were used to anchor the estimates and provide the contextual information for the economy as a whole. For 2014 and 2015, the benchmark CSUTs were not available, so GDP aggregates from the Provincial and Territorial Economic Accounts were relied upon to anchor the economy-wide totals.[6]

Once the industry estimates are generated and benchmark GDP information has been compiled, the remaining elements of supply and use are added: trade and transport margins and taxes on products, international and interprovincial imports and exports, household and government consumption, and investment information. Each of these elements begins with source information and then allocates to products using concordances. For example, international trade data are primarily sourced from customs data collected using the Harmonized System (HS). The HS is at an even more detailed level than the Satellite Account products and is thus merely a process of aggregating data.

Once initial estimates have been generated and the data have been adjusted to international macroeconomic accounting concepts, the data are integrated into the supply and use framework and two key accounting identities are reconciled:

1. Supply = use, across all products; and
2. Outputs = inputs, for each industry.

In practice, source data and estimation methods do not generate estimates that satisfy these constraints. These constraints are satisfied through an iterative process known as product balancing.[7] During this process, the strengths and weaknesses of all data sources are assessed and adjustments are made to reconcile the different sources of information. By the end of this process, inconsistencies have been identified, feedback has been made to source data providers and the constraints have been satisfied. The result is a completely coherent set of information for the industries and products compiled.

---

4. For more detail, see http://www23.statcan.gc.ca/imdb/p2SV.pl?Function=getSurvey&SDDS=2103
5. See CANSIM table 301-0008 for the relevant data.
6. Specifically, the Provincial and Territorial Income and Expenditure Accounts published in November 2016. See CANSIM tables 384-0037 (income), 384-0038 (expenditure) and 384-0047 (taxes and subsidies).
7. United Nations Statistical Division. *System of National Accounts, 2008*, p. 271.

Quality assurance in the SLSA

The product balancing technique is one of several key data quality assurance practices and procedures undertaken in SUT compilation. Others include:

Ensuring enterprise coherence

In a statistical system, large companies are generally divided into operating segments whose data are collected from different sources (e.g. surveys). Aggregate survey data can be cross-checked with corporate tax filings or a company's annual reports to ensure that the trends and levels are coherent and that they conform to expectations concerning the trends.

Confirming industry dynamics

When company financial information is aggregated and converted to national accounting concepts, the ratios of inputs to outputs can be compared in either real or nominal terms. The expectation is that these ratios should not change dramatically over a one-year period (certainly in real terms) without a significant economic event accounting for the change (e.g., exit or entry of a significantly different firm, technological change, large variations in relative prices of inputs or outputs).

Analyzing time series

Since the SUTs are compiled with tremendous detail, one can compare many different series over time. Do total outputs change dramatically from one year to the next? Can price fluctuations account for these changes? Does a certain input or output product change over time? If so, have the production processes of the dominant companies changed? Do output volumes follow a trend similar to that of export volumes? In all cases, viewing each of these elements independently, then cross-checking against secondary sources, greatly enhances confidence in the underlying data.

Comparing with external information

All the above checks can be done with reference to external information as well. Annual reports, company websites, association websites and news articles all describe the economic events of a given year and can help shed light on the trends presented by source data.

Results

The SLSA provides a wealth of information at a detailed level. What follows are just some of the possible tabulations from the account. The added value associated with the core SLSA industries (BS113, BS1153, BS321, BS322, i.e. excluding construction and all other industries) is small relative to the total economy.

Value added, core SLSA industries (excluding construction and all other industries), thousands of dollars

	2013	2014	2015
Value added, forestry and related core	20,410,218	20,692,003	22,226,634
Value added, total economy	1,777,213,062	1,858,113,000	1,855,439,000
Value added, share	1.1%	1.1%	1.2%

However, this view might understate the importance of this added value; when we look at the value of exports, we see that the sector contributes over 5% of the total economy exports.

Total exports, core SLSA products, thousands of dollars

	2013	2014	2015
Total exports, forestry and related	29,267,641	31,913,399	34,046,064
Exports, total economy	543,809,590	626,019,059	626,969,754
Share of exports	5.4%	5.1%	5.4%

As a share of total output, again, the core industries represent a relatively small share of the total output of the economy.

Total output, core SLSA industries (excluding construction and all other industries), thousands of dollars

	2013	2014	2015
Output, forestry and related core	62,725,725	66,133,142	68,747,044
Output, total economy	3,353,163,046	3,658,815,309	3,686,395,636
Output share	1.9%	1.8%	1.9%

The value added across the core industries nears $20 billion and is increasing over the time period. The value added to output ratio remains relatively stable.

Value added and ratio-to-output – Core SLSA industries (excluding construction and all other industries, thousands of dollars

	2013	2014	2015
Value added	20,410,218	20,692,003	22,226,634
Value added ratio	33%	31%	32%

The importance of contract loggers is highlighted in the following table, where their output exceeds that of non-contract loggers in two of the three years studied.

Total output and output shares, logging and contract logging industries, thousands of dollars

	2013	2014	2015
BS113311 – Logging (except contract)	4,408,253	4,616,673	5,045,647
BS113312 – Contract logging	4,974,886	5,270,118	4,873,763
BS113311 – Logging (except contract)	47%	47%	51%
BS113312 – Contract logging	53%	53%	49%

International exports increased strongly over the period, with gains experienced by most provinces. The provincial distribution highlights the clear concentration of the exports originating in Quebec, Ontario and British Columbia.

International exports by province and provincial shares – Core SLSA products, thousands of dollars

Province	2013	2014	2015	2013	2014	2015
Newfoundland and Labrador	121,700	170,121	166,735	0%	1%	0%
Prince Edward Island	546	2,114	2,300	0%	0%	0%
Nova Scotia	562,435	607,642	639,352	2%	2%	2%
New Brunswick	1,610,322	1,660,026	1,727,752	6%	5%	5%
Quebec	7,891,830	8,709,671	9,291,092	27%	27%	27%
Ontario	4,375,118	4,861,845	5,483,521	15%	15%	16%
Manitoba	352,321	418,239	423,741	1%	1%	1%
Saskatchewan	453,139	430,696	433,591	2%	1%	1%
Alberta	2,552,579	2,748,593	3,124,990	9%	9%	9%
British Columbia	11,346,944	12,304,174	12,752,658	39%	39%	37%
Yukon	686	274	326	0%	0%	0%
Northwest Territories	21	4	5	0%	0%	0%
Nunavut	0	0	1	0%	0%	0%
Canada	29,267,641	31,913,399	34,046,064	100%	100%	100%

The following table highlights the importance of the SLSA commodities in terms of a province's total exports. For British Columbia, these products are a very important share of total exports.

SLSA products as a share of total provincial international exports by province

Province	2013	2014	2015
Newfoundland and Labrador	0.9%	1.2%	1.6%
Prince Edward Island	0.1%	0.2%	0.2%
Nova Scotia	9.0%	8.5%	8.7%
New Brunswick	10.7%	10.8%	10.8%
Quebec	8.9%	8.7%	8.6%
Ontario	2.1%	1.9%	2.0%
Manitoba	2.5%	2.7%	2.5%
Saskatchewan	1.4%	1.2%	1.4%
Alberta	2.3%	2.1%	3.0%
British Columbia	23.7%	23.2%	23.1%
Yukon	0.2%	0.1%	0.1%
Northwest Territories	0.0%	0.0%	0.0%
Nunavut	0.0%	0.0%	0.0%
Canada	5.4%	5.1%	5.4%

As expected, sawmills are the dominant portion of NAICS 3211. When split in the Satellite Account, the other industries represent less than 10% of value added for the group.

Value added and value added shares, thousands of dollars

	2013	2014	2015
BS321111 – Sawmills (except shingle and shake mills)	3,626,320	3,673,835	3,806,598
BS321112 – Shingle and shake mills	124,330	124,473	121,795
BS321114 – Wood preservation	218,711	191,841	229,771
BS321111 – Sawmills (except shingle and shake mills)	91%	92%	92%
BS321112 – Shingle and shake mills	3%	3%	3%
BS321114 – Wood preservation	6%	5%	5%

Canada is a large net exporter of forestry-related products. Our imports are primarily products further down the supply chain; for example, converted paper products (MPG322209) range from $1.8 billion in 2013 to $2.2 billion in 2015, paper (MPG322102) ranges from $1.7 billion in 2013 to $1.9 billion in 2015 and disposable diapers and feminine products range from $0.6 billion in 2013 to $0.8 billion in 2015.

International exports and imports of core SLSA products, thousands of dollars

	2013	2014	2015
International exports	29,267,641	31,913,399	34,046,064
International imports	10,803,645	11,674,258	12,851,092

As expected, the value of Canadian production of softwood logs far outweighs that of hardwood logs. The dominance of softwood over hardwood products occurs in every product split along these lines.

Output of logs – All SLSA industries, all provinces, thousands of dollars

	2013	2014	2015
MPG113001H1 - Hardwood logs and bolts (except fuel wood and pulpwood)	255,315	183,809	221,405
MPG113001S1 - Softwood logs and bolts (except fuel wood and pulpwood)	3,295,843	3,246,018	3,277,062

Softwood chips are an extremely important input into the pulp and paper industry. They are valued at over $2 billion and make up over 20% of total intermediate inputs.

Intermediate use of softwood chips (MPG321103S1) in the pulp and paper industry (BS322100), thousands of dollars

	2013	2014	2015
Value	2,246,509	2,636,799	2,804,241
Percent of intermediate inputs	21%	23%	23%

Overall, the sector is small relative to total national economic activity, but its importance as an export sector is more significant and this significance varies across provinces. In terms of both output and exports, softwood products are far more important than hardwood products, although there are dedicated mills processing all types of products extracted from Canadian forests.

The SLSA provides detailed information on the sector that is not available in other official statistics. It provides more granular information for certain industries and products and it situates the sector in the context of total economic activity. It provides a better understanding of the structure of the sector and how this varies from one province to another. Many more observations and tabulations can be generated from the SLSA to expose the complexity and interconnectedness of the Canadian forestry sector. Readers are encouraged to explore the detailed tables accompanying the release.