Economic Impact of Cruise Tourism in Atlantic Canada*

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Background Information

- Fastest growing segment of leisure tourism (CLIA, 2010): Average annual growth of 7.2% since 1990.
- Economic contribution of the North American cruise industry (2013): $46 billion in total output, 373.7k jobs and $19.4 billion in income, (BREA, 2014).
- North America has the largest share (74%) of total cruise passengers in the world, however, strong growth in other markets (i.e. Australia, New Zealand) (Klein, 2011).
- Cruise tourism (CT) is of increasing importance in Atlantic Canada: Cruise ship visitors to Halifax grew from 138,400 in 2000 to 238,217 in 2016, constituting a 72% increase in visitation (Transport Canada, 2016).

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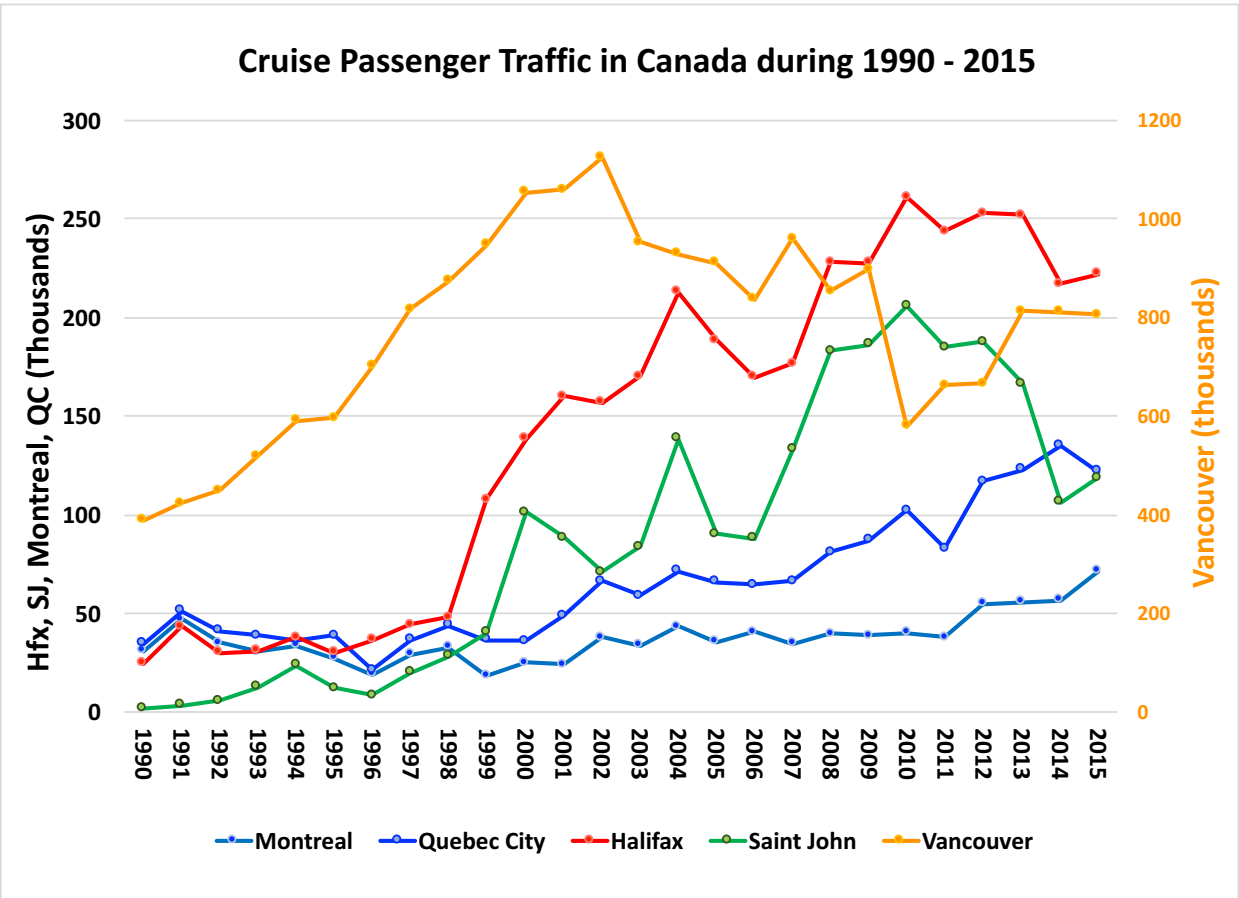
Background Information

- Average annual growth during the 1990-2015 period in major Canadian ports is given below: (Transport Canada)

  Vancouver: 2.96% Montreal: 3.41% Quebec City: 5.15%
  Halifax: 9.24% Saint John: 18.38%



Background Information (cont.) & Literature

- Growth in CT accompanied by expected growth of benefits (i.e. spending) for host ports.
- Atlantic Canada Cruise Association (ACCA) total economic impact estimates:
  - Output: $183m, Jobs:1,249 jobs, Income:$51m (2012)
  - Output: $233m, Jobs:1,400 jobs, Income:$61m (2016)
- Deficiencies in self-reported cruise association statistics: Scarfe (2011); Larsen et. Al (2013); Falkenhaug (2012); Seidl, Guiliano & Pratt (2007); Klein (2003, 2005a, 2005b)

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Literature (cont.)

Economic impact estimates reported by the cruise associations suffer from conceptual and methodological problems:

- Average visitor expenditures are often based on theoretical expectations. Cruise passengers spend significantly less than overnight tourists even after excluding overnight expenditures (Larsen et. al., 2013).
- 20-40% of the passengers do not leave the ship during a stop-over. (Stavanger, 2012)
- Environmental impact (wastewater treatment , air emissions, solid waste management) of the cruise industry is generally omitted/ignored. (Klein, 2011)
- Market power of the cruise industry and the distribution of economic surplus between cruise lines and ports/local producers. (Klein, 2005)

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Research Questions

1. Conduct an independent study to estimate the economic impact of CT in Atlantic Canada in 2016:
    - Average passenger/crew spending per port
    - Total visitor spending using on-shore visits
    - Cruise line spending in Atlantic Canada
    - Direct expenditures generated by the CI
    - Total economic impacts using a regional I-O model
2. Analyze other research questions: Determinants of passenger/crew spending and propensity to return as a regular (i.e. air/land) tourist, etc.

Data Sources

Our sample makes use of two distinct data sets:

1. **Passenger & Crew Surveys at Port (2016)**
   - Ports surveyed: Halifax, Saint John, Charlottetown, St. John's
   - Sample period: April to October, 2016
   - Hours Surveyed: 2-4 hrs after arr. until 1 hour before dep.
   - Information collected:
     a) **Main:** Expenditure, Party size
     b) **Itinerary:** Port order, Port, Cruise type (L,P,MM, E and Msc)
     c) **Weather:** Ave. temperature, Rain dummy
     d) **Demographics:** Pass/Crew, Age, Gender, Residence, Education, Employment, Income
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Sample: Passenger & Crew Surveys

Table 1: Number of surveys collected at each port

Port Surveyed	Total # of Ship Visits	Ships Surveyed	(%) of Ships Surveyed	# of Surveys Surveyed
Charlottetown	59	33	55.9%	404
Halifax	133	100	75.2%	2,333
Saint John	63	18	28.6%	256
St. John's	19	3	15.8%	57
TOTAL	274	154	56.2%	3,050

Sample: Passenger & Crew Surveys

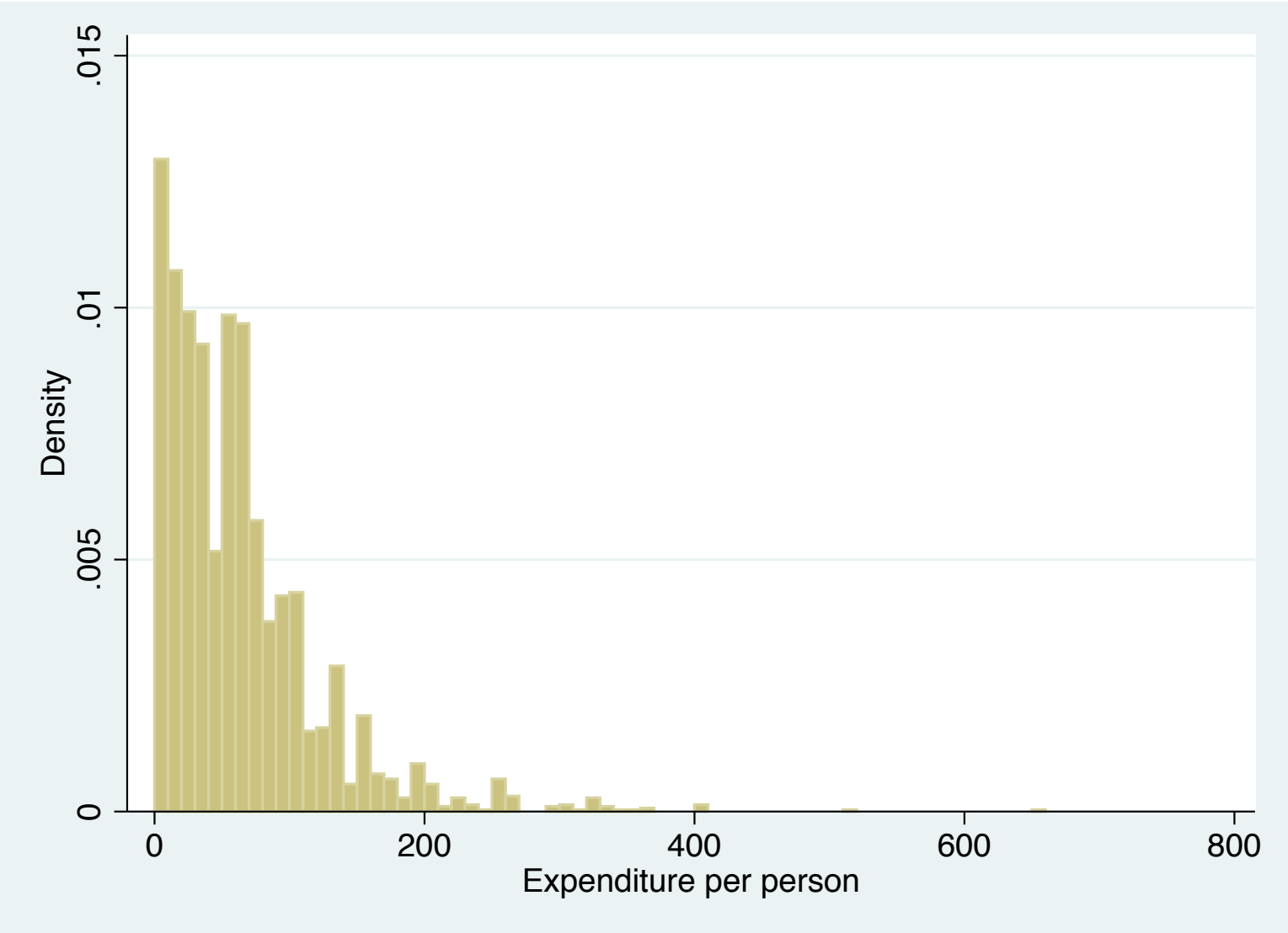
Question:"Please tell us how much you spent (or plan to spend) during this visit to this town/area."

- Currency (CAD, USD, Other)
- Expenditure categories: Tours, Meals, Souvenirs, etc.

Table 2: Average expenditure at each port

Variable	Obs	Mean	Std. Dev.	Min	Max
Total expenditure	2931	115.6	113.9	0	1336
Party size	2780	2.0	1.6	1	40
Expenditure per person*	2946	61.3	58.3	0	658
Charlottetown	389	55.0	59.9	0	400
Halifax	2276	62.8	59.0	0	658
Saint John	229	63.0	50.8	0	334
St John's	52	36.4	33.9	0	146

Figure 1: Histogram of Cruise Passenger/Crew Expenditures, 2016



Methodology

- **Goal**: Estimate predicted average per capita expenditure at each port using regression analysis
- **Dependent Variable:** Exppp (Expenditure per person)
- **Estimation Method:** Generalized Linear Regression
  - Family: Gamma distribution (Modified Parks Test)
  - Link: Natural Log
  - Variance-Covariance Matrix: Robust

Methodology(cont.)

Table 3: **Explanatory Variables**

port_sjs:	=1 if port surveyed is St. John's
portorder:	Port ranking in the itinerary
log(avetemp):	Natural log of average daily temperature
rain:	=1 if it rained on the day of survey
crew:	=1 if respondent is a crew member
clcat_lux	=1 if respondent is on a luxury cruise
clcat_prem	=1 if respondent is on a premium cruise
clcat_mass	=1 if respondent is on a mass market cruise
agecat_30to50	=1 if respondent is between 30 and 50
agecat_50to70	=1 if respondent is between 50 and 70
agecat_above70	=1 if respondent is older than 70
emp_ret	=1 if respondent is retired
emp_unemp	=1 if respondent is unemployed
Base group	
clcat_euro	=1 if respondent is on european cruise line
agecat_below30	=1 if respondent is younger than 30
emp_emp	=1 if respondent is employed

Table 4: Results from GLM Estimation

exppp	Coef.	Std. Err.	z	P-value	[95% Conf.	Interval]
port_sjs	-0.5809	0.1310686	-4.43	0	-0.837836	-0.3241
portorder	0.0188	0.0101419	1.85	0.064	-0.001101	0.03866
ltave	-0.1387	0.0565324	-2.45	0.014	-0.249459	-0.0279
rain	-0.1158	0.039349	-2.94	0.003	-0.192972	-0.0387
crew	-0.3175	0.118266	-2.68	0.007	-0.549285	-0.0857
clcat_lux	0.2891	0.1080754	2.68	0.007	0.0772943	0.50094
clcat_prem	0.2431	0.0739321	3.29	0.001	0.0982185	0.38803
clcat_mass	0.3826	0.0761457	5.03	0	0.2333996	0.53189
age50	0.3488	0.1098711	3.17	0.002	0.1334363	0.56412
age70	0.3014	0.1054047	2.86	0.004	0.0948367	0.50802
age90	0.1687	0.111641	1.51	0.131	-0.050109	0.38752
emp_R	-0.1	0.0436655	-2.29	0.022	-0.18559	-0.0144
emp_U	-0.3118	0.1500305	-2.08	0.038	-0.605806	-0.0177
_cons	4.0221	0.1951553	20.61	0	3.63958	4.40457

No. of obs = 2593	Scale parameter = .826
Deviance = 1898.8	(1/df) Deviance = .736
Pearson = 2131.8	(1/df) Pearson = .826
AIC = 10.25	BIC = -18373.57

Regression Results

Summary of Findings:

- All else being equal, on average, per person expenditure...
  - is significantly lower in St. John's.
  - is higher in ports visited later in the itinerary.
  - is lower as the average daily temperature increases.
  - is lower on rainy days.
  - is lower for crew members (relative to passengers).
  - is larger in mass market, luxury and premium cruises relative to the European cruise lines.
  - has a quadratic relationship with age.
  - is less for retired and unemployed (relative to employed people).

Table 5: Marginal effects: GLM vs OLS

	Generalized Linear Model			OLS		
Variable	**dy/dx**	**Std. Err.**	**P-value**	**Coeff.**	**Std. Err**	**P-value**
port_sjs	-27.79	4.64	0	-26.13	5.06	0
portorder	1.30	0.63	0.039	1.18	0.64	0.06
ltave	-8.91	3.47	0.01	-9.35	3.64	0.01
rain	-6.85	2.35	0.003	-6.79	2.40	0.01
crew	-16.33	5.44	0.003	-19.35	5.36	0
clcat_lux	24.58	8.90	0.006	19.38	6.53	0
clcat_prem	18.39	4.63	0	15.70	4.02	0
clcat_mass	28.36	5.24	0	25.05	4.22	0
age50	23.99	8.76	0.006	18.53	5.69	0
age70	17.60	6.28	0.005	15.48	5.05	0
age90	9.96	7.29	0.172	7.62	5.44	0.16
emp_R	-6.27	2.75	0.023	-7.19	2.91	0.01
emp_U	-16.71	6.79	0.014	-18.36	7.70	0.02

Table 6: Predicted average visitor spending per person

Port/Pax/Crew	GLM	Std. Err.	GLM_min	GLM_max	OLS	Std. Err.	OLS_min	OLS_max
Pax_CH	$59.51	$1.76	$56.06	$62.97	$60.16	$1.75	$56.72	$63.60
Crew_CH	$43.88	$5.08	$33.93	$53.83	$40.81	$6.39	$28.29	$53.32
Pax_HFX	$61.28	$1.32	$58.70	$63.86	$62.14	$1.44	$59.32	$64.96
Crew_HFX	$45.18	$5.21	$34.97	$55.39	$42.79	$6.30	$30.45	$55.13
Pax_SJ	$65.14	$1.33	$62.54	$67.75	$66.03	$1.62	$62.85	$69.20
Crew_SJ	$48.05	$5.61	$37.06	$59.04	$46.70	$6.19	$34.56	$58.83
Pax_Sjs	$28.20	$3.73	$20.89	$35.50	$25.82	$4.28	$17.44	$34.20
Crew_Sjs	$20.79	$3.68	$13.57	$28.01	$6.47	$8.39	($9.96)	$22.91

Table 7: Average spending estimates: GLM vs. Cruise Association

Pax/Crew Per Port	Average Spending (GLM)	Cr. Association Estimates (2016)	Relative Difference
Passenger_Charlottetown	$59.51	$98.77	66%
Crew_Charlottetown	$43.88	$78.88	80%
Passenger_Halifax	$61.28	$83.84	37%
Crew_Halifax	$45.18	$90.13	99%
Passenger_Saint John	$65.14	$81.66	25%
Crew_Saint John	$48.05	$73.51	53%
Passenger_St. John‘s	$28.20	$80.44	185%
Crew_St. John‘s	$20.79	$73.99	256%

Table 8: Direct visitor spending at major ports in Atlantic Canada

Pax+Crew Port	Total Direct Expenditure (GLM)	Total Direct Expenditure (ACCA, 2016)	On-shore visits (ACCA -2016)
Charlottetown	$4,256,016	$7,143,021	74,961
Halifax	$15,507,443	$22,472,034	264,707
Saint John	$9,924,819	$12,774,100	158,933
St. John's	$464,717	$1,372,076	17,311
Total	$30,152,995	$43,761,231	515,912

Table 9: Direct CI Expenditures in Atlantic Canada

(2016 millions of $)	BREA	Our study_Low	Our Study_High
Cruise Lines	$ 50	$47.6	$47.6
Passengers & Crew	$ 53	$32.2	$34.3
Total	$ 103	$79.7	$81.8

Table 10: Direct CI Expenditures by Province (2016 millions of $)

Cruise Association	Pax&Crew	Cr. Line	Airfare	Insurance	Cr. Industry
Nova Scotia	$28.7	$34.8	$0.10	$0.10	$63.7
New Brunswick	$12.7	$8.6	$0.03	$0.14	$21.5
Newfoundland	$2.7	$2.9	$0.19	$0.12	$5.9
Prince Edward Island	$7.1	$4.1	$0.02	$0.01	$11.3
Total	$51.2	$50.4	$0.34	$0.37	$102.4

Our Study	Pax&Crew	Cr. Line	Cr. Industry	Rel. to Cr. Ass.
Nova Scotia	$19.8	$33.9	$53.7	84.23%
New Brunswick	$9.4	$7.5	$16.9	78.69%
Newfoundland	$1.2	$2.0	$3.2	54.92%
Prince Edward Island	$4.0	$4.1	$8.1	71.53%
Total	$34.4	$47.5	$81.9	80.0%

Table 11: Economic Impact of Cruise Industry - Cruise Association

(2016 millions of $)	Direct Spend	Jobs	Income	Total Impact	Jobs	Income
Goods Producing Sector	**$23**	**73**	**$3.5**	**$112**	**355**	**$18**
Nat. Resources, Utilities & Construction	$1	4	$0.1	$39	120	$7
Manufacturing	$22	69	$3.4	$73	235	$11
Service Producing Sector	**$77**	**717**	**$26.7**	**$114**	**1045**	**$42**
Wholesale & Retail Trade	$2	22	$0.7	$2	28	$1
Transportation & Warehousing	$45	282	$13.5	$51	356	$17
Financial Services	$1	2	$0.1	$13	60	$3
Professional & Technical Services	$9	65	$3.9	$15	154	$9
Information, Culture and Recreation				$10	22	$1
Accommodation & Food Services	$14	265	$5.3	$16	294	$6
Other Services & Government	$6	81	$3.2	$7	131	$5
Total Direct Impacts	**$100**	**790**	**$30.2**	**$233**	**1400**	**$61**
Indirect Business Taxes	$3			$6		
Personal Income Taxes			$6.3			$13

Methodological Differences

Cruise Association Report:

a) Differences inexplicable with the information provided:
- Deficiency of explanation for the implementation of the methodology adopted in the 2016 ACCA report
- Incomplete references

b) Differences in methodology:
- Direct spending
  - Estimation of visitor spending & sampling issues (major)
  - Cruise line spending: Exclusion and allocation (minor)
- Indirect spending (I-O Analysis)
  - Aggregation and industry multipliers
  - Leakages (interprovincial & international imports)
  - Jobs and Income: Top down vs Bottom up
  - Level of economic impact: Output vs Value added

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Methodological Differences(cont.)

Our study:

a) Direct spending:
- Representative sample (month, temperature, etc.)
- Estimation of visitor spending: Regression analysis

b) Indirect spending (Input-Output Analysis):
- Seperation of cruise line spending and visitor spending
  - Input structure for the water transportation industry
  - Spending pattern for non-residents in Canada
- Statistics Canada: I-O analysis with provincial interlinkages

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Table 12: Total Impact - Industry Output: Difference in estimates

Total = Direct + Indirect (i.e. Closed)	Total Impact	Jobs	Income	Total Impact	Jobs	Income
Goods Producing Sector	**$112**	**355**	**$18**	**$33**	**99**	**$6**
Natural Resources, Utilities & Construction	$39	120	$7	$10	23	$2
Manufacturing	$73	235	$11	$23	76	$4
Service Producing Sector	**$114**	**1045**	**$42**	**$112**	**881**	**$40.1**
Wholesale & Retail Trade	$2	28	$1	$14	168	$6.0
Transportation & Warehousing	$51	356	$17	$65	386	$21.0
Financial Services	$13	60	$3	$11	51	$2.9
Professional & Technical Services	$15	154	$9	$7	73	$4.0
Information, Culture and Recreation	$10	22	$1	$3	16	$0.8
Accommodation & Food Services	$16	294	$6	$7	143	$2.8
Other Services & Government	$7	131	$5	$5	44	$2.6
Total Direct Impacts	**$233**	**1400**	**$61**	**$145**	**980**	**$46.49**
Indirect Business Taxes	$6					
Personal Income Taxes			$13			$9.8

Table 13: GDP at basic prices: Total Impact (Closed) by Industry

	Atlantic Canada		Rest of Canada		Total Impact	
(millions of $)	**GDP basic**	**Jobs**	**GDP basic**	**Jobs**	**GDP basic**	**Jobs**
Goods Producing Sector	**$5**	**32**	**$5**	**36**	**$10.6**	**68**
Natural Resources, Utilities & Construction	$4	17	$3	15	$6.84	32
Manufacturing	$2	16	$2	21	$4.08	37
Service Producing Sector	**$28**	**533**	**$18**	**237**	**$45**	**770**
Wholesale & Retail Trade	$6	184	$4	55	$10	239
Transportation & Warehousing	$6	80	$4	61	$9	141
Financial Services	$6	34	$5	26	$11	59
Professional & Technical Services	$3	61	$3	42	$6	104
Information, Culture and Recreation	$1	12	$1	11	$2	23
Accommodation & Food Services	$3	123	$1	25	$4	148
Other Services & Government	$3	40	$1	17	$4	57
Total Impact (Direct+Indirect+Induced) on GDP	**$33**	**565**	**$23**	**273**	**$56.0**	**838**

Table 14: Total Impact (Closed) - Impact on GDP

Expenditure-based (thousands of $)	NFL	PEI	NS	NB	RoC	Total
Final domestic expenditures on commodities	$3,782	$9,031	$60,654	$19,746	$6,903	$100,116
International imports	($1,260)	($1,621)	($15,631)	($11,453)	($5,244)	($35,209)
Interprovincial imports	($1,656)	($4,787)	($23,860)	($7,167)	($4,242)	($41,711)
Inventories and other commodity leakages	($16)	($18)	($89)	($41)	($204)	($367)
Interprovincial exports	$2,985	$912	$1,862	$9,528	$26,424	$41,711
Total	$3,835	$3,517	$22,937	$10,613	$23,639	$64,540
Income-based (thousands of $)	**NFL**	**PEI**	**NS**	**NB**	**RoC**	**Total**
GDP at market prices	$3,835	$3,517	$22,937	$10,613	$23,639	$64,540
Taxes on products	$307	$797	$4,906	$1,873	$1,059	$8,942
Subsidies on products	($52)	($53)	($323)	($68)	($264)	($760)
GDP at basic prices	$3,580	$2,772	$18,354	$8,808	$22,844	$56,358
Subsidies on production	($6)	($18)	($30)	($13)	($114)	($182)
Taxes on production	$84	$139	$952	$467	$1,131	$2,772
Wages and Salaries	$999	$1,365	$9,580	$4,172	$10,605	$26,722
Employers' social contributions	$160	$165	$1,262	$593	$1,593	$3,773
Labour income of unincorporated sector	$37	$71	$514	$202	$786	$1,609
Gross operating surplus	$2,306	$1,051	$6,077	$3,387	$8,843	$21,664

Table 15: Cruise Industry Multipliers by Province

Output (millions of $)	**NFL**	**PEI**	**NS**	**NB**
Direct impact	$2.56	$5.87	$41.93	$11.29
Total impact, closed model	$7.52	$9.02	$73.36	$30.44
Total multiplier	2.93	1.54	1.75	2.70
GDP at basic prices (millions of $)	**NFL**	**PEI**	**NS**	**NB**
Total impact, closed model	$3.58	$2.77	$18.35	$8.81
Total multiplier	1.40	0.47	0.44	0.78
Labour income (millions of $)	**NFL**	**PEI**	**NS**	**NB**
Total impact, closed model	$1.20	$1.60	$11.36	$4.97
Total multiplier	0.47	0.27	0.27	0.44

Summary of Results

Overall conclusion:

- Results suggest average cruise passenger expenditure in Halifax, Charlottetown and Saint John is around $60 per person, and half that amount in St. John's.
- Similarly, average cruise ship crew expenditure in Halifax, Charlottetown and Saint John is around $45 per person, and half that amount in St. John's.
- Total direct visitor (pax+crew) spending in Atlantic Canada is estimated to be somewhere between $26.7 to $32.1 million.

Summary of Results(cont.)

Overall conclusion:

- Direct cruise line spending estimates are adopted from the 2016 ACCA report with minor exclusions (i.e. airfare, insurance, travel agency commissions).
- Input-Output analysis has been conducted by Statistics Canada using the direct cruise industry (cruise line + visitor spending) expenditure estimates provided.
- The I-O model used by the Statistics Canada controls for margins (retail vs wholesale, transportation), leakages (imports) and interprovincial linkages.

Summary of Results(cont.)

Overall conclusion:

- In 2016, the total impact of the cruise industry in Atlantic Canada on GDP is estimated to be $56 million ($33 million for Atlantic Canada and $23 million for the rest of Canada).
- The total number of jobs created by the economic activity of the cruise industry in Atlantic Canada in 2016 is estimated to be 838 (565 in Atlantic Canada and 273 for the rest of Canada).
- Amount of labour compensation (wages and salaries) associated with the economic activity of the cruise industry in Atlantic Canada in 2016 is estimated to be $26.7 million ($16.1 million in Atlantic Canada and $10.6 million in rest of Canada).

Summary of Results (cont.)

Difference in estimates:

- ACCA estimates for the visitor expenditures in a given port are considerably larger (25%-250%) than ours.
- Similarly, ACCA estimates for the total direct spending by the cruise industry is 25% larger than ours. ($102.4 million vs $81.9 million).
- Consequently, the total impact estimates are considerably larger (Industry output by 61%, jobs by 67% and income by 128%) than the ones estimated in this study.
- The discrepancy in estimates can be explained by the differences in direct spending estimates and total impact estimates due to major differences in methodology (sampling, estimation, aggregation, etc.).

Future Research

Things to do:

- Explore the implications on public policy.
- Investigate determinants of the differences in estimates (Self-reported vs Academic).
- Extend 2016 survey with the 2017 data, focus on other questions (propensity to return), and identify avenues to stimulate passenger/crew spending & port development.
- Expand the current analysis with the combined data from both years.
- Research questions in other aspects of cruise tourism (port specific differences, propensity to convert cruise tourists to regular tourists, etc.).

Thank you. Questions?