2019 Economic Impact Study of the Home Appliance Industry

Methodology and Documentation

Prepared for

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The Home Appliance Industry Economic Contribution Study: 2019

Summary Results:

The Home Appliance Industry Economic Impact Study measures the economic contributions of home appliance manufacturers, wholesalers, and retailers to the economies of the United States and Canada in 2019. In all, the industry drives about USD198.14 billion in economic output throughout the US economy and an additional CAD5.8 billion in output across Canada.[1]

There are more than 660 facilities engaged in home appliance manufacturing in the United States. All told, these firms employ roughly 91,580 people in manufacturing roles and direct support services. In Canada, about 3,547 jobs are supported in more than 120 manufacturing facilities.

Once appliances have been produced or imported, they enter the wholesaling tier. We estimate that firms involved in the wholesale of home appliances (not including wholesaling operations directly owned and operated by producers) employ around 14,851 individuals in the U.S. and are present in every state in the country. Canada's home appliance industry supports roughly 1,552 jobs.

Finally, the third tier of the industry directly sells products to the consumer. Whether at dedicated home appliance stores, in appliance departments of big box stores, or on the aisles of the local grocery store, home appliances are carried and sold at a large number of locations by a wide variety of businesses. In the United States, we estimate that there are approximately 271,171 employees whose jobs depend on the sale of home appliances to the public. In Canada, the number of retail jobs is approximately 18,927.

Other firms are related to the three tiers of the home appliance industry as suppliers. These firms produce and sell a broad range of items including metals and plastics, fuel, packaging materials, sales displays, and/or machinery. In addition, supplier firms provide a broad range of services, including personnel services, financial services, advertising services, consulting services or even transportation services. Finally, a number of people are employed in government enterprises responsible for the regulation of the home appliance products industry. All told, we estimate that the home appliance industry is responsible for 262,028 supplier jobs in the United States and another 8,379 jobs in Canada.

An economic analysis of the home appliance industry will also take additional linkages into account. While it is inappropriate to claim that suppliers to the supplier firms are part of the industry being analyzed,[2] the spending by employees of the industry and those of supplier firms whose jobs are directly dependent on appliance sales and production should surely be included. This spending on everything from housing, to food, to educational services and medical care makes up what is traditionally called the "induced impact" or the multiplier effect of the industry.[3] In other words, this spending, and the jobs it creates is induced by the production, distribution and sale of home appliances. We estimate that the induced impact supports 353,936 jobs in the U.S. and 6,823 jobs in Canada.

Another important part of an impact analysis is the calculation of the contribution of the industry to the public finances of the community. In the case of the home U.S. appliance industry, over USD23.24 billion in business tax revenues is generated at the federal, state and local government levels. In Canada, CAD279.80 million in revenues is generated on behalf of federal and provincial governments.

Table 1 on the following page presents a summary of the total economic impact of the industry in the United States in 2019. Table 2 provides the economic overview of Canadian impacts.

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1 Throughout the study and methodology, unless otherwise noted, dollars represent local currency: USD in the United States and CAD in Canada.

2 These firms would more appropriately be considered a part of the supplier firms' industries.

3 Some of the communications material refers to "indirect" impacts. For the purpose of this study, indirect impacts should be interpreted as the sum of supplier and induced impacts.

Table 1: Economic Impact of the Home Appliance Industry: United States, 2019 (US Dollars)

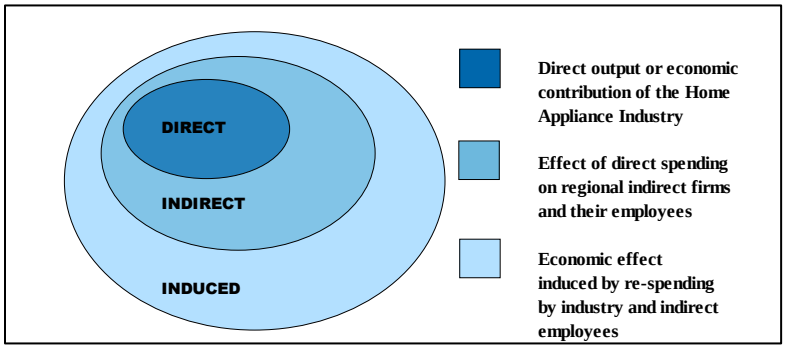
	Direct	Supplier	Induced
Output	$72.3B	$67.4B	$58.4B
Jobs	377,602	262,028	353,936
Wages	$19.8B	$18.9B	$18.4B
Business Taxes			$23.2B

Table 2: Economic Impact of the Home Appliance Industry: Canada, 2019 (Canadian Dollars)

	Direct	Supplier	Induced
Output	$2.9B	$1.6B	$1.2B
Jobs	24,026	8,379	6,823
Wages	$1.0B	$499.0M	$328.9M
Business Taxes			$279.8M

Methodology

The Economic Impact of the Home Appliance Industry starts with an accounting of the direct employment in the various sectors. Home appliance manufacturers include three broad categories, under which numerous individual products can be classified. Major home appliances capture most of the larger, stationary corded or otherwise powered products in a house – things like refrigerators, stoves, washing machines, dishwashers, etc. Floor care appliances are primarily vacuum cleaners, whether upright, robot, canister, or central.[4] Portable appliances encompasses small, easily moved corded or battery powered appliances – such as toasters, coffee makers, and desk fans.[5] Direct wholesaling jobs in the model represent all jobs supported by the distribution of home appliance products, whether through a dedicated appliance distributor or broader businesses such as electronics distributors, grocery distributors, or other general distributors. Home appliance retail jobs represent those jobs supported by the sale of home appliance products, in dedicated appliance stores and in broader retail outlets like grocery stores, electronics stores, and hardware stores. For wholesale and retail job estimations, the percentage of sales in a particular store category attributable to home appliance sales is used to determine the percentage of jobs assumed to be appliance-related jobs. The data come from a variety of government and private sources.



It is sometimes mistakenly thought that initial spending accounts for all of the impact of an economic activity or a product. For example, at first glance it may appear that consumer expenditures for a product are the sum total of the impact on the local economy. However, one economic activity always leads to a ripple effect that benefits other sectors and industries. This inter-industry effect of an economic activity can be assessed using multipliers from regional input-output modeling.

The economic activities of events are linked to other industries in the state and national economies. The activities required to produce a refrigerator or a robot vacuum cleaner, from manufacturing and packaging to shipping and selling, generate the direct effects on the economy. Regional supplier (or indirect) impacts

[4] Corded or battery-powered floor buffers are also included in this category if they are marketed as a consumer product (rather than a commercial or professional product).

[5] There are some notable exclusions from the appliance categorization. Light fixtures, smart bulbs, and ceiling fans are not included as appliances in the study.

occur when these activities require purchases of goods and services such as electronics or motors from local or regional suppliers. National supplier impacts, such as mined materials or financial services, are assumed to generate economic activity across the country, and the allocation of impacts is based off nationwide employment by relevant NAICS sectors. Additional induced impacts occur when workers involved in direct and indirect activities spend their wages in the region. The ratio between total economic and direct impacts is termed the multiplier. The framework in the chart on the prior page illustrates these linkages.

This method of analysis allows the impact of local production activities to be quantified in terms of final demand, earnings, and employment in the states and the nation as a whole.

Once the direct impact of the industry has been calculated, the input-output methodology discussed below is used to calculate the contribution of the supplier sector and of the re-spending in the economy by employees in the industry and its suppliers. This induced impact is the most controversial part of economic impact studies and is often quite inflated. In the case of the Home Appliance model, only the most conservative estimates of the induced impact have been used.

Model Description and Data

This Home Appliance Industry Economic Impact Model (Model) was developed by John Dunham & Associates based on data provided the Association of Home Appliance Manufacturers, Infogroup,[6] and state, territorial/provincial, and federal governments. Both analyses rely on input-output modeling, with direct industry jobs entered as an input, and additional direct measures as well as all supplier, induced and taxes are generated as outputs. The United States model utilizes the IMPLAN input-output model in order to quantify the economic impact of the home appliance industry on the economy of the United States. To model an impact of the Canadian industry, the STATSCanada input-output model was utilized. These models adopt specific accounting frameworks through which the relationships between different inputs and outputs across industries and sectors are computed. These models can then show the impact of a given economic decision – such as a factory opening or operating a sports facility – on a pre-defined, geographic region. The IMPLAN model is based on the national income accounts generated by the US Department of Commerce, Bureau of Economic Analysis (BEA).[7] The STATSCanada model is maintained by Statistics Canada, and the agency ran the impact analysis based on inputs supplied by JDA.

Data for the models came from a number of sources:

- AHAM conducted an extensive survey of member companies and provided location-level job estimates to JDA. Additional manufacturer employment is based on location-level jobs numbers reported to Infogroup by the companies as of August 2019. For facilities, with no member or Infogroup job data available, a median job number based on similar facilities in the same state or province is used.

- Wholesale employment is estimated based on zip code level data provided by Infogroup and adjusted to reflect the percentage of sales from home appliance products using data from the 2012 Economic Census.[8] Since similar data are not available for Canadian wholesalers, the US percentages were assumed to apply.

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6 Job numbers are from Infogroup, the leading provider of business and consumer data for the top search engines and leading in-car navigation systems in North America. Infogroup gathers data from a variety of sources, by sourcing, refining, matching, appending, filtering, and delivering the best quality data. Infogroup verifies its data at the rate of almost 100,000 phone calls per day to ensure absolute accuracy.

7 The IMPLAN model is based on a series of national input-output accounts known as RIMS II. These data are developed and maintained by the U.S. Department of Commerce, Bureau of Economic Analysis as a policy and economic decision analysis tool.

8 *2012 Economic Census, Wholesale Trade: Subject Series – Product Lines Statistics by Industry for the U.S. and States: 2012*, March 15, 2016, US Department of Commerce, Bureau of the Census, at:

- Data on the retail sectors are calculated by taking the percent of total retail sales (across various NAICS retail sectors) that are attributable to home appliance sales, and then multiplying this break to the number of jobs in each zipcode across the two countries.[9] For example, if home appliances count for 10 percent of sales at hardware stores, then it is assumed that 10 percent of hardware store jobs are supported by home appliance sales. These results were cross-checked against a wide variety of establishment data by state and were found to present a reasonable estimate of the employment in each sector generated solely by dairy products sales.

Once the initial direct employment figures have been established, they are entered into a model linked to one of the input-output databases. The input data are used to generate estimates of direct wages and output in each of the three sectors: production, wholesaling and retailing, as well as all supplier, induced, and tax impacts. IMPLAN was originally developed by the US Forest Service, the Federal Emergency Management Agency and the Bureau of Land Management. It was converted to a user-friendly model by the Minnesota IMPLAN Group in 1993. The IMPLAN data and model closely follow the conventions used in the "Input-Output Study of the US Economy," which was developed by the BEA.

- Wages: Data from the US Department of Labor's ES-202 reports are used to provide annual average wage and salary establishment counts, employment counts and payrolls at the county level. Since this data only covers payroll employees, it is modified to add information on independent workers, agricultural employees, construction employees, and certain government employees. Data are then adjusted to account for counties where non-disclosure rules apply. Wage data include not only cash wages, but health and life insurance payments, retirement payments and other non-cash compensation. They include all income paid to workers by employees. Further details are available from IMPLAN at http://www.implan.com.

- Output: Total output is the value of production by industry in a given state. It is estimated by IMPLAN from sources similar to those used by the BEA in its RIMS II series. Where no Census or government surveys are available, IMPLAN uses models such as the Bureau of Labor Statistics Growth model to estimate the missing output.

- Taxes: The model includes information on income received by the Federal, State and Local Governments. The model produces estimates for the following taxes at the Federal Level: Corporate Income, Payroll, Personal Income, Estate, Gift, and Excise Taxes; Customs Duties; and Fines, Fees, etc. State and Local tax revenues include estimates of: Corporate Profits, Property, Sales, Severance, Estate, Gift and Personal Income Taxes; Licenses; Fees; and certain Payroll Taxes.

The Canadian model is maintained by Statistics Canada, and includes input-output (IO) accounts for all provinces and territories. The accounts consist of 300 industries, 727 groups of goods and services (commodities), and 170 categories of final users. Unlike the IMPLAN model, provinces' and territories' tables are linked together through an interprovincial flows table that shows each jurisdiction's exports to, and imports from, other provinces and territories as well as abroad. These tables are compiled every year by Statistics Canada using surveys and other sources that are designed to collect reliable statistics from each jurisdiction. The tables are part of the Canadian System of National Accounts (CSNA). IO tables cover all economic activities conducted in the market economies of each province and territory, encompassing persons, businesses, government and non-governmental (non-profit) organizations, and entities outside its jurisdiction that give rise to imports or exports (interprovincially or internationally).

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https://factfinder.census.gov/faces/tableservices/jsf/pages/productview.xhtml?pid=ECN_2012_US_42SLLS1&prodType=table

9 *2012 Economic Census, Retail Trade: Subject Series – Product Lines Statistics by Industry for the U.S. and States: 2012*, January 26, 2016, US Department of Commerce, Bureau of the Census, at: https://factfinder.census.gov/faces/tableservices/jsf/pages/productview.xhtml?pid=ECN_2012_US_44SLLS1&prodType=table]. Each of the U.S. states plus the District of Columbia have their own sales estimates (and subsequent sales breaks); Canadian sales breaks are based on the overall United States retail break.

To compile the IO accounts, Input-Output Division obtains source data from all relevant surveys as well as administrative sources such as tax records, professional and industry organizations, and non-government institutions every year for each province and territory.[10]

The 2019 model reflects the best data and modeling techniques available now, and should provide a very accurate measure of the economic foot print of the industry today. Any errors are unintentional and are strictly those of John Dunham & Associates.

IMPLAN Methodology:[11]

Francoise Quesnay, one of the fathers of modern economics, first developed the analytical concept of inter-industry relationships in 1758. The concept was actualized into input-output analysis by Wassily Leontief during the Second World War, an accomplishment for which he received the 1973 Nobel Prize in Economics.

Input-output analysis is an econometric technique used to examine the relationships within an economy. It captures all monetary market transactions for consumption in a given period and for a specific geography. The IMPLAN model uses data from many different sources – as published government data series, unpublished data, sets of relationships, ratios, or as estimates. The Minnesota IMPLAN group gathers this data, converts them into a consistent format, and estimates the missing components.

There are three different levels of data generally available in the United States: Federal, state and county. Most of the detailed data is available at the county level, and as such there are many issues with disclosure, especially in the case of smaller industries. IMPLAN overcomes these disclosure problems by combining a large number of datasets and by estimating those variables that are not found from any of them. The data is then converted into national input-output matrices (Use, Make, By-products, Absorption and Market Shares) as well as national tables for deflators, regional purchase coefficients and margins.

The IMPLAN Make matrix represents the production of commodities by industry. The Bureau of Economic Analysis (BEA) Benchmark I/O Study of the US Make Table forms the bases of the IMPLAN model. The Benchmark Make Table is updated to current year prices, and rearranged into the IMPLAN sector format. The IMPLAN Use matrix is based on estimates of final demand, value-added by sector and total industry and commodity output data as provided by government statistics or estimated by IMPLAN. The BEA Benchmark Use Table is then bridged to the IMPLAN sectors. Once the re-sectoring is complete, the Use Tables can be updated based on the other data and model calculations of interstate and international trade.

In the IMPLAN model, as with any input-output framework, all expenditures are in terms of producer prices. This allocates all expenditures to the industries that produce goods and services. As a result, all data not received in producer prices is converted using margins which are derived from the BEA Input-Output model. Margins represent the difference between producer and consumer prices. As such, the margins for any good add to one. If, for example, 10 percent of the consumer price of a toaster is from the purchase of electricity, then the electricity margin would be 0.1.

Deflators, which account for relative price changes during different time periods, are derived from the Bureau of Labor Statistics (BLS) Growth Model. The 224 sector BLS model is mapped to the 536 sectors of the IMPLAN model. Where data are missing, deflators from BEA's Survey of Current Businesses are used.

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[10] *The input-output structure of the Canadian economy: 2000-2001*¸Statistics Canada, at: https://www150.statcan.gc.ca/n1/pub/15-201-x/00005/4113385-eng.htm

[11] This section is paraphrased from IMPLAN Professional: Users Guide, Analysis Guide, Data Guide, Version 2.0, MIG, Inc., June 2000.

Finally, one of the most important parts of the IMPLAN model, the Regional Purchase Coefficients (RPCs) must be derived. IMPLAN is derived from a national model, which represents the "average" condition for a particular industry. Since national production functions do not necessarily represent particular regional differences, adjustments need to be made. Regional trade flows are estimated based on the Multi-Regional Input-Output Accounts, a cross-sectional database with consistent cross interstate trade flows developed in 1977. These data are updated and bridged to the 536 sector IMPLAN model.

Once the databases and matrices are created, they go through an extensive validation process. IMPLAN builds separate state and county models and evaluates them, checking to ensure that no ratios are outside of recognized bounds. The final datasets and matrices are not released before extensive testing takes place.