

# Dealing with economic shocks: How Statistics Canada pivoted during the pandemic

[Document subtitle]

by

Marie-Christine Bernard  
Retail and Service Industries Division  
Statistics Canada

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## 1. Introduction

This paper provides an overview of some of the key changes made to Statistics Canada’s data collection and processing methods in the Service Industries Program to account for economic shocks related to the COVID-19 pandemic. Statistics Canada’s mission is to produce high-quality statistical information for Canadians. Statistics Canada has had to adapt its statistical methods to account for pandemic-era economic conditions. In addition, Statistics Canada has focused on putting out new and more timely data and analysis to better capture the pandemic’s impacts on Canadian households and businesses. While other major economic crises have occurred in recent decades (2008 financial crisis, foreign geopolitical conflicts), none has had such a major impact on Statistics Canada’s operations.

The pandemic disrupted business operations and Canadians’ lifestyle in ways unlike any other economic crisis in recent decades. Though certain service industries, such as travel, accommodation, food services and drinking places, culture, arts, and entertainment and recreation services, felt the pandemic’s impacts most severely, these economic impacts were felt throughout the different service industries to varying degrees.

This paper is divided into five sections and is organized as follows:

- Section 2 discusses the changes to the Service Industries Program and other affiliated programs as a result of the rapidly changing business conditions of 2020 and 2021.
- Section 3 presents new data developments for monthly business service industry surveys and other key economic indicators.
- Section 4 shows the ways in which Statistics Canada leveraged administrative tax data to improve timeliness and fill data gaps.
- Section 5 discusses statistical measurement challenges that arose or were amplified during the pandemic.
- Section 6 offers final thoughts.

## 2. Changes to statistical operations and methods

### 2.1 Collection strategy and challenges for the Service Industries Program during the pandemic

Initially, the economic conditions that arose because of the COVID-19 pandemic heavily affected the collection process of the Service Industries Program’s annual surveys for reference year (RY) 2019.<sup>1</sup> In March 2020, the collection process for RY 2019 could not get underway as usual for 34 annual surveys of service industries.

As a result of the lockdown policies implemented early in the pandemic, the Service Industries Program adopted a streamlined approach for annual survey collection to mitigate risks to the

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1. The Service Industries Program always collects data with a one-year lag for the annual surveys.



program.<sup>2</sup> The collection started with a delay of several months, and a smaller portion of the sample was collected (the number of survey questionnaires sent out for collection was reduced to mainly focus on critical units<sup>3</sup>). This approach was taken in the hopes of reducing the response burden on Canadian businesses. During this period, the Service Industries Program was focused on trying to balance the need for high-quality industry statistics and economic indicators with a wish to reduce the burden its surveys placed on business respondents at a difficult time.

There were several challenges with the data collection. With many business closures, it became difficult to confirm whether closures were temporary or permanent (see Chart 1). Furthermore, many of the businesses that continued to operate did so with most or all of their employees working from home. This change caused several issues. For example, traditional follow-up methods with respondents, such as calling landline office phone numbers,<sup>4</sup> were no longer effective. There were also challenges with conducting these follow-ups by mail or email, because existing confidentiality rules were not suited for collecting data from businesses where employees were working from home. Additionally, a number of businesses furloughed or laid off a majority of their staff, while others were facing acute labour shortages,<sup>5</sup> resulting in a situation where many businesses did not have the capacity to complete the surveys sent to them.

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2. At the onset of the pandemic, following the initial switch to a work-from-home environment, Statistics Canada systems were only accessible to critical monthly statistical programs, and the Service Industries Program was not part of those key programs.

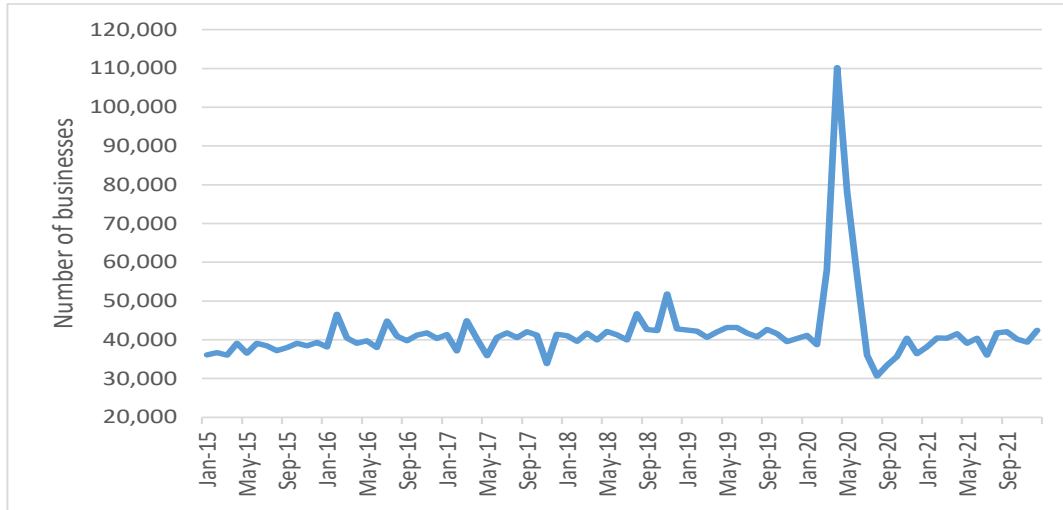
3. The critical units were identified by the subject-matter analysts based on a number of factors, including the propensity to respond, quality of estimates and lack of alternative data available for replacement.

4. Phone numbers kept on the Business Register, Statistics Canada's continuously maintained central repository of baseline information on businesses and institutions operating in Canada, consist of office phone numbers only.

5. Labour shortages were manifested by absenteeism (for health reasons and supervision of children at home).



Chart 1  
Business closings, January 2015 to December 2021, Canada



Note: Closing businesses are businesses that transitioned from having at least one employee in the previous month to having no employees in the current month. These instances occur when a small firm goes out of business, when a large firm closes an establishment temporarily or permanently, and when a seasonal firm ceases business activity for the year.

Source: Statistics Canada Table 33-10-0270-01.

Throughout the pandemic in 2020 and 2021, the collection process for the annual surveys of the Service Industries Program faced a number of challenges. For example, Statistics Canada led the COVID-19 contact tracing initiative on behalf of the federal government, which engaged collection resources at that time. Additionally, Statistics Canada introduced several new surveys related to COVID-19 to provide relevant data for policy makers in a timely manner. As well, the 2021 Census of Population and Census of Agriculture<sup>6</sup> programs were in collection. These developments led to some prioritization of available resources for Statistics Canada collection operations.

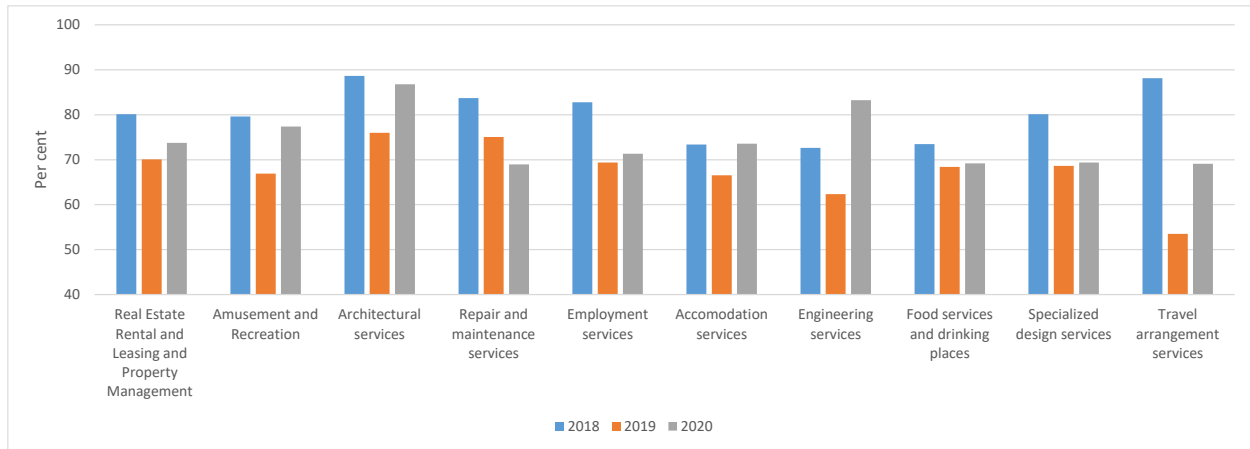
Ultimately, the revenue-weighted response rates for the annual surveys in the Service Industries Program were lower for RY 2019 compared with those of the recent past. The revenue-weighted response rates picked up for RY 2020, but remained lower than usual for most annual surveys (see Chart 2).

6. The Census of Population and Census of Agriculture are held every five years.



Chart 2

Revenue-weighted response rates in per cent for selected annual surveys of services industries, reference years 2018 to 2020, Canada



Source: Annual survey of services industries program

## 2.2 Imputation strategy for the Service Industries Program during the pandemic

During the pandemic, the imputation strategy for non-response or missing data had to be reviewed to consider the unprecedented shock to the economy. Because a smaller portion of the sample was collected and revenue-weighted response rates were lower, there were more imputations in RY 2019 and RY 2020 than usual. For RY 2020, imputation methods relying on historical relationships were not representative of the highly unusual economic environment caused by public health restrictions, government support programs and changes to the operational environment faced by many businesses. For example, wage subsidies and other public assistance programs provided to eligible businesses in the service sector threw off several expense and revenue ratios, such as the ratio of salaries, wages, commissions and benefits to total expenses.

When imputation is required, total revenues and total expenses are the financial variables that are normally imputed first. These variables come from administrative tax data files, and the imputation strategy was adjusted to better capture the impacts of the pandemic.<sup>7</sup> For the components of total revenues and total expenses, relying on historical imputation for RY 2020 was not an option because of mandated operating restrictions and unusual business practices that deviated significantly from previous years. The imputation method that was favoured for RY 2020 was based on current average reported data from a pool of donors<sup>8</sup> within the same classification group at the regional or national level (see Appendix A for more details on methods of imputation). This imputation method will be favoured for RY 2021 until the pandemic shock dissipates more fully.

7. The imputation strategy was modified to use current information from similar reporting units (over historical information where possible).

8. This method is generally used when there is a new unit in the sample, but it was widely adopted as the imputation method for RY 2020.



## 3. New data developments

Data users from both the private and public sectors quickly showed interest in timelier data releases during the early stages of the pandemic. The need for timelier data as the economy was rapidly changing led Statistics Canada to develop advanced indicators for a number of its flagship critical service programs. This development shifted the traditional equilibrium between accuracy and timeliness and introduced the possibility of making larger revisions to estimates.

### 3.1 Advanced indicators

Statistics Canada began providing advanced retail and wholesale trade indicators a few months into the pandemic. Retail and wholesale sales estimates are key monthly indicators for many economic models and are used in monetary policy decision making and in private sector business investment plans.

#### 3.1.1 Advanced estimate of retail sales

Monthly retail sales estimates at Statistics Canada are generally published 50 to 55 days after the reference month. Before the pandemic, Statistics Canada had undertaken exploratory projects to develop an advanced estimate of retail sales using statistical models and survey data. This would mean that an advanced estimate for the following month would be provided at the same time as the release for the current reference month. These projects were still in the exploration and testing phases and had not produced publishable estimates yet.

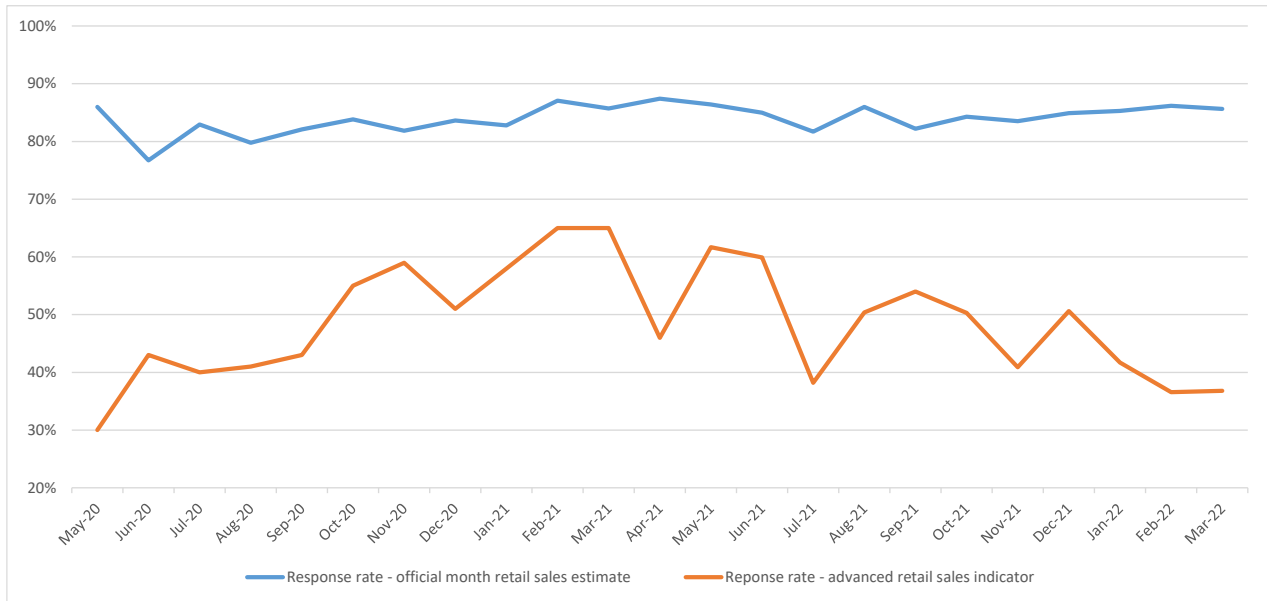
The pandemic accelerated the development of an advanced estimate of retail sales. The retail sector pivoted quickly to e-commerce during the pandemic as restrictions placed on brick-and-mortar stores limited their operating capacity and changed consumer spending preferences. There was a need for timelier estimates.

Based on prior testing with statistical models and survey data, the preferred methodology for estimating an advanced retail sales indicator would rely solely on survey data. The production method for the advanced estimate of retail sales is similar to what is outlined for the production of the reference month estimates and uses the same production process. To put it in simple terms, roughly seven to nine days into the survey collection period, advanced estimates are generated. It was determined that there was a suitable amount of respondent data available at that time to provide sound and high-quality estimates (see Chart 3). On average, the response rate for the Monthly Retail Trade Survey has hovered around 84% since May 2020, while the response rate when the advanced estimate of retail sales is produced has been averaging around 50%.



Chart 3

Response rates in percent for the Monthly Retail Trade Survey, May 2020 to March 2022, Canada



Source: Statistics Canada Monthly Retail Trade Survey

The accuracy of the advanced estimate of retail sales is well within acceptable norms (see Chart 4). Since there is a trade-off between accuracy and timeliness, the advanced estimate of retail sales is subject to revisions as Statistics Canada continues to collect respondent data for the month. The revisions can often be higher for the advanced indicator compared with the monthly retail sales for the reference month.

The advanced estimate of retail sales provides a month-over-month change at the national level. It is seasonally adjusted and expressed in current dollars, but it is not disaggregated by sector or by geography (province, territory or census metropolitan area). The early growth estimate is provided in *The Daily*, Statistics Canada's official release vehicle. The advanced estimate of retail sales is often referenced in the media and was well received by all classes of data users.





Chart 4

Advanced indicator of retail sales and final estimate of retail sales, percentage change, April 2020 to March 2022, Canada



Source: Statistics Canada Monthly Retail Trade Survey

### 3.1.2 Advanced estimate of wholesale sales

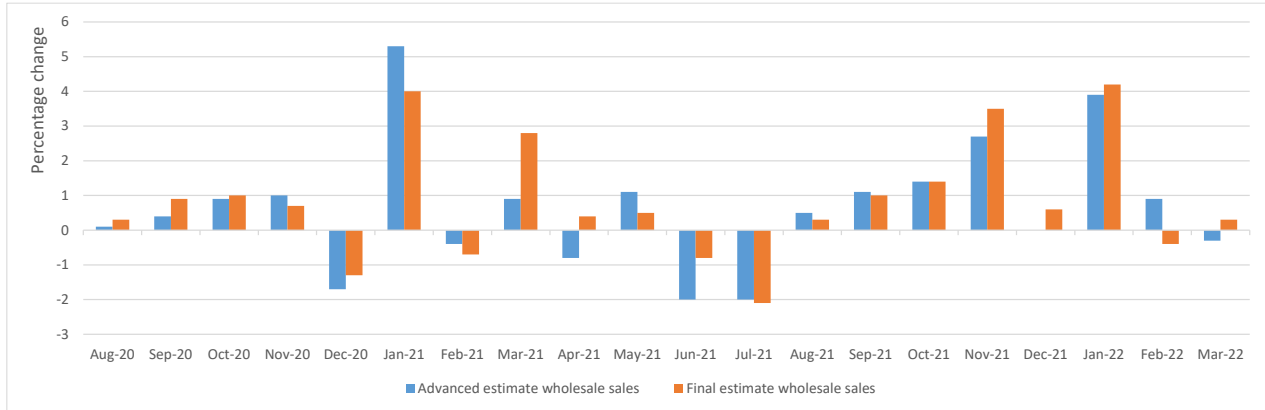
Largely following the same methodology as the advanced retail sales indicator, Statistics Canada also started to produce an advanced wholesale sales indicator during the pandemic (see Chart 5). The indicator is calculated using seasonally adjusted data in current dollars and is based on a response rate averaging 56%. A year and a half into the pandemic, Statistics Canada started producing advanced estimates of wholesale sales by subsector.<sup>9</sup> Unlike the retail sales indicator, the advanced wholesale sales estimate is not released in *The Daily* at the same time as the official release. Instead, because of the timing of collection, the advanced wholesale sales estimate is generally released four or five working days after the official release.

9. The subsectors include farm products, food, beverage and tobacco products, personal and household goods, motor vehicles and motor vehicle parts and accessories, building materials and supplies, machinery, equipment and supplies, and miscellaneous goods.



Chart 5

Advanced indicator of wholesale sales and final estimate of wholesale sales, percentage change, April 2020 to March 2022, Canada



Source: Statistics Canada Monthly Wholesale Trade Survey

### 3.1.3 Flash estimate of industry monthly real gross domestic product

The new advanced estimates of retail and wholesale sales inform the flash estimate of industry monthly real gross domestic product (GDP) at the national level. Similarly to other statistical agencies, Statistics Canada started publishing an advanced indicator of monthly GDP at an aggregate level for Canada in constant dollars. The flash estimate is based on methodology that combines qualitative and quantitative information such as existing statistical data, real-time data, publicly released facts, general information from media releases, and public statements by businesses and governments on current events.

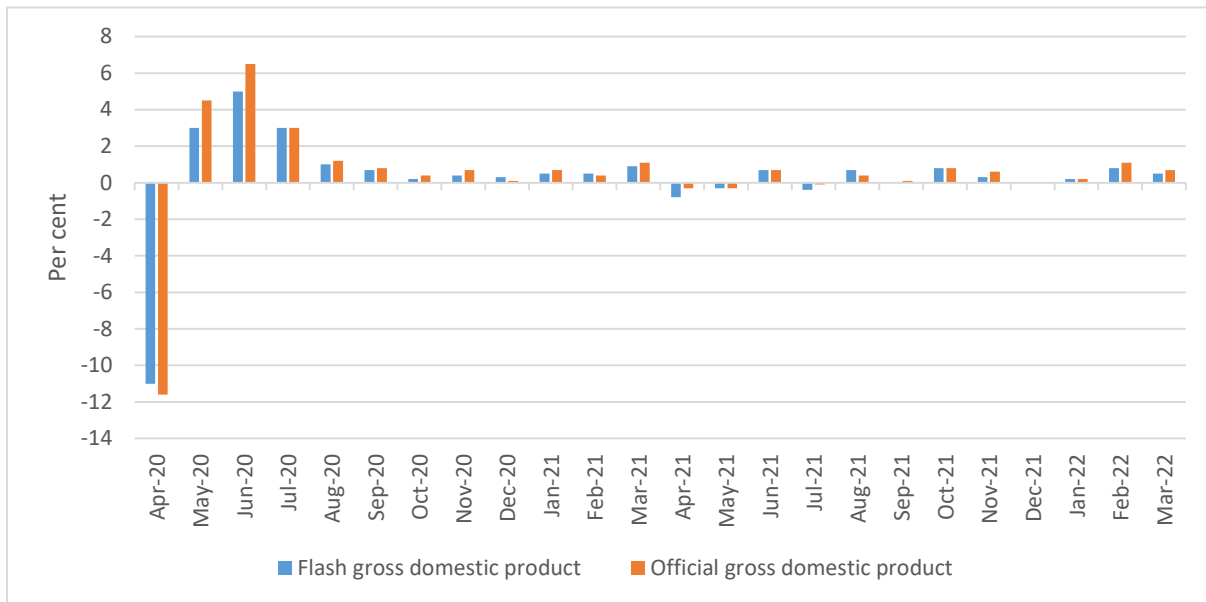
Normally, Statistics Canada uses a complete set of surveys from source programs across many divisions, as well as administrative data, when compiling monthly GDP. The new monthly GDP flash estimate uses all information at hand—including the advanced estimates of retail and wholesale sales. This estimate does not have the same quality as Statistics Canada’s official estimates of monthly GDP by industry, but it is timelier and can be seen as a tool to inform data users of the expected change in GDP ahead of the official estimate.

Given the differences in methodology, discrepancies between flash and official GDP estimates exist, though these differences have not been substantial (see Chart 6). For example, between April 2020 and March 2022, the mean error between official GDP estimates and flash GDP estimates has been 0.2 percentage points.



Chart 6

Flash gross domestic product and official gross domestic product, percentage change, April 2020 to March 2022, Canada



Source: Statistics Canada Industry Accounts Division

Despite some initial reluctance attributable to concerns over data revisions, the early monthly indicators have, in general, received very positive feedback from all groups of data users, including public policy decision makers.

## 4. Making greater use of administrative tax data

For timelier estimates of service sector industries, Statistics Canada made greater use of administrative tax data in its business statistical programs. One of the programs that benefitted from alternative data sources was the Service Industries Program.

### 4.1 Goods and services tax revenues and payroll deduction

Financial data for service industry groupings—including operating revenue and salary expense statistics—are usually obtained through Statistics Canada’s detailed annual business surveys. The results of these surveys are typically published 10 to 15 months after the reference year. The pandemic required a timelier alternative to this approach. As a result, the Service Industries Program used data from administrative datasets, such as goods and services tax (GST)<sup>10</sup> revenue data and the payroll

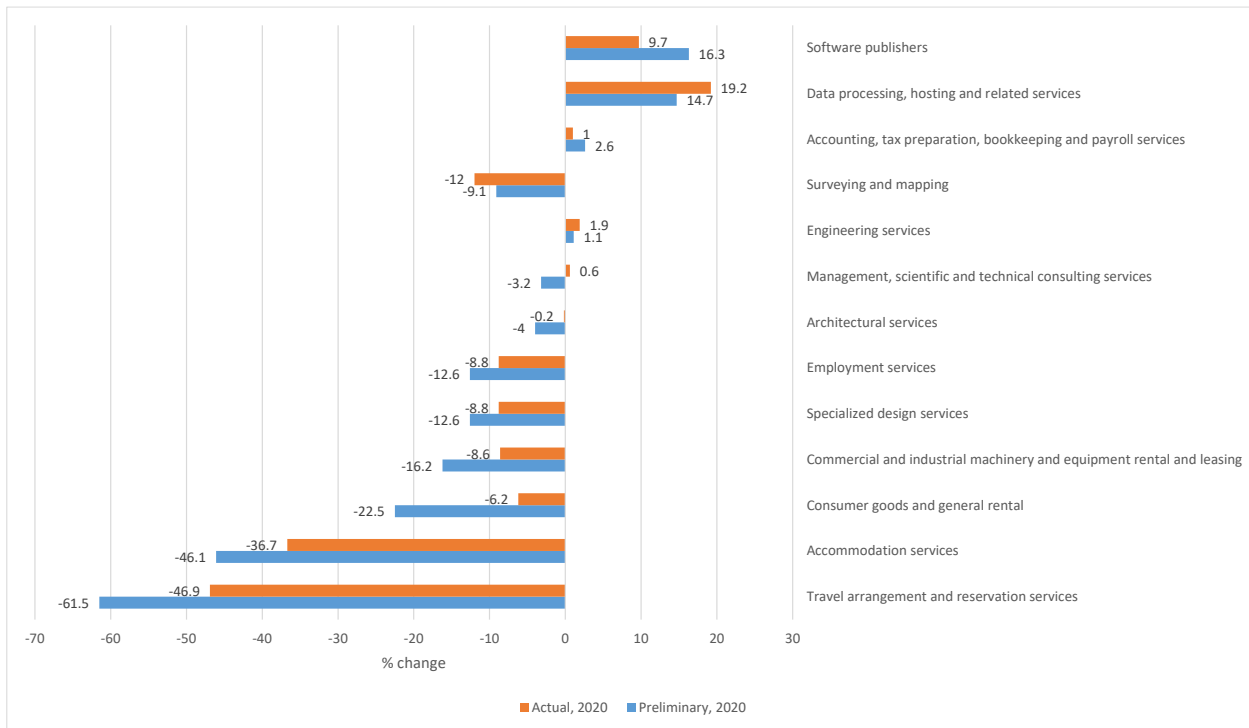
10. The GST is a value-added tax levied by the federal Canadian government and is essentially borne by the final consumer.



deduction (PD7) files,<sup>11</sup> to estimate operating revenue<sup>12</sup> and salary expenses during the first and second years of the pandemic. This information was produced 6 to 12 months before the official estimates were published. After review and processing, the GST data for several industries providing professional, administrative, culture, art, entertainment and recreation services for businesses and consumers were historically comparable, reliable and a coherent proxy for preliminary estimates of operating revenue for 2020 and 2021 (see Chart 7).

Chart 7

Preliminary and actual revenue estimates for select service industries providing professional and administrative consumer and business services, percentage change, 2020, Canada



Source: Annual survey of services industries program

Several reports providing insights on the state of economic conditions in the service sector, which relied primarily on administrative data sources, were published in 2021 and 2022 under the banners *StatCan COVID-19: Data to Insights for a Better Canada* and *Analysis in Brief* (see Appendix B for more details).

11. Employer payroll deduction remittances to the Canada Revenue Agency.

12. Operating revenue is a key input in the measurement of national economic production statistics such as GDP and is indispensable for tracking economic activity performance, conducting macroeconomic analysis, and developing monetary and fiscal policy measures.



## 5. Statistical measurement challenges

The pandemic emphasized data gaps and measurement challenges in the Service Industries Program, mainly for the digital economy, and services and products delivered over the Internet. By thrusting large numbers of organizations online, the COVID-19 pandemic contributed to a further increase in the importance of the Internet and digital technologies in business practices. The Service Industries Program has been collecting data on e-commerce sales for several years, as well as information on methods of sales and other characteristics for online service activities, but survey responses and data quality are uneven. While the Service Industries Program collects e-commerce sales for nearly 20 annual service industries surveys, only slightly more than half of those surveys publish estimates on e-commerce sales because of data quality issues and low response rates.

Other challenges in collecting data on the digital economy stem from the misclassification of business activities or lack of a business frame designed to specifically capture emerging technological services such as cloud computing, cryptocurrency mining or other digital technologies.

Despite the challenges, survey questionnaire content is being updated to collect better information on businesses in the digital economy. For example, new characteristics questions were added to survey questionnaires to better measure platform-based activities, such as those for food services with third-party food delivery charges. Data quality for platform-based activities will be assessed. It remains a challenge to quickly fill data gaps related to emerging aspects of the digital economy, which have changed the service sector rapidly in recent years.

Along with new survey content, other data sources will be available. A change in legislation for the GST and harmonized sales tax (HST) was announced in the 2020 Fall Economic Statement, then mandated in the federal budget released on April 19, 2021. As of July 1, 2021, digital economy businesses, including foreign-based digital economy businesses and digital platform operators, must register, charge, collect and report GST and HST to the Canada Revenue Agency. There was a transition period of one year for compliance. In addition, the 2021 federal budget proposed to implement an interim 3% digital sales tax, which came into effect at the beginning of 2022. These new developments enable Statistics Canada to tap into more administrative tax data for better reporting on and analysis of the digital economy.

Finally, Statistics Canada is also experimenting with the use of external datasets to complement the use of survey data and administrative tax data. For example, external data obtained from AirDNA are used to measure platform-based activities, such as those for short-term rental accommodation services. This external dataset provides wide coverage of these services and detailed characteristic information that is difficult to get with traditional surveys.



## 6. Final thoughts

Since the beginning of the pandemic, statistical operations involving confidential data have mostly been carried out working remotely in the Service Industries Program,<sup>13</sup> a shift that would have been unthinkable before the health crisis. Responding to data user needs, Statistics Canada programs continued to innovate over the last two years. Boundaries were pushed and opportunities seized, leading to the accelerated development of new, timelier service industry statistics. The Service Industries Program will continue to address measurement challenges in the service sector, such as those related to the digital economy, and leverage new alternative data sources. The Canadian economy continues to face macroeconomic turbulence (price and labour pressures, supply chain issues, external geopolitical factors) that requires timely statistics on the service industries.

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13. Before the pandemic, all statistical operations with confidential data were taking place onsite at Statistics Canada offices.



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## Appendix A

The equation below describes the imputation methods for the Service Industries Program. If there are no large economic shocks, historical imputation for components of financial variables is calculated as follows:  $Y_{imp} = Y_h * X_c / X_h$  where

$Y_{imp}$  is a component of total expenses to impute, for example, salaries

$Y_h$  is historical salaries (at time t-1)

$X_c$  is total expenses (at time t) and

$X_h$  is historical total expenses (at time t-1)

The imputation method that was favoured during the pandemic was based on more current collected data from a donor pool with the same geographical classification. The equation below describes this alternate approach.<sup>14</sup>

$$Y_{imp} = \bar{Y}_c * X_c / \bar{X}_c$$

Where  $Y_{imp}$  and  $X_c$  are described as above

$\bar{Y}_c$  represents average salaries of the same classification group (at time t) and

$\bar{X}_c$  represents average total expenses of the same classification group (at time t)

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14. This method is generally used when there is a new unit in the sample, but it was widely adopted as the imputation method for reference year 2020.





## Appendix B

Analysis reports using administrative data published under the banners *StatCan COVID-19: Data to Insights for a Better Canada* and *Analysis in Brief*.

1. Statistics Canada. (2021). *Fallout from the COVID-19 pandemic: A look back at selected industries in the service sector in 2020*. <https://www150.statcan.gc.ca/n1/pub/45-28-0001/2021001/article/00020-eng.htm>.
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### **Writing guides consulted**

APA Style Appendix Writing: <http://rasmussen.libanswers.com/faq/33090>

### **Reviewers**

Sylvie Lafond, Retail and Service Industries Division

Mathieu Thomassin, Retail and Service Industries Division

Ben Veenhof, Retail and Service Industries Division

Megan Brown, Retail and Service Industries Division

Nathalie Breault, Retail and Service Industries Division

Andrew Dormer, Retail and Service Industries Division

Etienne Saint-Pierre, National Economic Accounts Division