

Significance of the Cruise Industry in Atlantic Canada Tourism

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Abstract: Tourism has been identified as a strategic sector for the Atlantic Growth Strategy, launched in July 2016 by the Government of Canada and the Atlantic provincial governments. The cruise industry received particular attention due to its high profile and the rapid growth of cruise passenger traffic in Atlantic Canada during the post-2000 period until the global disruption caused by the COVID-19 outbreak. Identifying the economic impact of the cruise industry and assessing its significance within the overall tourism sector are essential to determine the extent to which the recent tourism strategy focusing on the development of the cruise industry has been successful in generating economic growth.

This paper examines the significance of the cruise industry by estimating the economic impact of its operation in Atlantic Canada in 2016. Our estimates from a regional input-output (I-O) model show that the cruise industry generated a total of \$52.5 million in value-added, \$30.1 million in total labour income, 515 full-time equivalent jobs, and \$11.3 million in taxes. The analysis further shows that one-third of the total impact flows outside the region to the rest of the Canadian economy. The contribution of the cruise industry to the overall tourism sector is also estimated using Tourism Satellite Account data. The cruise industry's shares of contribution to value-added generated by the overall tourism sector ranges from 0.5% to 2.2% depending on the province. Although the cruise industry's shares of contribution to the employment and labour income generated by the overall tourism sector are similar in magnitude, its share of contribution to the taxes attributable to tourism is substantially smaller.

Our results illustrate that the cruise industry in Atlantic Canada has a modest economic impact and plays a relatively small role within the overall tourism sector, which stands in stark contrast to the high public profile of this industry. In the policy context, cruise tourism efforts have a limited capacity to instigate growth or replace the rapid erosion of manufacturing employment in this region since the early 2000s.

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1. Introduction

The cruise industry has been the fastest growing category in the leisure travel market until recently, with an average annual passenger growth rate of approximately seven percent per annum since the 1980s (Florida-Caribbean Cruise Association [FCCA], 2017). The number of passengers carried by the cruise industry globally increased from 17.8 million in 2009 to 29.7 million in 2019 (Cruise Lines International Association [CLIA], 2021). A Business Research and Economic Advisors (BREA) study estimates the total contribution of the cruise industry in 2016 to the Canadian economy as \$3.2 billion, creating approximately 23,000 jobs and paying over \$1 billion in wages (2017). Periodic reports commissioned by the cruise industry feed the perception that cruise passengers are big spenders, generating substantial economic impacts, wages, and employment for the ports and the local economies.

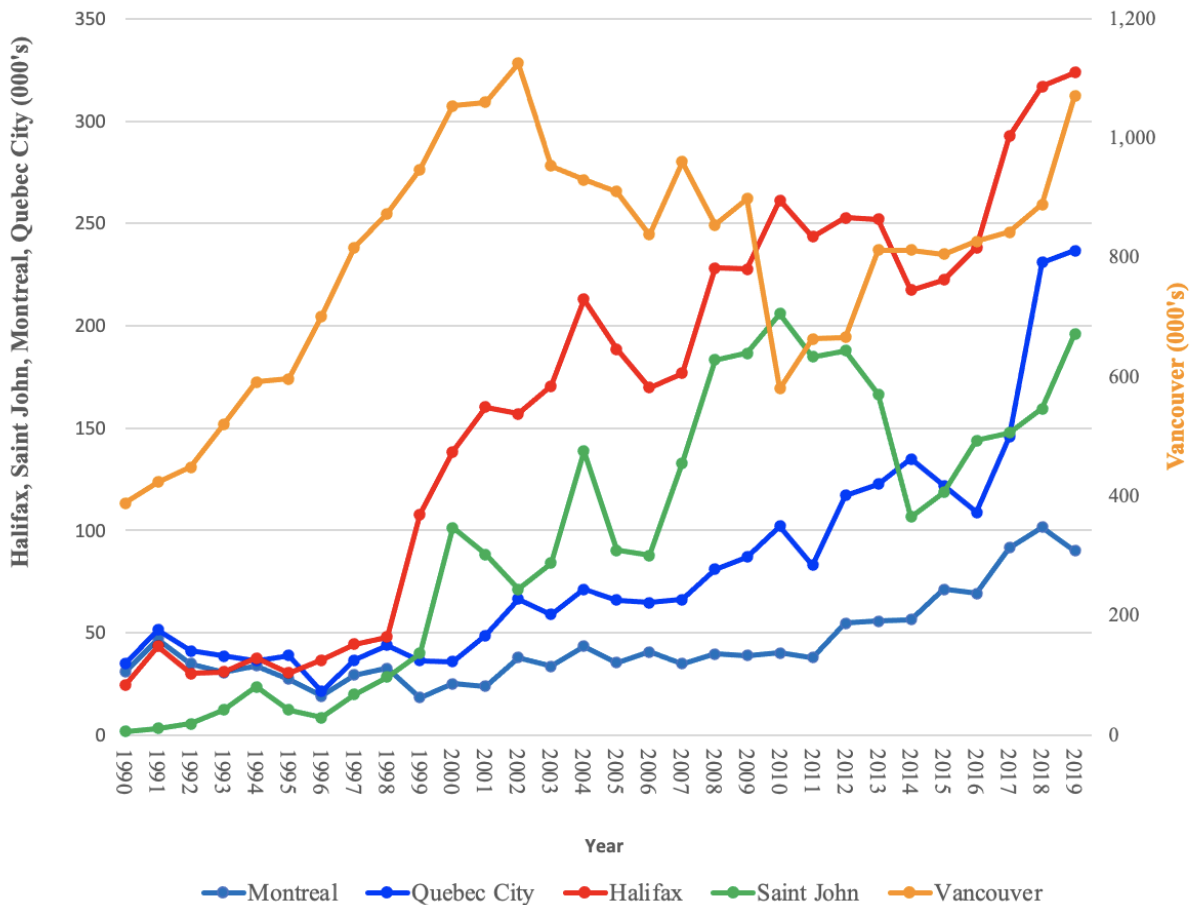
Tourism has been a strategic sector for the Canadian economy and particularly for Atlantic Canada. In particular, the decline of the tradable sectors strengthened the role of tourism as a replacement industry in this region. Consequently, growth of the tourism sector has been targeted by public policy initiatives implemented both at the federal and provincial levels of the government, such as the Atlantic Growth Strategy (2016)¹ and the Atlantic Canada Opportunities Agency's (ACOA) Growth Strategy for Tourism (2016),² which are actively pursued.

The cruise industry received particular attention due to its high profile and the rapid growth of cruise passenger traffic in Atlantic Canada during the post-2000 period, as shown in Figure 1 below. Public funding³ was utilized in the construction of cruise industry infrastructure and the development of tourism services to stimulate cruise tourism spending at the port destinations. Hence, identifying the economic impact of the cruise industry and assessing its significance within the overall tourism sector in the region are essential steps for determining the extent to which the recent tourism strategy focusing on the development of the cruise industry has been successful in generating economic growth in the region.

¹ The Atlantic Growth Strategy (AGS) was launched in July 2016 by the Government of Canada and the Atlantic provincial governments to accelerate the growth of Atlantic Canada's economy. As stated on the AGS website, "Tourism contributes more than \$5 billion annually to the Atlantic Canadian economy. The Atlantic Growth Strategy offers businesses plenty of tools to develop the tourism industry and includes \$24.5 million in investments from the private and public sector" (Atlantic Growth Strategy, 2016).

² The Atlantic Canada Opportunities Agency (ACOA) conducted a study between June 2015 and March 2016 to evaluate its tourism-related programming, including the Growth Strategy for Tourism. As stated in the tourism programming profile of the report, "Tourism has long been important to the economy of Atlantic Canada. Building upon the region's unique natural resources, the sector helps to create jobs and wealth for Atlantic Canadians. ACOA plans and delivers programming aimed at growing the competitiveness of the sector at both the provincial level – through its regional offices – as well as at the pan-Atlantic level – through Tourism Atlantic" (Government of Canada, 2016). The study examined the performance of the programming, with an emphasis on the implementation of the ACOA Growth Strategy for Tourism (AGST) from 2009-2010 to 2013-2014, and presented its findings in the report published on April 29, 2016.

³ The Port of Saint John in New Brunswick received \$3 million in municipal funding for the construction of the Marco Polo Terminal in 2009 and \$9 million funding, shared equally between the federal and the provincial government, for the construction of the Diamond Jubilee Cruise Terminal in 2013. The Port of Sydney in Nova Scotia received \$20 million in funding from all three levels of government towards the construction of a second berth at the Sydney Marine terminal in 2017. The Charlottetown Harbour Authority Inc. (CHAI) in Prince Edward Island announced the expansion of the Charlottetown Marine Terminal in 2018, which received a total of \$8 million in funding shared equally by the federal and the provincial government.

FIGURE 1. International Cruise Passenger Traffic at Major Canadian Ports (1990-2019)

Source: Transportation Canada Comprehensive Reports – Statistical Addendum

Notes: Visitation to the Port of Vancouver is presented on a separate axis on the right due to differences in volume of traffic.

The cruise industry received considerable attention in the academic literature as well (Larsen and Wolff, 2016; Papathanassis and Beckmann, 2011). Although the economic relevance of cruise tourism is widely acknowledged in the literature, concerns are also expressed regarding the real economic value of cruise activity in a port of call and the cruise industry's ability to produce economic benefits that exceed the associated costs for local communities (Gouveia and Eusébio, 2019; Lester and Weeden, 2004; Marsh, 2012; Pino and Peluso, 2018).

There are several reasons behind this skepticism. First, the cruise industry has a high concentration ratio and exerts a large degree of market power (Clancy, 2017). Consequently, cruise companies are alleged to engage in rent-seeking strategies that capture economic values for themselves while minimizing economic value to local stakeholders (Bradley and Trammell, 2006; Klein, 2011; London and Lohmann, 2014).

Second, cruise passengers spend less on shore-based activities than the average tourist (Brida and Zapata, 2010; Larsen et al., 2013; Larsen and Wolff, 2016). In many communities, cruise tourists spend their money either on the cruise ship itself or at businesses that are economically tied to cruise companies (Klein, 2009, 2011; London and Lohmann, 2014). Moreover, when passengers participate in shore excursions, cruise lines often benefit the most from such activities, as they charge about 50 percent of the price paid as commissions, resulting in significant economic leakage from communities hosting cruise tourism (Nicely and Palakurthi, 2012; Seidl, Guiliano, and Pratt, 2017).

Third, the environmental impacts of cruise vessels can be significant. Despite representing a tiny fraction of the global merchant fleet, cruise ships are estimated to be responsible for 25 percent of all waste generated by merchant vessels (Butt, 2007). Cruise ships produce a multitude of organic and inorganic waste in gaseous, liquid, and solid form (Klein, 2011). In particular, the volume of ship-generated waste disposal at home ports and ports of call exerts various levels of risk and hazard for the host environment (Carić and Mackelworth, 2014).

Despite the recent growth in the cruise tourism literature, there is a limited number of economic impact studies (Gouveia and Eusébio, 2019). Governments invest substantial sums of public funding in the infrastructure needed for cruise ship operations in the hopes of attracting a stream of economic benefits for local businesses and communities (Klein, 2005). These public investments carry inherent risks due to factors such as unrealistic revenue expectations, uncertainty of return on these investments, and strategic behaviour of cruise lines. Therefore, accurate information is needed on the economic impacts and the net benefits accruing to the region if policymakers are to determine the optimal amount of support for the development and support of this sector (Dwyer, Douglas, and Livaic, 2004).

This requires an estimation of the economic impacts of cruise tourism in a port or region. Dwyer and Forsyth (1996, 1998) establish a multidimensional framework of benefits that can be used to assess the economic impact of cruise activity on port destinations. Direct benefits consist of passenger and crew member expenditures and cruise line expenditures at the port destination. Indirect benefits occur with spending at firms that supply goods and services to the end users, which, in turn, feed suppliers' expenditures on materials and other inputs. Induced benefits entail an income improvement among local firms and residents, which generates increased local spending and local development (Pavlić and Portolan, 2012; Stefanidaki and Lekakou, 2012; Vaggelas and Pallis, 2010).

The relationship between expenditures and value-added generated in the region is also crucial for an accurate assessment of the economic impact. As Torbianelli (2012) points out, the total cruise tourism spending in a port may have a minor impact if much of this expenditure leaks out. A large portion of goods purchased by passengers, crew, and cruise ships at a given port are often produced elsewhere in the world (Scarfe, 2011). Hence, leakages from the local economy associated with imported goods, commissions and fees collected by the cruise lines, and nonlocal employment should all be considered to properly assess the impact of cruise tourism on the host region (Kayahan, VanBlarcom, and Klein, 2018). In this regard, periodic reports commissioned by the cruise industry seem to be misguided in their emphasis on the total cruise industry

spending at port destinations rather than focusing on the value-added generated in the local economy.

In this paper, we estimate the economic impact of cruise industry operations in Atlantic Canada in 2016 using a regional input-output (I-O) model that controls for interprovincial and interindustry linkages, as well as other leakages. Estimates from the regional I-O model are utilized to accomplish two primary objectives:

- First, to identify the local impact of the cruise industry operation in Atlantic Canada for this region and its impact on the rest of the economy.
- Second, to estimate the cruise industry's share of contribution to the overall tourism sector in each Atlantic province.

Identification of the cruise industry's economic impact and its overall significance within the overall tourism sector is essential to evaluate the extent to which the tourism strategy focusing on the development of the cruise industry has been successful in stimulating economic growth in the region.

The analysis is conducted in three stages. In the first stage, we identify direct expenditures associated with the cruise activity using the framework developed by Dwyer, Douglas, and Livaic (2004). Average passenger and crew spending is estimated using the information gathered from visitor surveys conducted at the four main ports⁴ in Atlantic Canada during the 2016 and 2017 cruise seasons. Direct cruise industry expenditures for each Atlantic province are then calculated by combining the visitor spending estimates with onshore visitation numbers and information on the cruise line expenditures reported by BREA (2017).⁵ Results suggest that the total direct cruise industry expenditure in Atlantic Canada was \$78.2 million in 2016. The bulk of the direct cruise industry expenditures is concentrated on the manufacturing industry, followed by the transportation & warehousing and accommodation & food services industries in Atlantic Canada.

In the second stage, the total economic impact is estimated using Statistics Canada's regional I-O model, taking into account the direct, indirect, and induced spending associated with the cruise industry. Results show that the operation of the cruise industry in Atlantic Canada generated a total of \$52.5 million in value-added, \$30.1 million in total labour income, 515 full-time equivalent (FTE) jobs, and \$11.3 million in taxes in 2016. Results show that roughly two-thirds of the value-added and employment generated remains within the region, and the rest flows to other (non-Atlantic) Canadian provinces. Corresponding economic impact estimates reported by BREA (2017) are more than twice as large for employment and labour income and 70 percent larger for taxes attributable to cruise tourism. Major methodological shortcomings identified in the BREA study, which will be discussed later in the paper, raise concerns about the validity of the estimates in the reports commissioned by the cruise industry.

⁴ The four main ports include Saint John in New Brunswick (NB), Halifax in Nova Scotia (NS), Charlottetown in Prince Edward Island (PEI), and St. John's in Newfoundland and Labrador (NL).

⁵ The BREA report was commissioned by CLIA – North West & Canada and its Canadian cruise destination partners to analyze the economic contribution of the international cruise industry to the Canadian economy in 2016.

In the final stage, the relative contribution of the cruise industry to the overall tourism sector in each Atlantic province is estimated using the Provincial and Territorial Tourism Satellite Accounts (PTSA). The estimates show that the cruise industry's share of the revenues generated by the overall tourism sector in each province ranges from 0.5 to 3.1 percent in Atlantic Canada. The contribution to value-added and labour income generated by the overall tourism sector are similar in magnitude, ranging from 0.5 to 2.2 percent and 0.4 to 2.1 percent respectively. However, the contribution rates for employment are slightly smaller (0.3 to 1.7 percent) and substantially smaller for total (Federal/Provincial/Municipal) taxes (0.1 to 0.8 percent) attributable to the tourism sector.

Our results illustrate that the overall contribution of the cruise industry to the economy remains modest despite the robust growth in cruise passenger traffic in the recent period. Moreover, the cruise industry in Atlantic Canada plays a relatively small role within the overall tourism sector, which stands in stark contrast to the high profile of the industry and the public attention it receives. In comparison, land tourists have a larger average spending per visitor. Based on these findings, the cruise industry seems to have a limited capacity to instigate growth in the region or to replace the manufacturing that has been lost since 2010, like the pulp and paper industry.

This paper proceeds as follows: In the next section (Section 2), we describe the data and methodology used in the study. Section 3 presents the empirical results from the visitor spending regression analysis and the economic impact assessment. Section 4 provides a brief discussion and conclusion.

2. Data and Methodology

In this section, we begin by describing the data used in calculating the economic impact of the cruise industry in Atlantic Canada. Then, we present details of the methodology adopted in this study and describe the relevant assumptions underlying the construction of the key economic variables used in the analysis.

2.1 Data

This study uses data from multiple sources. A detailed presentation of the data and its sources are given below.

2.1.1 Visitor Expenditures

As noted earlier, visitor expenditures in cruise port destinations constitute a major component of the direct expenditures associated with the cruise industry. Information on visitor demographics and spending behaviour was collected during the 2016 and 2017 cruise seasons via in-person surveys conducted in the four major ports in Atlantic Canada: Halifax (NS), Saint John (NB), Charlottetown (PEI), and St. John's (NL). Surveying was conducted throughout the entire cruise season, from the beginning of May until the end of October. Passengers and crew members were surveyed at the port area beginning approximately two hours after the ship's arrival and continuing until one hour before the ship's departure. Surveys gathered information on the

spending behaviour of visitors (total spending⁶ and breakdown across individual spending categories⁷), party size (number of adults and children in the party) and demographic information (age, education, country of residence, etc.) for the main respondent.

TABLE 1. Sampling Information for the 2016 and 2017 Cruise Season

Port Surveyed	Total Number of Ship Visits	Ships Surveyed	Visitors Surveyed
St. John's (NL)	50	20	388
Charlottetown (PEI)	146	61	830
Halifax (NS)	306	267	5,928
Saint John (NB)	129	60	536
Total	631	408	7,682

Source: Total number of ship visits is reported by the port authority in each port. Numbers of ships and visitors surveyed are summary breakdowns for our survey.

Note: NL = Newfoundland and Labrador, PEI = Prince Edward Island, NS = Nova Scotia, NB = New Brunswick.

A total of 7,682 surveys were collected from 408 (65 percent) of the 631 cruise ships that visited the major ports in Atlantic Canada during the 2016 and 2017 cruise seasons. Table 1 shows the breakdown of ships surveyed and visitor surveys collected by port. Approximately 87 percent of the ships that visited Halifax (NS) during this period were surveyed in our sample. For the remaining ports, the coverage rate was somewhere between 40 percent to 46.5 percent. Post-stratification weights⁸ have been employed to correct for the disproportionate representation of surveys collected from Halifax in the sample.

2.1.2 Onshore Visitation Data

Onshore visitation data for each Atlantic Canadian port is adopted from the 2017 Business Research and Economic Advisors (BREA) study, which reports the number of passengers and crew members that disembarked and visited each port in the 2016 cruise season. These numbers are presented in Table 5.

2.1.3 Cruise Line Expenditures

Cruise line expenditures in the port destination are the second major source of direct expenditures associated with the cruise industry. The BREA (2017) report provides a breakdown

⁶ Visitors were asked about how much they spent or planned to spend during their visit in the port destination and the number of people for whom they were reporting these expenses.

⁷ Information was gathered across the following categories: Tours bought on board ship, Tours bought ashore, Transportation, Meals, Beverages, Souvenirs and Crafts, Jewelry, Cosmetics and Personal Items, and Other (specify).

⁸ Sampling weights are based on the stratification of cruise passenger population in cruise market segments across the port destinations during the 2016 and 2017 cruise seasons.

of cruise line expenditures across main expenditure categories for each port, which are shown in Table 2.

TABLE 2. Direct Cruise Line Expenditures in Atlantic Canada by Province (\$2016 million)

Expenditure Category	NL	PEI	NS	NB	Total
Administrative & Professional Expenses	\$0.50	\$0.04	\$6.4	\$0.1	\$7.0
Transportation & Storage	\$0.70	\$2.38	\$21.0	\$2.5	\$26.6
Food & Beverages	NA	NA	\$2.6	\$1.5	\$4.1
Vessel Maintenance & Equipment	NA	\$0.50	\$1.3	NA	\$1.8
Travel Agent Commissions	\$0.90	\$0.09	\$0.9	\$1.0	\$2.9
Other Operating Expenses	\$0.80	\$1.13	\$2.7	\$3.4	\$8.0
Total	\$2.9	\$4.1	\$34.9	\$8.5	\$50.4

Source: BREA (2017).

Note: NA = Not applicable, NL = Newfoundland and Labrador, PEI = Prince Edward Island, NS = Nova Scotia, NB = New Brunswick.

The cruise line expenditures reported in the BREA (2017) study are also used for this study except for the travel agent commissions category since it is not clear whether these services are sourced from within the region or from elsewhere. However, given the small magnitude of these expenditures, the decision to exclude them does not significantly impact on our results.

2.1.4 Provincial and Territorial Tourism Satellite Account

The tourism sector is not explicitly separated from other sectors within the industrial classification system but is rather made up of many different segments of other industries such as food and beverage services, accommodation services, transportation services, etc. The Tourism Satellite Account (TSA) is a standard statistical framework that enables the extraction of tourism economic data. The Provincial and Territorial Tourism Satellite Account (PTTSA) in Canada allows for the comparison of tourism with other industries within a province or territory since the concepts and methods used are based on the framework of the Canadian System of National Accounts (Statistics Canada, 2020). The PTTSA provides an estimate for the value-added generated by the tourism industry relative to gross domestic product and the number of jobs attributable to tourism demand. In this study, we utilize the data reported by the 2017 PTTSA on tourism revenues, the tourism sector's contribution to the total economy and employment, and the labour income generated by tourism activities in each Atlantic province.

2.2. Methodology

The total economic impact of the cruise industry is calculated in two stages. Direct expenditures associated with the cruise industry in each province are calculated in the first stage, and indirect and induced expenditures are calculated in the second stage. Details regarding the estimation for each stage are given below.

2.2.1 Direct Cruise Industry Expenditures in Atlantic Canada

Direct cruise industry expenditures are calculated by combining total visitor (passenger and crew) spending with cruise line expenditures in each province. Visitor expenditures in each port are obtained following a two-step process. In the first step, average visitor expenditures are estimated with regression analysis using the following specification:

$$y_{it} = \beta_0 + \sum_{j=1}^3 \alpha_j P_{jit} + \delta I_{it} + \pi W_{it} + \beta X_{it} + \sum_{j=1}^5 \gamma_j M_{jit} + \rho Y17_i + \varepsilon_{it} \quad (1)$$

The dependent variable, y_{it} , denotes the per person visitor spending obtained from the visitor surveys conducted in 2016 and 2017. P_j are the port indicators for Saint John (NB), St. John's (NL), and Charlottetown (PEI), where the base category is Halifax (NS). I is a vector of cruise itinerary variables that controls for the number of port destinations visited in the itinerary, the specific order of the Atlantic Canadian ports within the entire itinerary, and the cruise market segment of the cruise ship. Cruise lines visiting the region were divided into four groups based on the market segment that target: Mass Market, Premium, Luxury, and European, which is the base category.⁹

W_{it} is a vector of two weather-related variables that consist of the average temperature and an indicator variable for rain on the day of the cruise ship visit. X is a vector of visitor demographics with three variables: Indicator for visitor type (passenger or crew) surveyed, age, and labour force status of the primary respondent in the survey. M_{jit} denotes indicators for the months of May, June, July, August, and September that the expenditure was recorded, where April is the base category. $Y17$ is an indicator that takes value 1 if the expenditure is sampled in 2017 and 0 otherwise. Finally, index i refers to individual and t to year.

Estimation is conducted via weighted generalized linear model (GLM) regression where sampling weights¹⁰ are based on the stratification of cruise passengers across the cruise market segments in each port over the 2016 and 2017 cruise seasons. The class of generalized linear models (GLM) is the most widely used framework in applied statistics for nonlinear cross-section regression (Cameron and Trivedi, 2005).

The GLM framework, developed by McCullagh and Nelder (1989) enables the methods developed for linear models to be applied to more general cases where the response variable does not follow a normal distribution and is a non-linear function of the explanatory variables in the model (Dobson and Barnett, 2018). GLM is the preferred measure of estimation for our specification because visitor spending exhibited a positively skewed empirical distribution.

The estimate of average per visitor spending is based on the predicted value of spending from the model, where cruise itinerary, weather, and time variables are evaluated at their port-specific population means for the 2016 cruise season, and the variables on visitor demographics are

⁹ We requested feedback from the Halifax Port Authority (HPA) regarding the categorization of the cruise lines adopted in our methodology. HPA agreed with this categorization.

¹⁰ Sampling weight is the reciprocal of the overall probability of selecting a cruise passenger from a particular cruise market segment in a given port during the pooled 2016 and 2017 season.

evaluated at their overall sample means.¹¹ This approach allows differences in key dimensions, such as market segmentation and cruise itinerary attributes, to be reflected in the average spending estimate for each port.

Direct visitor spending in each province is calculated by combining the average spending estimate for each port with the onshore visitation numbers for passengers and crew reported in Table 2. Additionally, the total direct visitor spending in each province is broken down into individual expenditure categories from our survey (tours bought on board ship, tours bought ashore, meals, transportation, etc.) using the share of expenditures observed in each category in the sample.

As mentioned in Section 2.1, direct cruise line expenditures in each province are adopted from the BREA (2017) study with the exception of the travel agents' commissions category. The breakdown of these expenditures is summarized in Table 2. Nova Scotia and New Brunswick attract most of the cruise line expenditures (71.5 percent and 15.8 percent respectively) in the region.

2.2.2 Total Economic Impact of the Cruise Industry in Atlantic Canada

The total economic impact consists of the direct, indirect, and induced impacts associated with cruise activity in the region. Direct impact measures the initial requirements for an extra dollar's worth of output of a given industry. Indirect impact measures the changes due to interindustry purchases as they respond to the new demands of the directly affected industries. Induced impact measures the changes in the production of goods and services in response to consumer expenditures induced by households' incomes generated by the production of the direct and indirect requirements.

I-O models have been the predominant approach for evaluating the economic impacts of tourism in the literature, but they are also criticized for their assumptions¹² (Dwyer et al., 2004). Despite these limitations, I-O models are appropriate for estimating the economic impact to a specific economy (Chang et al., 2016).

The total economic impact of the cruise industry in this paper is estimated using a regional I-O model, which accounts for the interindustry linkages and provincial interrelations. Separate I-O analyses¹³ have been conducted in consultation with the Industry Accounts Division of Statistics Canada to calculate the indirect and induced impacts of visitor spending and cruise line

¹¹ This approach is based on the assumption that the cruise visitor population in Atlantic Canada is homogeneous with respect to age and labour force status across the ports visited.

¹² I-O models assume fixed technological coefficients, which fails to consider factors such as account economies of scale, constraint capacities, technological change, externalities, or price changes. This makes impact analysis less accurate in the long term and may lead to overestimation of the impact of a change in final demand. Limitations like these resulted in the development of alternative techniques such as the Computable General Equilibrium (CGE) model. Unfortunately, Statistics Canada does not have a CGE model for the region.

¹³ The I-O analysis for visitor spending is conducted using the supply use product classification for the consumption expenditures of non-residents in 2016. The I-O analysis for cruise line expenditures is based on the 2013 Input Structure for the water transportation industry.

expenditures in the region. The total economic impact of the cruise industry is calculated by combining the total impact for visitor spending and cruise line expenditures in the final step.

2.2.3 Contribution of the Cruise Industry to the Overall Tourism Sector

The contribution of the cruise industry to tourism revenues, GDP, employment, taxes, and labour income in each province is estimated using the regional I-O model. To quantify the cruise industry's contribution, the corresponding values of these measures need to be established for the overall tourism sector in each Atlantic province in 2016.

The PTTSA provides estimates for the overall tourism sector's contribution to GDP and employment in 2017. We combine these estimates with the provincial GDP and employment numbers in 2016 to calculate the GDP and employment attributable to the tourism sector for each province. The PTTSA also reports the values for tourism revenues and labour income generated by the tourism sector for each Atlantic province in 2017. The values of these variables in 2016 are imputed by discounting the 2017 values reported by the growth rate of GDP for the 2016-17 period. Finally, government revenues attributable to tourism per \$100 of tourism spending by non-residents is reported to be \$30.97 in 2017 by Statistics Canada (2020). We use this figure to calculate the overall level of taxes attributable to the tourism sector in 2016.

3. Results

Results of the economic impact assessment for each stage are presented below.

3.1 Total Visitor Expenditures in Atlantic Canada

As mentioned in Section 2.2, average visitor spending per person in each port is estimated using the weighted GLM regression. Using the outcome of the modified Park test (Manning and Mullahy, 2001), the family and the link function of the model are determined as Poisson and natural log respectively.

Regression results and coefficient estimates from Equation 1 are presented in Table A1 of the Appendix. Marginal effects of the explanatory variables, evaluated at the means using robust variance estimates, are given in Table 3. Discussion of the results is focused on marginal effects, as they are easier to interpret since they are expressed in dollars.

TABLE 3. Marginal Effects: Weighted GLM Estimation

Variable	dy/dx	Std. Err.	Z-score	P-value	95% Conf. Interval	
Port_Charlottetown	-\$1.56	2.66	-0.59	56%	-\$6.78	\$3.66
Port_Saint John	-\$10.84	2.24	-4.83	0% ***	-\$15.23	-\$6.44
Port_St. John's	-\$19.78	3.93	-5.04	0% ***	-\$27.48	-\$12.09
Port Order	\$1.08	0.45	2.41	2% ***	\$0.20	\$1.95
# of Ports	-\$0.22	0.47	-0.47	64%	-\$1.14	\$0.70
Average temperature	-\$0.26	0.21	-1.25	21%	-\$0.67	\$0.15
Rain	-\$1.17	1.57	-0.75	46%	-\$4.25	\$1.90

TABLE 3. Continued

Variable	dy/dx	Std. Err.	Z-score	P-value	95% Conf. Interval	
Crew	-\$22.86	5.06	-4.52	0% ***	-\$32.77	-\$12.95
Luxury Segment	\$14.01	4.52	3.1	0% ***	\$5.16	\$22.86
Premium Segment	\$16.28	3.57	4.55	0% ***	\$9.27	\$23.28
Mass Market Segment	\$21.18	3.84	5.51	0% ***	\$13.64	\$28.72
Age_30to50	\$8.74	5.45	1.6	11%	-\$1.94	\$19.42
Age_50to70	\$7.34	5.33	1.38	17%	-\$3.11	\$17.79
Age_70 or More	\$1.78	5.50	0.32	75%	-\$9.00	\$12.55
Employment: Retired	-\$8.85	1.82	-4.86	0% ***	-\$12.42	-\$5.29
Employment: Not working	-\$11.16	5.62	-1.98	5% **	-\$22.17	-\$0.14
May	\$6.18	3.59	1.72	9% *	-\$0.85	\$13.21
June	-\$2.95	2.49	-1.19	24%	-\$7.82	\$1.92
July	\$5.00	3.14	1.59	11%	-\$1.15	\$11.16
August	\$2.65	3.21	0.83	41%	-\$3.63	\$8.94
September	\$2.28	2.07	1.1	27%	-\$1.78	\$6.35
Year_2017	-\$5.87	1.53	-3.84	0% ***	-\$8.86	-\$2.87

Notes: dy/dx = Marginal effects, Std. Err. = Standard errors of the marginal effects. Conf. = Confidence. * $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$. The dependent variable is per person spending of cruise visitors in the port destination. Marginal effects are calculated at means of the independent variables using sampling weights. Reported standard errors are robust under heteroskedasticity.

Results from Table 3 are summarized as follows. Holding everything else constant,

- Average cruise passenger spending in Halifax (NS) is greater than Saint John (NB) and St. John's (NL) but not significantly different from Charlottetown (PEI).
- Average visitor spending seems to be higher in ports that are visited later in the itinerary.
- Although days with hotter average temperatures and rainfall are associated with lower spending in the sample, these effects are not statistically significant.
- Crew members spend on average \$23 less than cruise passengers.
- Visitors in the mass market segment spend the most, followed by the luxury and premium segments, which are not significantly different from one another. The European segment is associated with the lowest spending.
- Although middle aged adults seem to spend more than younger adults (base group: age 16 to 30) and seniors (70 or more) in the sample, these differences are not statistically significant.
- Individuals who are not working or retired spend less on average than those who are employed.
- Spending is significantly higher in May and July than in October, which is the base group, at the 10 percent level of significance.

TABLE 4. Predicted Average Visitor Spending per Person by Port (\$2016)

Port Destination	Visitor Type	Average Spending	Standard Error	Lower Limit	Upper Limit
St. John's (NL)	Passenger	\$40.56	\$2.60	\$35.45	\$45.66
Charlottetown (PEI)	Passenger	\$59.00	\$2.71	\$53.69	\$64.30
Halifax (NS)	Passenger	\$60.86	\$0.98	\$58.83	\$62.78
Saint John (NB)	Passenger	\$53.06	\$2.00	\$49.13	\$56.99
St. John's (NL)	Crew	\$26.95	\$2.61	\$21.84	\$32.07
Charlottetown (PEI)	Crew	\$39.21	\$3.81	\$31.74	\$46.68
Halifax (NS)	Crew	\$40.44	\$3.67	\$33.26	\$47.63
Saint John (NB)	Crew	\$35.26	\$3.46	\$28.48	\$42.05

Notes: NL = Newfoundland and Labrador, PEI = Prince Edward Island, NS = Nova Scotia, NB = New Brunswick. The average per visitor spending estimate for each port is based on the predicted value from the GLM specification where the cruise itinerary variables, weather data, and time indicators are evaluated at their population values for the 2016 cruise season in each port, and the visitor demographics are evaluated at their overall sample means. Lower and upper limits denote the 95 percent confidence limits for the average spending estimate.

Table 4 presents the average per visitor spending estimates based on the predicted values of the GLM regression as previously mentioned. Halifax (NS) and Charlottetown (PEI) are associated with the largest average per passenger spending in Atlantic Canada, whereas Saint John (NB) is ranked in the middle, and St. John's (NL) is not only ranked at the bottom but is also substantially lower than the rest.

Moreover, average crew spending per person appears to be approximately \$20 lower than passenger spending across these ports. Finally, Table 4 presents the standard errors and the 95 percent confidence interval limits for the average visitor spending estimates. These confidence limits are utilized to construct the interval estimates of the economic impact measures.

TABLE 5. Total Visitor Expenditure in Atlantic Canada by Province (\$2016)

Port Destinations	Average Spending per Passenger	Passenger Onshore Visits	Average Spending Per Crew	Onshore Crew Visits	Total Visitor Expenditure
St. John's (NL)	\$40.56	14,145	\$26.95	15,862	\$1,001,234.3
Corner Brook (NL)	\$40.56	7,516	\$26.95	1,802	\$353,401.7
Other ports in NL	\$40.56	17,888	\$26.95	4,573	\$848,754.4
Charlottetown (PEI)	\$59.00	61,845	\$39.21	13,116	\$4,163,010.7
Halifax (NS)	\$60.86	220,351	\$40.44	44,356	\$15,203,694.9
Sydney (NS)	\$60.86	75,611	\$40.44	25,076	\$5,615,591.0
Saint John (NB)	\$53.06	133,857	\$35.26	3,166	\$7,214,158.7

Notes: NL = Newfoundland and Labrador, PEI = Prince Edward Island, NS = Nova Scotia, NB = New Brunswick. Onshore visitation data are adopted from the BREA (2017) study. Average spending is obtained from the weighted GLM regression. Average spending estimates for Sydney (NS) are imputed by spending estimates for Halifax (NS). Similarly, average spending estimates for Corner Brook and other ports in Newfoundland and Labrador are imputed by the spending estimates for St. John's (NL).

Table 5 presents the total visitor expenditure estimates for each port, which are calculated by combining average visitor spending with the onshore visitation data in each port. Since only the main ports in each Atlantic province are surveyed, average visitor spending in smaller ports, such as Sydney (NS), Corner Brook (NL), and other smaller ports in Newfoundland and Labrador is imputed¹⁴ with the average spending of the major port in their province.

3.2 Direct Cruise Industry Expenditures in Atlantic Canada

TABLE 6. Total Direct Cruise Industry Spending in Atlantic Canada by Province (\$2016 million)

Province	Direct Visitor	Direct Cruise Line	Total Direct Spending
Newfoundland and Labrador	\$1.66	\$2.00	\$3.66
Prince Edward Island	\$3.71	\$4.05	\$7.76
Nova Scotia	\$18.22	\$33.90	\$52.12
New Brunswick	\$7.11	\$7.50	\$14.61
Total	\$30.71	\$47.45	\$78.16

Table 6 presents direct total visitor spending, direct cruise line expenditures, and total direct cruise industry spending in each province. The confidence limits for direct visitor expenditures and total direct spending are based on the confidence interval values of the average spending estimates in Table 4. It is important to note that the total visitor expenditures in Table 5 contain the markup on onshore excursions purchased directly on board the ship and retained by the cruise lines.

Studies in the literature point to a 100 percent markup, implying that only half the expenditure on tours purchased through the cruise lines would be received by local tour operators (Honey, 2019; Klein, 2005; Novelo, Santoya, and Velloso, 2007; Seidl et al., 2017). Hence, the value of the markup in each province is netted out¹⁵ from the direct visitor spending figures in Table 6 to obtain a more accurate estimation of the local impact.

¹⁴ To the extent that the average spending in these ports may be lower than the major ports in the province, the visitor spending estimates in our study would constitute an upper bound for the total spending.

¹⁵ The averages of the shares of expenditures in each expenditure category for passengers and crew are presented in Table A2 of the Appendix. Shares of expenditures on tours bought on board the ship for passengers and crew members are reported to be 24.3 percent and 2.7 percent respectively. We use this information along with the average expenditure estimates and the onshore visitation numbers for each port to calculate the value of cruise line markup in each province.

Results suggest that the total direct cruise industry expenditures in Atlantic Canada are \$78.2 million¹⁶ in 2016. Nova Scotia generates the largest share of total direct spending among the Atlantic provinces, which is not surprising since it has the largest level of visitation, average visitor spending, and total cruise industry spending in the region. Breakdown of the direct expenditures by industry is presented in Table A4 of the Appendix. The bulk of the direct cruise industry expenditures is concentrated in the manufacturing industry, followed by the transportation & warehousing and accommodation & food services industries in Atlantic Canada.

3.3 Total Economic Impact of the Cruise Industry in Atlantic Canada

Table 7 presents the value-added and employment generated by the cruise industry operation in Atlantic Canada in 2016. Results show that the cruise industry contributed \$52.5 million to the Canadian economy in 2016. Of this amount, \$32.7 million was generated in the Atlantic provinces, and \$19.8 million was generated in the remaining provinces. Regarding employment, the cruise industry operation in the region generated a total of 515 FTE jobs in the Canadian economy in 2016. 360 FTE jobs were generated in Atlantic provinces, and 154 were generated within the remaining provinces.

These figures illustrate the fact that a significant portion of the economic benefits of the cruise industry in Atlantic Canada flows out of the region to the rest of the country through interprovincial trade. Confidence limits¹⁷ of these estimates are presented in Table A5 and Table A6 of the Appendix respectively.

TABLE 7. Total Economic Impact: GDP at Basic Prices and Employment by Industry

Industry	Atlantic Canada		Rest of Canada		Total Impact	
	GDP	Jobs	GDP	Jobs	GDP	Jobs
Goods Producing Sector	\$5.5	38	\$5.0	32	\$10.5	71
Natural Resources, Utilities & Construction	\$2.2	11	\$2.1	11	\$4.3	22
Manufacturing	\$3.3	27	\$2.9	21	\$6.2	48
Service Producing Sector	\$27.2	322	\$14.8	122	\$41.9	444
Wholesale & Retail Trade	\$6.0	96	\$3.6	32	\$9.6	127
Transportation & Warehousing	\$5.1	49	\$1.7	16	\$6.8	65
Financial Services	\$6.0	23	\$4.3	20	\$10.3	43
Professional & Technical Services	\$3.0	37	\$2.7	26	\$5.7	63
Information, Culture & Recreation	\$1.2	9	\$1.1	7	\$2.3	16
Accommodation & Food Services	\$2.7	68	\$0.6	12	\$3.3	79
Other Services & Government	\$3.1	40	\$0.9	10	\$4.0	50
Total Impact	\$32.7	360	\$19.8	154	\$52.5	515

¹⁶ Confidence limits presented in Table A3 of the Appendix show that the total direct spending could range anywhere from \$76 to \$80.3 million.

¹⁷ According to these tables, the value-added and employment generated by the cruise industry in Atlantic Canada are most likely somewhere between \$51 and \$54 million and 496 to 533 FTE jobs respectively.

Notes: GDP figures are measured in \$2016 million, and jobs are measured on a full-time equivalent (FTE) basis. Total impact includes the direct, indirect, and induced spending associated with the cruise industry operation in Atlantic Canada in 2016.

Looking at the value-added generated by industry, the cruise industry had the largest total economic impact on the financial services, wholesale & trade, and transportation & warehousing industries in Atlantic Canada.

Results are similar for the rest of the Canadian provinces, except for the manufacturing industry replacing transportation & warehousing among the highest value-added industries. Looking at employment, the highest number of FTE jobs was generated in the wholesale & retail trade, accommodation & food services, and transportation & warehousing industries in Atlantic Canada.

For the rest of the Canadian provinces, the highest employment was generated in the wholesale & retail trade, professional & technical services, manufacturing, and financial services.

TABLE 8. Total Impact of the Cruise Industry on GDP - Closed Model (\$2016 Thousand)

Expenditure-Based	NL	PEI	NS	NB	RoC	Total
Final domestic expenditures on commodities	\$4,339	\$8,679	\$59,294	\$17,105	\$5,906	\$95,323
International imports	(\$1,335)	(\$1,901)	(\$16,189)	(\$9,737)	(\$4,922)	(\$34,083)
Interprovincial imports	(\$1,513)	(\$3,919)	(\$19,831)	(\$6,079)	(\$3,452)	(\$34,794)
Inventories and other leakages	(\$13)	(\$39)	(\$209)	(\$59)	(\$260)	(\$581)
Interprovincial exports	\$1,442	\$802	\$1,301	\$7,986	\$23,264	\$34,794
Total	\$2,919	\$3,623	\$24,365	\$9,216	\$20,537	\$60,660
Income-Based	NL	PEI	NS	NB	RoC	Total
GDP at Market Prices	\$2,919	\$3,623	\$24,365	\$9,216	\$20,537	\$60,660
Taxes on products	\$458	\$843	\$4,946	\$1,650	\$908	\$8,804
Subsidies on products	(\$51)	(\$89)	(\$298)	(\$34)	(\$151)	(\$623)
GDP at Basic Prices	\$2,512	\$2,869	\$19,718	\$7,600	\$19,779	\$52,479
Subsidies on production	(\$5)	(\$21)	(\$56)	(\$10)	(\$109)	(\$202)
Taxes on production	\$92	\$139	\$954	\$408	\$931	\$2,525
Wages and salaries	\$1,200	\$1,327	\$9,810	\$3,611	\$8,904	\$24,853
Employers' social contributions	\$170	\$162	\$1,509	\$538	\$1,383	\$3,763
Labour income of unincorporated sector	\$38	\$78	\$559	\$166	\$622	\$1,464
Gross operating surplus	\$1,017	\$1,184	\$6,941	\$2,887	\$8,047	\$20,076

Notes: NL = Newfoundland and Labrador, PEI = Prince Edward Island, NS = Nova Scotia, NB = New Brunswick, RoC = Rest of Canada.

Table 8 presents a breakdown of the total impact of the cruise industry on GDP. Recall that the total economic impact is calculated using a regional I-O model that explicitly takes the leakages from interprovincial and international trade into account. The upper panel of the table illustrates the magnitude of these leakages from the final domestic expenditures associated with the cruise industry. A large fraction of the final expenditures leaks out due to international and interprovincial imports in each Atlantic province. However, this is partially offset by the goods and services exported to other provinces.

Among the Atlantic provinces, Nova Scotia has the largest value-added, as expected. New Brunswick and Newfoundland and Labrador have the largest value of interprovincial exports, which helps in reducing the discrepancy between the final expenditures and the value-added generated in the provinces. Nova Scotia and Prince Edward Island have the largest share of net imports,¹⁸ about 58 percent of the final expenditures, in the region.

The bottom panel of the table presents information on the taxes and income generated by the cruise industry in Atlantic Canada. The total labour income¹⁹ generated by the cruise industry amounts to \$30.1 million, of which \$19.2 million is generated in the Atlantic provinces and \$10.9 million in the rest of the country. Looking at taxes on production/products, the cruise industry generated a total of \$11.3 million in taxes, of which \$9.5 million were generated in Atlantic Canada and \$1.8 million in the rest of the country. Confidence limits of these estimates are presented in Table A7 of the Appendix.

TABLE 9. Total Multipliers for the Output, GDP, and Labour Income (\$2016 Thousand)

Industry Output	NL	PEI	NS	NB
Direct impact	\$2,886	\$5,576	\$42,777	\$11,050
Total impact, closed model	\$6,344	\$9,627	\$71,866	\$27,047
Total multiplier	2.20	1.73	1.68	2.45
GDP at Basic Prices	NL	PEI	NS	NB
Total impact, closed model	\$2,512.06	\$2,869.26	\$19,717.69	\$7,600.12
Total multiplier	0.87	0.51	0.46	0.69
Labour Income	NL	PEI	NS	NB
Total impact, closed model	\$1,408.66	\$1,567.45	\$11,878.59	\$4,315.06
Total multiplier	0.49	0.28	0.28	0.39

Notes: NL = Newfoundland and Labrador, PEI = Prince Edward Island, NS = Nova Scotia, NB = New Brunswick.

Table 9 presents the multipliers for the total output, GDP, and labour income in the Atlantic provinces. The upper panel shows the output multiplier, which illustrates that \$1 of expenditure

¹⁸ Net import is calculated by adding interprovincial exports to the sum of interprovincial and international imports.

¹⁹ Total labour income is calculated by combining the wages and salaries, employers' social contributions, and labour income of unincorporated sectors.

associated with the cruise industry operations in Atlantic Canada will generate anywhere between \$1.68 to \$2.45 of total output depending on the province. The multipliers for the GDP (0.46 to 0.87) and labour income (0.28 to 0.49) are much smaller depending on the province.

3.4 Validity of the Cruise Industry Reports

The total economic impact estimate in the BREA (2017) study primarily focuses on the total industry output, which does not accurately reflect the local impact given the major leakages from the provincial economies illustrated in our analysis. However, it also reports that “the cruise industry in Atlantic Canada was responsible for generating 1,400 annualized jobs (1,065 FTE), \$61 million in wages income and \$19 million in taxes throughout the Canada in 2016” (p. 83).

Corresponding estimates from our analysis identify the impact as 515 FTE jobs, \$30.1 million labour income (of which wages and salaries accounted for \$24.9 million), and \$11.33 million in taxes for the Canadian economy in 2016. BREA (2017) estimates are more than twice as large as ours for employment and income and approximately 70 percent higher for taxes, despite the fact that both studies use the same onshore visitation numbers and almost identical values for the cruise line expenditures.

There are two methodological differences that may help in explaining the discrepancy between these estimates. First, the average visitor spending estimates reported in the BREA (2017) study are considerably larger²⁰ than ours. For example, the average cruise visitor spending in Halifax (NS) is reported to be \$83.8 per passenger and \$90.1 per crew member in their study, as opposed to \$60.9 per passenger and \$40.4 per crew member in ours.

Kayahan, VanBlarcom, and Klein (2018) show that BREA’s sampling framework oversampled passengers from the mass market segment, which is associated with significantly more spending per person than the other cruise market segments. Hence, these flaws inherent in the BREA study are likely to result in overestimation of the direct total visitor spending and the total economic impact.

Second, the I-O analysis in the BREA (2017) study has several shortcomings. Interprovincial leakages seem to be completely omitted from the analysis, which induces an upward bias in their economic impact estimate for the region. Moreover, the analysis adopts a top-down approach where the visitor spending and the cruise line expenditures are lumped together prior to the I-O analysis, as opposed to conducting separate I-O analyses for each group. Finally, the analysis only considers direct and indirect spending, excluding the induced benefits associated with the cruise industry. Hence, their economic impact estimates would be even larger if induced effects were also included.

²⁰ Looking at the major ports in each province, spending estimates per passenger and per crew member are \$22 to \$40 and \$38 to \$50 larger respectively.

3.5 Contribution of the Cruise Industry to the Tourism Sector in Atlantic Canada

In this section, we evaluate the contribution of the cruise industry to the overall tourism sector in each Atlantic province. The shares of revenues, GDP, labour income, employment, and taxes generated by the cruise industry within the overall tourism sector are presented below.

TABLE 10. Contribution of the Cruise Industry to the Tourism Sector in Atlantic Canada (2016)

Contribution Category	NL	PEI	NS	NB
Tourism revenues (\$ million)	\$1,266.9	\$549.9	\$2,336.8	\$1,503.4
Contribution of the cruise industry (\$ million)	\$6.3	\$9.6	\$71.9	\$27.0
The cruise industry's share of overall tourism revenues	0.50%	1.75%	3.08%	1.80%
Tourism GDP (\$ million)	\$493.1	\$203.1	\$907.1	\$562.0
Contribution of the cruise industry (\$ million)	\$2.5	\$2.9	\$19.7	\$7.6
The cruise industry's share of overall tourism GDP	0.51%	1.41%	2.17%	1.35%
Labour income from tourism activities (\$ million)	\$325.3	\$132.7	\$570.9	\$361.4
Contribution of the cruise industry (\$ million)	\$1.4	\$1.6	\$11.9	\$4.3
The cruise industry's share of labour income generated	0.43%	1.18%	2.08%	1.19%
Employment generated by the overall tourism sector	8.8	5.3	18.5	13.1
Contribution of the cruise industry	27.0	43.9	304.2	107.6
The cruise industry's share of tourism employment	0.31%	0.83%	1.65%	0.82%
Taxes attributable to overall tourism (\$ thousand)	\$392,346	\$170,316	\$723,701	\$465,593
Taxes attributable to the cruise industry (\$ thousand)	\$550	\$982	\$5,900	\$2,058
The cruise industry's share of taxes	0.14%	0.58%	0.82%	0.44%

Notes: NL = Newfoundland and Labrador, PEI = Prince Edward Island, NS = Nova Scotia, NB = New Brunswick. Provincial figures for revenues, GDP, labour income, employment, and taxes are calculated using data from the Provincial and Territorial Tourism Satellite Account in 2017 and employment numbers from Statistics Canada in 2016. See the Methodology section for details. The cruise industry's contribution amounts are estimated using the regional I-O analysis conducted in this paper.

Table 10 illustrates that the cruise industry's share of the revenues generated by the overall tourism sector in each province ranges anywhere from 0.5 percent to 3.1 percent in Atlantic Canada. The shares of contribution to value-added and labour income generated by the overall tourism sector are similar in magnitude, ranging from 0.5 percent to 2.2 percent and 0.4 percent

to 2.1 percent respectively. However, the contribution rates are slightly smaller for employment (0.3 percent to 1.7 percent) and substantially smaller for total taxes (0.1 percent to 0.8 percent) attributable to the overall tourism sector.

These results imply that the cruise industry in Atlantic Canada plays a relatively small role within the overall tourism sector in the region. This stands in stark contrast to the high profile of the industry and the amount of public attention it receives. Large volumes of cruise passenger traffic at port destinations, combined with the perception that cruise passengers are big spenders, promote the idea that the cruise industry generates substantial economic benefits for port destinations.

Our results illustrate that the actual economic impacts of the cruise industry for the local economies are much smaller than those reported by the cruise industry. This is due to low average spending of cruise passengers and leakages from the local economies due to international and interprovincial trade.

In terms of visitor spending, land tourists have a larger footprint within the overall tourism sector. For example, according to the 2017 Nova Scotia Visitor Exit Survey (VES), the average spending²¹ of visitors, under the pleasure category of trip purpose, is estimated as \$143 per person per day and \$735 per person per trip where the average length of stay is 5.3 days. Similarly, according to the PEI Visitor Exit Survey conducted for the 2018-19 season, the average spending of pleasure visitors is estimated as \$91.14 per person per day and \$384 per person per trip for the spring shoulder season (May to June), \$97.57 per person per day and \$525 per person per trip for the summer main season (July to August), and \$90.13 per person per day and \$408 per person per trip for the fall shoulder season (September to October).

These estimates are substantially larger than the average cruise passenger spending in Halifax (NS) and Charlottetown (PEI). Moreover, the spending of land tourists is anticipated to stimulate a broader spectrum of the local economy due to a wider range of goods and services consumed during their visit. In contrast, visitor spending associated with the cruise industry is concentrated on a smaller range of goods and services and in a smaller geographic region around the port destination. This is in part because Atlantic Canadian ports almost exclusively²² appear as “ports of call” in the cruise ship itineraries, where cruise ships mostly spend seven to nine hours in a given port.

4. Discussion and Conclusion

The cruise industry was the fastest growing category in the leisure travel until the recent disruption due to the COVID-19 outbreak. Periodic reports commissioned by the cruise industry feed the

²¹ These expenditures exclude major purchases but include allocated travel, which is 50 percent of the money spent getting to and from Nova Scotia. The 2017 VES also reports average spending by travel method. Air travelers on average spend \$169 per person per day and \$1,175 per person per trip with an average length of stay of seven days. Road travelers on average spend \$103 per person per day and \$423 per person per trip with an average length of stay of 4.3 days.

²² The only exception is St. John’s (NL), which was a home port to six and nine cruise ships in 2016 and 2017 respectively. However, this had a very minor role in terms of visitation, as it represents approximately 5-6 percent of overall passenger visits in St. John’s and 0.2-0.3 percent of overall visitation in Atlantic Canada.

perception that the cruise industry generates substantial economic benefits for the port destinations and their local economies.

This study had two main objectives. The first objective was to estimate the economic impact of cruise industry operations in Atlantic Canada using a regional I-O model developed by Statistics Canada. Our results show that the operation of the cruise industry in Atlantic Canada generated a total of \$52.5 million in value-added, \$30.1 million in total labour income, 515 FTE jobs, and \$11.3 million in taxes in 2016. A breakdown of the impact by region illustrates that roughly two-thirds of the value-added and employment generated remains within the region, and the rest flows to the remaining Canadian provinces. Comparison of our estimates with those reported by the BREA (2017) reveals large discrepancies. These discrepancies are mostly attributed to the major methodological flaws inherent in their study, which raises concerns about the validity of their economic impact estimates.

The second objective of the paper was to identify the share of cruise industry's contribution to the overall tourism sector in the Atlantic region. Our analysis shows that the cruise industry's share of the value-added generated by the overall tourism sector ranges anywhere from 0.5 percent to 3.1 percent depending on the province. Contribution rates for labour income and employment are similar in magnitude but substantially lower for taxes, ranging from 0.1 percent to 0.8 percent depending on the province.

Our results should not be interpreted as a disapproval of the cruise tourism efforts in the region since the cruise industry clearly makes a modest contribution to the provincial economy. However, given the magnitude of the impact and its small contribution within the overall tourism sector, the cruise industry seems to have a limited capacity to instigate growth or replace the rapid erosion of manufacturing employment since the early 2000s.

There are several public policy implications associated with our study. First, our findings highlight the need for independent research in identifying the regional impacts of the cruise industry. Studies commissioned by cruise associations can be misleading regarding the magnitude of the impact, as shown in this study and the related literature. Policymakers need reliable and accurate estimates to make optimal decisions. Ideally, this research can be conducted by non-partisan researchers, such as academics or statistical agencies of the federal or provincial governments, who can collect detailed data and quantify the impacts of interest using consistent methodologies.

The second policy dimension is based on our finding that a substantial portion of the overall impact leaks out of the Atlantic provinces due to international and interprovincial trade. For the Atlantic provinces, a larger portion of the value-added can be captured within the region by further development of the supply chain that caters to the cruise industry. The episodic nature of cruise ship visits provides further challenges towards the scaling of businesses. Increasing the capacity to meet the peak demand that occurs on the day of cruise ship visits would result in underutilization of the capacity on those days without cruise ship visits.

The Atlantic provinces may be able to benefit from a higher degree of cooperation. The Atlantic Canada Tourism Partnership²³ (ACTP) was established in 1991 to promote the Atlantic region as a tourism destination in targeted markets. By establishing a regional cruise tourism strategy under the ACTP framework, the Atlantic provinces would not only be able to avoid competition between the ports but also strategically promote the region via specialization and marketing of differentiated cruise products (Klein, 2005). Moreover, since cruise lines possess a high degree of market power, a collective approach is more likely to produce successful outcomes in dealing with other issues such as establishing environmental standards or distribution of economic benefits more equitably between the cruise lines and port destinations (Klein, 2011).

The spillover effects of the cruise industry operations in Atlantic Canada for the rest of the country suggest positive returns on the federal funds invested in the cruise industry infrastructure in Atlantic Canada. However, given the modest economic impact of the cruise industry, alternative uses of public funding may produce a greater return on investment. For example, infrastructure investment could target either other tourism segments, like the land-based tourism, or other industries identified under the Atlantic Growth Strategy, like the food industry and aquaculture, that are rooted in the comparative advantages of the regional economy. Establishing new tradable sectors would benefit the lagging regions and alleviate the regional disparities (Floerkemeier, Spatafora, and Venables, 2021).

Finally, our findings carry insights for the current economic environment in the region. The COVID-19 outbreak caused a major disruption in global cruise industry operations. Suspension of the 2020 and 2021 cruise seasons in Atlantic Canada contributed to the existing economic woes felt in the region. However, although these suspensions certainly have a negative economic impact in the region, our results suggest that the magnitude of the impact is likely to be much smaller than the disruptions on the mainstream tourism sector caused by the provincial lockdowns and travel restrictions imposed in the region.

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²³ The ACTP is a nine-member pan-Atlantic partnership comprising the Atlantic Canada Opportunities Agency (ACOA), the four provincial tourism industry associations, and the Atlantic provincial government departments responsible for tourism.

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Appendix

TABLE A1. Weighted Regression Results of the GLM

Variable	Coef.	Std. Err.	Z-score	P-value	95% Conf. Interval	
Port_Charlottetown	-\$0.03	0.047	-0.59	56%	\$0.12	\$0.07
Port_Saint John	-\$0.19	0.041	-4.7	0%***	-\$0.27	-\$0.11
Port_St. John's	-\$0.35	0.070	-5.04	0%***	-\$0.49	-\$0.22
Port Order	\$0.02	0.008	2.42	2%***	\$0.00	\$0.03
# of Ports	\$0.00	0.008	-0.47	64%	-\$0.02	\$0.01
Avg. temperature	\$0.00	0.004	-1.25	21%	-\$0.01	\$0.00
Rain	-\$0.02	0.028	-0.75	46%	-\$0.08	\$0.03
Crew	-\$0.41	0.090	-4.51	0%***	-\$0.58	-\$0.23
Luxury Segment	\$0.25	0.081	3.09	0%***	\$0.09	\$0.41
Premium Segment	\$0.29	0.064	4.53	0%***	\$0.16	\$0.42
Mass Market Segment	\$0.38	0.069	5.47	0%***	\$0.24	\$0.51
Age_30to50	\$0.16	0.097	1.6	11%	-\$0.03	\$0.35
Age_50to70	\$0.13	0.095	1.38	17%	-\$0.06	\$0.32
Age_70 or more	\$0.03	0.098	0.32	75%	-\$0.16	\$0.22
Employment: Retired	-\$0.16	0.032	-4.87	0%***	-\$0.22	-\$0.09
Employment: Not working	-\$0.20	0.100	-1.98	5%**	-\$0.39	\$0.00
May	\$0.11	0.064	1.72	9%*	-\$0.02	\$0.24
June	-\$0.05	0.044	-1.19	23%	-\$0.14	\$0.03
July	\$0.09	0.056	1.6	11%	-\$0.02	\$0.20
August	\$0.05	0.057	0.83	41%	-\$0.06	\$0.16
September	\$0.04	0.037	1.1	27%	-\$0.03	\$0.11
Year=2017	-\$0.10	0.027	-3.83	0%***	-\$0.16	-\$0.05
Constant	\$3.90	0.146	26.66	0%***	\$3.62	\$4.19
Number of observations = 7,682			Residual degrees of freedom = 7,659			
Variance function: $V(u) = u$ [Poisson]			Link function: $g(u) = \ln(u)$ [Log]			
AIC = 6,340.0			BIC = 4.35e+07			
Deviance = 43,605,878.3			(1/df) Deviance = 5,693.4			
Pearson = 52,133,637.9			(1/df) Pearson = 6,806.8			

Notes: *Coef.* = Coefficient, *Std. Err.* = Standard errors of the marginal effects, *Conf.* = Confidence, *AIC* = Akaike Information Criterion, *BIC* = Bayesian Information Criterion, *df* = degrees of freedom.

TABLE A2. Average Shares of Expenditures in Subcategories

Expenditure Categories	Share of Spending	
	Passenger	Crew
Tours bought on ship	24.3%	2.7%
Tours bought on shore	7.1%	1.8%
Transportation	2.5%	3.3%
Meals	13.7%	23.3%
Beverages	6.7%	20.7%
Souvenirs	34.8%	22.0%
Jewelry	3.5%	1.2%
Cosmetics	1.4%	6.2%
Other	6.0%	18.8%

Note: Share of spending figures reported in the table denote the average proportion of visitor spending in each category observed in our survey.

TABLE A3. Confidence Limits for Direct Cruise Industry Spending in Atlantic Canada (\$2016 million)

Province	Direct Visitor Spending		Direct Cruise Line Spending	Total Direct Spending	
	Lower Limit	Upper Limit	BREA (2017) estimates	Lower Limit	Upper Limit
Newfoundland and Labrador	\$1.44	\$1.89	\$2.00	\$3.44	\$3.89
Prince Edward Island	\$3.33	\$4.10	\$4.05	\$7.38	\$8.15
Nova Scotia	\$17.29	\$19.15	\$33.90	\$51.19	\$53.05
New Brunswick	\$6.48	\$7.74	\$7.50	\$13.98	\$15.24
Total (\$ millions)	\$28.54	\$32.87	\$47.45	\$75.99	\$80.32

Notes: Province confidence limits for direct visitor spending are based on the 95% confidence interval for the average per visitor spending estimates reported in Table 4. Confidence limits for cruise line expenditures cannot be established due to data limitations.

TABLE A4. Total Direct Cruise Industry Spending in Atlantic Canada by Industry (\$2016 million)

Industries	Direct Spending	Share of Total Spending
<i>Goods Producing Sector</i>	\$40.8	52.5%
Natural Resources, Utilities & Construction	\$3.0	3.9%
Manufacturing	\$37.7	48.6%
<i>Service Producing Sector</i>	\$36.8	47.5%
Wholesale & Retail Trade	\$0.0	0.0%
Transportation & Warehousing	\$14.0	18.0%
Financial Services	\$3.0	3.8%
Professional & Technical Services	\$5.4	6.9%
Information, Culture & Recreation	\$5.7	7.3%
Accommodation & Food Services	\$7.8	10.1%
Other Services & Government	\$1.0	1.3%
Total Direct Spending	\$77.6	

TABLE A5. Confidence Limits for the Value-Added Generated by the Cruise Industry in Atlantic Canada (\$2016 million)

	Atlantic Canada		Rest of Canada		Total Impact	
	Lower Limit	Upper Limit	Lower Limit	Upper Limit	Lower Limit	Upper Limit
GDP (\$ million) by industry						
<i>Goods Producing Sector</i>	\$5.5	\$5.6	\$4.9	\$5.1	\$10.4	\$10.7
Natural Resources, Utilities & Construction	\$2.2	\$2.3	\$2.0	\$2.1	\$4.2	\$4.4
Manufacturing	\$3.3	\$3.3	\$2.9	\$3.0	\$6.1	\$6.3
<i>Service Producing Sector</i>	\$26.3	\$61.7	\$14.4	\$35.5	\$40.7	\$97.1
Wholesale & Retail Trade	\$5.7	\$6.3	\$3.5	\$3.7	\$9.2	\$9.9
Transportation & Warehousing	\$5.0	\$5.1	\$1.7	\$1.8	\$6.7	\$6.9
Financial Services	\$5.9	\$6.2	\$4.2	\$4.4	\$10.1	\$10.6
Professional & Technical Services	\$3.0	\$3.1	\$2.6	\$2.7	\$5.6	\$5.8
Information, Culture & Recreation	\$1.2	\$1.2	\$1.0	\$1.1	\$2.2	\$2.3
Accommodation & Food Services	\$2.5	\$2.9	\$0.5	\$0.6	\$3.0	\$3.5
Other Services & Government	\$3.0	\$3.2	\$0.8	\$0.9	\$3.8	\$4.1
Total Impact	\$31.8	\$33.6	\$19.3	\$20.3	\$51.0	\$53.9

TABLE A6. Confidence Limits for Employment Generated by the Cruise Industry in Atlantic Canada

	Atlantic Canada		Rest of Canada		Total Impact	
	Lower Limit	Upper Limit	Lower Limit	Upper Limit	Lower Limit	Upper Limit
FTE Jobs by Industry						
<i>Goods Producing Sector</i>	38	39	32	33	69	72
Natural Resources, Utilities & Construction	11	11	11	11	22	23
Manufacturing	27	27	21	22	48	49
<i>Service Producing Sector</i>	309	336	118	125	427	461
Wholesale & Retail Trade	91	101	31	32	122	133
Transportation & Warehousing	48	50	16	17	64	67
Financial Services	23	24	19	20	42	44
Professional & Technical Services	36	38	25	26	61	64
Information, Culture & Recreation	9	9	7	7	15	16
Accommodation & Food Services	63	73	11	12	74	85
Other Services & Government	39	42	10	10	48	52
Total Impact	346	375	150	158	496	533

TABLE A7. Confidence Limits for the Labour Income and Taxes Generated (\$2016 thousand)

Variable	Conf. Limit	NL	PEI	NS	NB	RoC	Total
Labour Income (\$ Thousand)	Lower	\$1,340	\$1,488	\$11,599	\$4,142	\$10,619	\$29,189
	Upper	\$1,477	\$1,647	\$12,158	\$4,488	\$11,200	\$30,969
Taxes on Products and Production (\$ Thousand)	Lower	\$506	\$910	\$5,718	\$1,937	\$1,790	\$10,862
	Upper	\$594	\$1,053	\$6,082	\$2,178	\$1,888	\$11,796

Notes: Conf. = Confidence, NL = Newfoundland and Labrador, PEI = Prince Edward Island, NS = Nova Scotia, NB = New Brunswick, RoC = Rest of Canada.