Research Article

Do Twitter and Facebook Matter? Examining the Economic Impact of Social Media Marketing in Tourism Websites of Atlantic Canada

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Abstract

This paper quantifies the economic impacts of introducing social media as marketing tools in the tourism websites of the provinces of Atlantic Canada: New Brunswick, Newfoundland and Labrador, Nova Scotia, and Prince Edward Island. The authors build on prior marketing research of tourism website design in Atlantic Canada and focus on eight forms of social media: e-newsletters, Facebook, Twitter, RSS, YouTube, Flickr, Travel Blog, and Share. They used panel techniques for data across the four provinces and the months in 2005-2010 to estimate models of tourism-related economic activity (hotel rooms available and rented, hotel occupancy, number of domestic and US visitors, etc.). As independent variables, they used measures that are standard in economic models (unemployment rates, retail sales, exchange rates, interest rates, temperatures and seasonal dummies, etc.) and various measures of the timing of the introduction of social media into provincial tourism websites. Their results highlight the strong seasonal patterns in tourism data in Atlantic Canada, the role of domestic and international economic data in predicting various measures of tourism, and provide preliminary evidence that adopting social media as marketing tools may have contributed substantially to tourism. Finally, the research seeks to highlight the role in tourism promotion of ongoing innovations in marketing, such as using social media, and the importance of tourism as an economic driver in the region.

Keywords: Tourism marketing; Social media marketing; Economic impacts; Atlantic Canada

Introduction

Using technology to promote tourism-related activities, such as wine trail excursions or golf holidays, is not a new concept. Travel agents and tourism authorities have long used traditional marketing campaigns to create images that made travel destinations appealing. For decades, they have also used computer networks, facsimile machines, and broadcast advertisements to market their services to target audiences who had the desire and resources to visit those destinations. However, tourism marketing changed further in the

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mid-1990s when the general public began to use the Internet en masse. Many traditional brick and mortar travel agencies ceased to operate as airlines and hotels began to book services through their own websites. As services such as Expedia and Orbitz began to provide travelers with ever more information and travel options, tourism authorities had to seriously consider how to market their regions on the Internet. Clearly, the Internet has changed tourism marketing. In this paper, we focus on recent trends in the ongoing changes in tourism, such as the use of social media, and their economic impacts. The remainder of this paper proceeds as follows: first, we review the use of websites and social media in tourism marketing. Next we present data regarding (1) the dates when the provincial tourism websites of Atlantic Canada started to use social media; and (2) various measures of tourism-related economic activity. After briefly presenting our hypotheses and statistical specifications, we discuss our findings. Many of our results confirm those of earlier studies, highlighting the roles of seasonality, domestic economic conditions, and exchange rates in tourism. However, we also provide evidence that adopting more forms of social media may contribute substantially to tourism.

Understanding tourism marketing on the web

Sears [1] noted that, since tourism is an experiential product, those promoting travel destinations must create websites that both communicate authentically and satisfy information seekers. However, tourism website designers are faced with a myriad of challenges. Gertner et al. [2] and Parker [3] suggested that these challenges may be as minor as developing uniform naming conventions such as including country names in web addresses to increase brand awareness. A more complex challenge is information overload. Morgan et al. [4] note that the complexity of homepages may cause translation issues for consumers. However, they argue that "technology and tourism are increasingly interdependent" and also suggest that websites which are well-designed are "critical in tourism because, as an intangible product, its marketing largely depends upon visual representation".

Despite the challenges of information overload and the translation of information from homepages of individual websites, Parker et al. [5] note that the Internet has become the primary resource for most people seeking rewarding travel experiences because "information is readily available via the Internet" which "may satisfy the desire for service convenience consumers seek in their searches." Earlier, Berry et al. [6] had shown that time and effort saved when searching for information plays a key role in maintaining consumer satisfaction. Parker et al. [5] further note that the "Internet allows consumers to experience service satisfaction in terms of decision convenience, access convenience, transaction convenience, and benefit convenience".

To understand marketing on the Internet, one must understand the issues that marketing managers consider when they use websites to promote products and services. Parker et al. [5] noted that managers may adjust the design of websites to sustain the positioning of their brand and enhance the experience of their consumers. A website's ease of use may generate consumer satisfaction or meet other abstract consumer needs. Earlier research on consumer behavior trends, such as House of Quality strategy, means-end theory, and laddering

techniques, has established the link between product features and consumer satisfaction [7,8].

Several studies [9-13] provide concrete grounding in how designers may continuously review and improve websites to maximize consumer satisfaction. Carroll and Broadhead [10] established that a website's homepage is the equivalent of a storefront window. As the onus lies with the shopkeeper to keep displays updated and fresh, webmasters must also create "sticky" websites that keep visitors returning consistently for reliable experiences. Various researchers [9,14,15] have found that updating websites regularly with new material both encourages repeat visits and keeps consumers at websites for longer periods of time.

Park and Gretzel [16] conducted a meta-analysis to understand what constitutes effective marketing of travel destination websites. They found that many factors helped to determine whether a website would satisfy information seekers. These factors included: visual appearance, interactivity, ease of use, privacy and security, personalization, responsiveness and information quality.

Parker et al. [5] highlight that website development is very important in tourism marketing. While designers place much emphasis on the visuals of websites, information seekers who are faced with growing numbers of readily available resources place paramount importance on trust and credibility. As noted in their study:

The tourism industry is unique in that the web provides substantial advantages over traditional methods of representing an experiential product that consumers must purchase without seeing and cannot return if it does not suit them. This is no doubt one of the reasons for its early adoption as a means of both searching information and making bookings in this sector.

Moreover, O'Connor [17] suggests that aesthetics are not enough to provide the information seekers that visit a tourism website a satisfying experience. Considering the Functional School of Web Design, O'Connor notes: "Functionality and usability are the key design issues, and this approach largely ignores beauty and finesse". Thus, to market their regions effectively to travelers, tourism authorities need to achieve a balance between aesthetics and functionality to ensure that their websites are considered trustworthy and credible by consumers.

Another important area regarding the continuing development and refinement of tourism marketing websites is the role of social media. Diffley et al. [18] define social media as follows:

Social media are tools that provide people with the ability to collaborate and communicate with one another online. Social media tools facilitate the creation and sharing of knowledge, information, media, ideas, opinions and insights, and allow people to actively participate in the media itself. This signals the move from passive consumption of marketing messages to facilitating interaction with messages. Online tools include social networking sites, blogs, wikis, podcasts, content aggregators and content communities. Of these social media tools, social networking sites (SNSs) and blogs have experienced the most prolific growth.

In their study of the impact of blogs on tourism marketing, Mack et al. [19] acknowledge that blogging has become a channel for marketing communications that carries as much weight as traditional word-of-mouth communications. However, they also warn that further research on the credibility of blogs is needed. Nevertheless,

even if consumers may not read them, consumers searching the Internet for information regarding almost all aspects of tourism are likely to encounter travel blogs.

In Woodside et al. [20], the authors interviewed tourists returning from vacation on Prince Edward Island and concluded that, regarding information about travel destinations, consumers "prefer narrative forms of events related to a destination visit rather than simply listings of features and benefits" and also "that consumers store and retrieve stories, and may prefer stories for processing communications". This preference for narratives likely makes social media an ideal channel for both marketers and consumers to exchange information about tourism experiences. Sigala [21] also highlights that socialization factors (such as social attitude theories and the practice of sharing stories and experiences among a social network in cultures that place a high value on communication) play a key role among Internet users seeking tourism information.

If tourism marketing managers use social media as a part of integrated marketing communication efforts, how can they determine success or failure? Morrison et al. [22] suggested the use of a "balanced scorecard approach" that includes a dynamic interaction between consumers, internal business practices, financials, growth and learning, and vision and strategy. However one must ask whether Morrison et al. have the best method for evaluating website effectiveness and if their "scorecard" is adequate for the impact of social media on the financial success of tourism efforts.

Bhagat et al. [23] argue that to evaluate the effectiveness of social media as a marketing tool one must consider the still ongoing evolution of social media. The key difference between social media and earlier media vehicles is that they allow consumers to interact. In previous decades, marketers largely assumed audiences were passive. However, with the social media revolution of the 21st century, such assumptions are no longer valid. Thus, marketers must react to audience involvement with marketing efforts that are active and impact "content, context and connections." Parsons [24] notes that marketers increasingly seek to assess the real benefits of involvement with social media websites such as Facebook and Twitter. As many information seekers turn to social media for their search needs, Parsons asserts that some businesses perceive social media as a cost effective alternative to "pay per click Google costs."

In a study on the use of Facebook for health advertising and promotion, Park et al. [25] note that using social media to gather information is unique in that users are able to create and share content in ways not seen with previous technologies. In particular, Park et al. noted that the increased opportunity for user feedback through "mechanisms such as buttons or quizzes, facilitate more participation from users of social media and encourage discussion among users." Their research also supports Parsons in that "a virtual social media platform offers an easy, cost-effective way for both profit and nonprofit sectors to communicate information, promote their products and build brand communities." Further, providing an outlet for consumers to offer personal feedback and interactive input helps information seekers to validate their searches. The key factor in determining whether these efforts are successful is to consider how personal recommendations can gain the attention of potential customers and/or influence attitudes toward organizations and brands [25,26].

The interaction and connection of people through social media websites that focus on experiences with travel products, services, and destinations should also be considered. In a review of the Canadian Tourism Commission's 2009 marketing efforts, marketing professor Alan Middleton notes "travelers are looking for the opinions of other travelers; the academic research on tourism tell us the number one reason for visiting a destination is what friends have said about their trips…and that's the power of social network marketing" [27].

Yet target consumers and those who have experienced a tourism opportunity first-hand are not the primary players where social media marketing is concerned. We must not lose focus of the organizations that seek to attract these actual and potential travelers to their destinations. Chan and Guillet [28] provide an early example of a study of the social media marketing efforts of the hotel industry in Hong Kong and found extensive use of sites such as Facebook and Twitter. As they noted: "The most frequent and common activity that hotels do is to promote the company's discounted products or services offered to general guests or sometimes, exclusively to the online community". Additionally they noted that hotels used the online service YouTube to showcase advertisements and unique selling points of their properties' products and services to guests. Given the increasing use of social media by Hong Kong hotels, can we determine if increased use by tourism agencies (whether private or public) will generate enough exposure or interest among actual or prospective travelers to make a significant economic difference?

Data

To quantify the economic impacts of introducing social media as marketing tools in tourism websites, we used a panel of data across Canada's four Atlantic Provinces (New Brunswick, Newfoundland and Labrador, Nova Scotia, and Prince Edward Island) and over time, for each month in 2005-2010.[1] As dependent variables, we used several measures of tourism-related economic activity (henceforth: tourism) that are common in the economic literature of tourism [29-31]. These variables included: lodging (e.g., hotel) rooms available for rent per 100 provincial residents (ROOMS), rooms actually rented per 100 residents (RENTED), the occupancy rate, or rooms rented as a percentage of rooms available for rent (OCCUPANCY), out-of-province Canadian and international visitors to the province per 100 residents (VISITORS), and visitors from the United States of America per 100 residents (USA).[2] We used many of our variables both not seasonally adjusted (NSA) and seasonally adjusted (SA), and, to avoid confusion, we often denote which version of the variables we are referring to by adding a hyphenated suffix, as in ROOMS-NSA and ROOMS-SA.

We interpret the relationship between ROOMS and RENTED as somewhat akin to the relationship between supply and demand in a market.[3] Higher supply in the lodging market might be reflected more directly, at least in the short run, in higher values of ROOMS than of RENTED. Higher demand might be reflected more directly in higher values of RENTED than of ROOMS. We further interpret ROOMS, RENTED, and OCCUPANCY as broader measures of tourism, since they include the use of lodging by all of in-province, out-of-province Canadian, and international tourists, as well as business travelers. We interpret VISITORS and USA as narrower measures of tourism, with the former focusing on all out-of-province tourists and the latter on tourists from the USA.

We used several independent variables to control for conditions ranging from the weather to economic conditions. These variables

included: the difference between each month's average temperature and the average temperature over the six-year period in the province's capital (TEMP),[4] the province's unemployment rate (UNEMPLOYMENT), the exchange rate between the U.S. and Canadian dollars, expressed as the amount of U.S. currency (in cents) per Canadian dollar (DOLLAR), and real, i.e., inflation-adjusted, retail sales per capita in each province (RETAIL). We considered both UNEMPLOYMENT and RETAIL separately so that the former variable could account for the potential effects of short-term fluctuations in economic conditions and the latter variable could account for the potential effects of long-term trends in economic development (e.g., 2010 could both be experiencing higher unemployment than both 2005 and 2009, but higher per capita spending than 2005). We also tested but do not include detailed results for Canadian prime interest rates, and province-level inflation rates.

We used several measures of whether provincial tourism websites (henceforth: websites) used social media. In particular, we considered eight forms of social media: electronic (or E-) newsletters, Facebook, Twitter, RSS, YouTube, Flickr, Travel Blog, and Share. To collect these data, we employed a modified coding scheme first developed by Parker [3] in a preliminary study of how Canadian provinces conduct Internet tourism marketing. The coding scheme is also similar to that used by Parker et al. [5] to examine the differences between the internet tourism marketing efforts of Atlantic Canada and New England. For each form of social media, we developed a time-series dummy variable including values of zero for months when a website did not use that form of social media, and values of one for months when it did.[5] In practice, most social media dummy variables contained zeros until some date, and ones henceforth, with our measures comparing conditions before and after the website started to use that form of social media.[6] We experimented with including each form of social media separately (i.e., only one per model), simultaneously (i.e., several separate social media variables per model), or aggregated (e.g., using indices that indicate how many forms of social media each website used).

Table 1 shows that many of our social media dummy variables were highly correlated with each other. Thus, with the data at hand, reliably delineating the separate effects associated with the various forms of social media would be difficult. Thus, in our results section below, we largely focus on results for a single index reporting how many forms of social media each website was using on each month

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1. Some of the variables were not available for the entire time period for every province.

2. We also computed and tested, but do not report similarly-defined measures for visitors only from Canada (CANADA) and a measure for foreign visitors other than from the USA (OTHER). The results for CANADA were very similar to those for the overall measure VISITORS, since Canadians account for a very large majority (86%) of VISITORS. Visitors from countries other than Canada and the USA accounted for only 4% of VISITORS. We did not have monthly data for OTHER for New Brunswick. We also collected data for the average daily rate (i.e., price) and revenue (rooms rented times price) for Newfoundland and Labrador and Nova Scotia, but not for New Brunswick and Prince Edward Island and, thus, do not include results for those variables.

3. Several studies and data sources draw distinctions between supply and demand elements in tourism data [32,33].

4. In addition to TEMP, we performed our analysis including monthly dummies and the simple monthly temperature average for each province. We ultimately selected specifications using TEMP rather than monthly dummies since including monthly dummies would involve less parsimonious models and since temperatures may vary, for instance, from one province to another and from one January to another.

(SOCIAL), with values ranging from zero to eight.[7] The values of SOCIAL for all four provinces, generally, start at very low values and reach much higher values at later dates, with the main differences across provinces being how early or quickly they added the various forms of social media.

Table 2 presents some key descriptive statistics for one of the provinces, Newfoundland and Labrador.[8] For instance, ROOMS averaged 42 but ranged widely from a minimum of 33 to a maximum of 50 (see columns 1 through 3). RENTED averaged 20, ranging from 9 to 36. OCCUPANCY averaged 46, ranging from 25 to 72. Much of this variation can be explained using only seasonal factors.[9] Figure 1 displays the marked seasonal patterns in ROOMS and RENTED. In column 8 of table 2, we quantify and compare seasonal patterns by presenting the fractions of variation (R^2) for each variable that are explained by models using only monthly dummies. As the table (and figure) show, the seasonal pattern for RENTED is far more pronounced (at 0.53) than that for ROOMS (at 0.25), but ROOMS does exhibit a strong seasonal component, as lodging providers make more rooms available during higher-season months.

Other dependent variables also exhibit pronounced seasonal patterns, with fractions explained by monthly dummies ranging from 0.41 for VISITORS to 0.57 for USA, and 0.70 for OCCUPANCY. Among our independent variables, at one extreme, almost all variation in average monthly temperatures (0.95) can be explained by monthly dummies. Some economic variables, e.g., retail sales and unemployment rates, also exhibit substantial seasonal patterns (0.78 and 0.21). At the other extreme, some economic variables, such as inflation, key interest rates, and international exchange rates do not exhibit much of a seasonal pattern.

In some cases (e.g. retail sales), we used seasonally-adjusted data as computed by the Canadian government. In other cases, we computed our own seasonally-adjusted series (see TSP International, 2009). Again figure 1 also compares not seasonally adjusted (NSA) and seasonally adjusted (SA) versions of ROOMS and RENTED. Columns 5 through 7 in table 2 present descriptive statistics for the seasonally-adjusted variables. Comparing columns 2-4 and 5-7 highlights how once one accounts for seasonal patterns, many of

5. To collect this data, we visited each website once per month during 2010, and used the Internet Archive Wayback Machine (www.archive.org) to "visit" archived versions of those websites for earlier dates during 2005-2009 as well as for several sample months in 2000-2004. We selected the period 2005-2010 based on both data availability for some of our dependent variables and what we concluded would be the most relevant time period for the overall story of the introduction of various forms of social media to websites. Through our study of archived websites, we were able to trace not only changes in website addresses, but also in their styles and contents.

6. As designed, our variables do not take into account whether tourists and potential tourists actually visited the provincial websites or whether they used social media. They also do not reflect how widely each form of social media was used in that province, internationally, or how its use changed over time.

7. We experimented with several indices excluding some forms of social media and found results were broadly robust across the various indices.

8. Here we present descriptive statistics for a single province since presenting minima, maxima, and standard deviations across provinces in a single table would mask the values across which several variables actually ranged for each individual province.

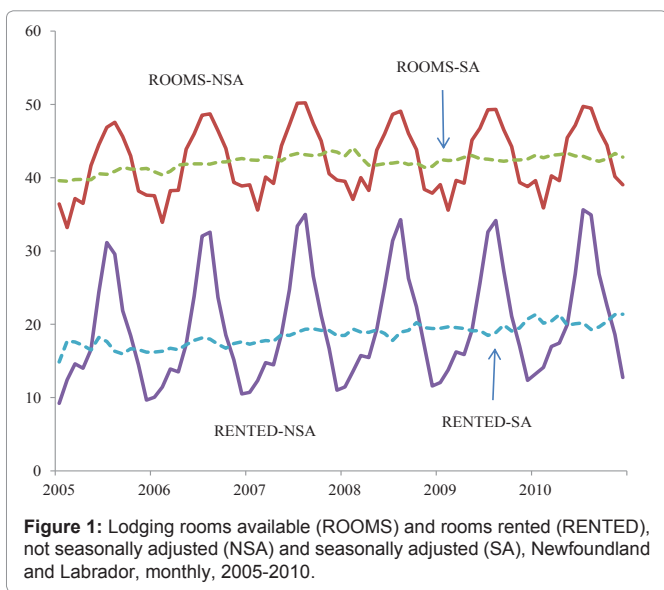9. For a study of the role of seasonality in Canadian tourism see [34].

Table 1: Correlations between social media dummy variables.

	E-newsletter	Facebook	Twitter	RSS	YouTube	Flickr	Travel blog	Share
E-newsletter	1.00							
Facebook	0.27	1.00						
Twitter	0.20	0.86	1.00					
RSS	-0.01	0.51	0.62	1.00				
YouTube	0.18	0.80	0.88	0.56	1.00			
Flickr	-0.02	0.46	0.53	0.02	0.57	1.00		
Travel blog	0.07	0.60	0.70	0.51	0.75	0.43	1.00	
Share	0.06	0.60	0.66	0.91	0.58	0.00	0.49	1.00
Average of (absolute levels of) correlations	0.11	0.59	0.64	0.45	0.62	0.29	0.51	0.47

Table 2: Descriptive statistics for Newfoundland and Labrador: monthly data, 2005-2010, not seasonally adjusted (NSA) and seasonally adjusted (SA).

	Average (1)	Not seasonally adjusted (NSA)			Seasonally adjusted (SA)			Seasonal variation (8)
		Min. (2)	Max. (3)	Std. dev. (4)	Min. (5)	Max. (6)	Std. dev. (7)	
ROOMS	42.3	33.2	50.2	4.6	39.5	44.1	1.0	0.25
RENTED	19.8	9.2	35.6	7.6	14.9	21.4	1.5	0.53
OCCUPANCY	45.7	25.3	71.7	12.8	37.6	50.0	2.9	0.70
VISITORS	7.6	3.9	15.4	3.1	6.2	7.9	0.4	0.41
USA	0.8	0.4	1.7	0.3	0.7	0.9	0.04	0.57
TEMP	5.8	-6.1	18.4	7.3	1.2	10.8	1.4	0.95
UNEMPLOYMENT	14.5	11.0	18.7	2.5	12.1	17.4	1.1	0.21
RETAIL	1,142	777	1,471	163	1,005	1,268	76	0.78
DOLLAR	0.91	0.79	1.04	0.07	-	-	-	0.06
Inflation rate	1.9	-0.9	4.6	1.2	-	-	-	0.004
Prime interest rate	4.3	2.3	6.3	1.5	-	-	-	0.002
SOCIAL	3.2	1	7	2.8	-	-	-	0.01

Note: This table provides actual monthly mean temperatures (degrees Celsius), not the actual variable we used in our specifications, which was the deviation for each month from the province's average during 2005-2010.

Figure 1: Lodging rooms available (ROOMS) and rooms rented (RENTED), not seasonally adjusted (NSA) and seasonally adjusted (SA), Newfoundland and Labrador, monthly, 2005-2010.

these variables exhibit values over far narrower ranges and have far lower standard deviations. For instance, the range for OCCUPANCY narrows from 25 to 72 not seasonally adjusted to 38 to 50 seasonally adjusted, and the standard deviation falls from 12.8 to 2.9. (We did not use or compute seasonal adjustments for several variables that exhibit little seasonal variation.)

Hypotheses, models, and caveats

In this paper, we test whether introducing several forms of social media in provincial tourism websites can be statistically associated with changes in tourism. To test our hypotheses, we used a variety of model specifications utilizing panel data techniques and holding constant for the effects of seasonal patterns, changes in the weather outside of seasonal patterns, short-term and long-term economic and financial conditions, and persistent differences across provinces. We based our choice of statistical techniques on earlier studies in the economic literature of tourism that found support for using both the time-series techniques common in macroeconomic studies and panel-based techniques [35-37].

Panel techniques are widely used as a means to reduce the potential problems resulting from model misspecification and missing variables. The structure of the data, across cross-sectional units and time, can help account for differences across cross-sectional units (e.g., provinces) that are constant over time and developments over time that affect all cross sectional units similarly.[10] For instance, in some panel techniques, the presence of separate dummy variables for each time period can serve as an indirect proxy for seasonal variations.

In particular, we were interested in exploring whether seasonal fluctuations might mask relevant statistical associations between our dependent variables (tourism) and key independent variables (use of social media). We used several methods to address the substantial seasonal patterns in several of our dependent (and independent) variables. First, we regressed seasonally unadjusted dependent variables on seasonally unadjusted temperatures as well as sets of other independent variables that either did not exhibit seasonality or were seasonally adjusted. Second, we reproduced the same models,

but also seasonally-adjusted the dependent variables and temperature. We experimented with several other approaches for which we do not include detailed results. For instance, in some models, we regressed seasonally unadjusted dependent variables not on seasonally unadjusted temperatures, but on monthly dummy variables. In other models, we did not use the levels of dependent variables, but the year-on-year first differences or growth rates in those variables.

Using either seasonally-unadjusted or -adjusted data can both have shortcomings. On one hand, including variables with strong seasonal patterns (i.e., temperature) to help explain unadjusted data with pronounced seasonal patterns may mask the potential predictive power of other variables. On the other hand, using seasonally-adjusted data may counter intuitively mask the importance and predictive power of seasonal patterns, or of temperature. Since we have seen that measures of tourism in Canada have a very substantial seasonal pattern, we present panel regressions using both seasonally-unadjusted and -adjusted data. The former will help us to highlight the role of seasonality and the weather. The later will help us to explore the role of other factors beyond the seasons, including both social media, and unpredicted temperature fluctuations (as opposed to predictable seasonal fluctuations).

Our models and results likely provide an early glimpse of the effects of social media on tourism. We are unlikely to know yet which forms of social media will be most important economically or socially in the years ahead. Thus, our measures of the introduction of social media have a preliminary character. Their advantage is that they were readily-available measures of the advent of social media. Their disadvantage is that they are only rough measures of whether and when each form of social media was first used, but not of how much each form was used. Under our model design, future changes in the popularity of, for instance, Facebook would not be captured in our models once all four provincial tourism websites initially adopted it. For instance, it could be that early adopters of social media might experience small impacts as long as that form of social media was relatively unknown to the broader public. Or, over the long-term once social media become settled parts of our economy, it could be that adding more forms of social media or provinces' devoting more resources to existing ones might not lead to further increases in tourism.

Results

Table 3 presents results for panel regressions using as dependent variables measures of tourism that were not seasonally adjusted (columns 1 through 5). Many of the results were as expected. As discussed throughout, we included TEMP-NSA as an independent variable to help account for the pronounced seasonal patterns in the dependent variables.[11] Thus, coefficients for TEMP-NSA were consistently positive, large, and statistically strongly significant for all

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10. We present coefficients and t-statistics for models corrected for both heteroskedasticity and autocorrelation. We performed Hausman tests to determine whether random effects or fixed effects panel techniques were appropriate for each model specification. We report results for a 6 year (2005-2010) window. We experimented with shorter windows (2-5 years) and found our results to be broadly robust across various time windows.

11. Using monthly dummies instead of TEMP-NSA did not affect the thrust of our results. In the regressions in Table 3, we used our seasonally-adjusted measure of UNEMPLOYMENT and the Canadian government's seasonally-adjusted measure of retail sales. Since they did not exhibit any substantial degree of seasonality, we used DOLLAR and SOCIAL seasonally unadjusted.

Table 3: Regression results for measures of tourism-related economic activity: Dependent variables <u>not</u> seasonally adjusted (NSA).

	ROOMS -NSA (1)	RENTED -NSA (2)	OCCUPANCY-NSA (3)	VISITORS -NSA (4)	USA -NSA (5)
Constant	49.66 (2.37)**	30.10 (2.39)**	60.41 (6.53)***	59.02 (3.83)***	-
TEMP-NSA	1.61 (14.42)***	1.35 (16.56)***	1.17 (23.38)***	1.38 (13.63)***	0.22 (3.76)***
UNEMPLOYMENT	-0.33 (-0.33)	-0.47 (-0.96)	-0.82 (-1.86)*	-2.36 (-4.05)***	-0.13 (3.34)***
RETAIL	7.39 (4.25)***	2.54 (4.33)***	-2.05 (-2.80)***	3.70 (5.39)***	-0.03 (-0.13)
DOLLAR	-0.10 (-0.60)	-0.08 (-0.66)	-0.04 (-0.51)	-0.24 (-1.66)*	-0.03 (-4.81)***
SOCIAL	-0.41 (-0.84)	0.01 (0.02)	0.27 (1.21)	0.66 (1.57)	-0.02 (-0.89)
R^2	0.62	0.54	0.68	0.53	0.58
Mean of dependent variable	52.61	23.87	44.74	21.75	2.23
Number of observations	288	288	288	276	276
Panel technique	Random effects	Random effects	Random effects	Random effects	Fixed effects

Note: In the top rows, t-statistics are included in parenthesis below each coefficient. *, **, and *** denote significance at the 10%, 5%, and 1% level.

Table 4: Regression results for measures of tourism-related economic activity: Dependent variables seasonally adjusted (SA).

	ROOMS -SA (1)	RENTED -SA (2)	OCCUPANCY -SA (3)	VISITORS -SA (4)	USA -SA (5)
Constant	56.26 (12.00)***	20.84 (11.90)***	49.49 (13.81)***	-	2.09 (6.10)***
TEMP-SA	0.02 (0.31)	0.04 (1.39)	0.04 (0.81)	0.07 (2.30)**	0.004 (0.95)
UNEMPLOYMENT	-0.44 (-2.78)***	-0.37 (-4.50)***	-0.64 (-3.98)***	-0.08 (-1.55)	-0.03 (-1.90)*
RETAIL	-2.51 (-2.83)***	0.95 (3.46)***	-0.57 (-0.92)	0.65 (0.72)	0.003 (0.05)
DOLLAR	0.04 (1.91)*	0.01 (1.18)	0.01 (0.48)	-0.01 (-0.31)	-0.004 (-2.01)**
SOCIAL	0.01 (0.08)	0.16 (4.52)***	0.37 (5.22)***	0.02 (0.34)	-0.02 (-2.79)***
R^2	0.76	0.61	0.49	0.97	0.39
Mean of dependent variable	52.61	23.87	44.74	21.75	2.23
Number of observations	288	288	288	276	276
Panel technique	Random effects	Random effects	Random effects	Fixed effects	Random effects

Note: In the top rows, t-statistics are included in parenthesis below each coefficient. *, **, and *** denote significance at the 10%, 5%, and 1% level.

five measures of tourism. For instance, an increase in temperature of 7.3 degrees Celsius (one standard deviation)[12] was statistically associated with 10 more rooms rented (half of the average and more than one standard deviation of RENTED-NSA).

The signs and levels of significance for several other independent variables roughly accord with our expectations for variables that focused more or less clearly on local vs. domestic vs. international tourism. Thus, better local economic conditions (e.g., higher levels of RETAIL) were associated with higher levels of the measures of tourism that were more likely to include in-province tourists (ROOMS and RENTED) and Canadian tourists (VISITORS), but not with foreign tourists (USA). Similarly, DOLLAR was strongly significant in predicting American visitors (USA), significant only at the 10% level for all tourists (VISITORS), and insignificant for the measures that focus more on local tourists (ROOMS, RENTED, and OCCUPANCY). Thus, a stronger Canadian dollar would reduce the

number of American visitors. In particular, we estimated that a 7-cent increase in the Canadian dollar (i.e., one standard deviation) would reduce USA-NSA by 0.2 (or by one quarter of its average level (of 0.8), or two thirds of its standard deviation [0.3]).

Table 4 presents results for panel regressions using as dependent variables measures of tourism that were seasonally adjusted. In these regressions, we do not include TEMP-NSA, or actual seasonal patterns, but TEMP-SA, or how much temperatures deviated from what is normal at that time of the year. That is, TEMP-SA would not necessarily have lower values in January than in August, but would

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12. For simplicity, throughout this paper, we express the sizes of estimated effects as fractions of the averages and standard deviations of the data for one individual province, Newfoundland and Labrador, that we present in Table 2, instead of for averages and standard deviations computed across all four provinces.

have low values even in Augusts, if they were colder than usual and high values even in Januaries, if they were warmer than usual. Unlike the coefficients for TEMP-NSA in the panel regressions for seasonally unadjusted dependent variables, the coefficients for TEMP-SA were largely insignificant in the panel regressions for seasonally-adjusted dependent variables.[13]

A possible explanation for this difference could be that while predictable fluctuations in temperatures affect tourism decisions (i.e., more vacations are planned for times with warmer weather), unpredicted fluctuations in temperatures affect tourism decisions far less (i.e., a cold summer would not lead to many cancellations). In particular, we did not find statistically significant coefficients for departures from seasonal temperatures for four out of five dependent variables. We only found a significant coefficient for TEMP-SA for VISITORS-SA. Even the positive coefficient was relatively small; implying that temperatures lower by 1.4 degree (one standard deviation) would only reduce VISITORS-SA by 0.1 (or less than 2% of the average and one quarter of the standard deviation of VISITORS-SA).

The results regarding our macroeconomic control variables for the models with seasonally-adjusted dependent variables were broadly similar to those for the models with seasonally unadjusted dependent variables. However, they pointed even more clearly to a dichotomy between measures of tourism that focused more on out-of-province and international tourists and those that focused more on in-province travelers. Thus, the coefficients for a key measure of local economic conditions, RETAIL, were significant for both ROOMS and RENTED, which include in-province tourists and business travelers, but were not significant for VISITORS-SA and USA, which exclude in-province travelers. The coefficients for UNEMPLOYMENT had broadly similar implications. Higher unemployment rates were associated with lower values of ROOMS-SA, RENTED-SA, and OCCUPANCY-SA, at the 1% significance level. For instance, a 1.1% increase in the unemployment rate (i.e., one standard deviation) was associated with a decline in RENTED-SA of 0.4 (or one quarter of the standard deviation). In contrast, the statistical significance of the coefficients for UNEMPLOYMENT in the models for VISITORS-SA and USA-SA hovered around the boundary between statistical insignificance and the lowest generally accepted significance levels.[14] The borderline levels of significance for the coefficients of local short-term economic conditions could reflect either, or both, that tourists are somewhat affected by their knowledge of local economic conditions in the areas they plan to visit or that unemployment rates in the Atlantic provinces have been somewhat correlated with the rates in the markets from which their visitors originate.

The coefficients for DOLLAR broadly fit the same patterns, being

statistically significant at the 5% level only for USA, implying that fewer American visitors traveled to the Atlantic Provinces when the Canadian dollar was stronger. The coefficients for measures of tourism including non-US citizens were broadly unaffected by the DOLLAR. The only exception, and only at the 10% level of significance, was for ROOMS-SA, implying that when the Canadian dollar is stronger, providers of lodging make more rooms available. However, since the coefficient for RENTED-SA is not statistically significant, this combination might point out to a case where greater quantities supplied were not met by greater quantities demanded.

The statistical significance of the coefficients for SOCIAL in table 4 highlight the importance of exploring measures of tourism both seasonally unadjusted and adjusted. As we suspected, the strong seasonal patterns in tourism masked the statistical significance of the associations between tourism and some of its potential explanatory variables. Seasonal weather patterns do play a key role in predicting tourism. However, to investigate additional factors contributing to explain measures of tourism, we found it helpful to seasonally adjust them. Once we did so, we found evidence that introducing some forms of social media may have played a role in predicting some, but not all, measures of tourism. In particular, we found that adding more forms of social media was strongly statistically associated with more rooms rented and with higher OCCUPANCY. For instance, adding three forms of social media (about one standard deviation) was statistically associated with, a rather large, increase of 0.5 in RENTED-SA (or about one third of its standard deviation). These effects are rather large and are similar to the impacts of, for instance, a decline in a province's UNEMPLOYMENT of 1.3% (or more than one standard deviation).

We also note that introducing social media seems to have led to more local consumer demand (higher RENTED), rather than either more local supply or more out-of-province consumers. Thus, we did not find significant coefficients for ROOMS or VISITORS. Our most puzzling result was a large negative, strongly significant coefficient for SOCIAL in the regression for USA-SA. According to these results, adding three forms of social media (about one standard deviation) was statistically associated with 0.05 fewer US visitors per 100 residents (about one standard deviation of USA-SA). While

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13. Again, the only difference between the independent variables in tables 3 and 4 is that TEMP is not seasonally adjusted in Table 3 and is seasonally adjusted in Table 4. All other independent variables are identical across tables 3 and 4.
14. Note that the patterns of significance for UNEMPLOYMENT across models for seasonally-adjusted dependent variables comport more readily to the predictions of economic theory than across models for seasonally unadjusted dependent variables, perhaps providing additional backing for the validity of our models using seasonally-adjusted data.

Table 5: Abridged results for social media dummy variables from panel regressions for RENTED-SA.

	E-newsletter	Facebook	Twitter	RSS	YouTube	Flickr	Travel blog	Share
(1) All simultaneously	0.17	1.51	-0.20	-0.80	-0.06	-1.96	0.96	0.64
	(0.52)	(3.10)***	(-0.54)	(-1.05)	(-0.10)	(-4.30)***	(1.11)	(0.94)
(2) One per regression	0.02	0.97	0.74	0.54	0.68	-0.26	1.18	0.74
	(0.08)	(5.44)***	(3.74)***	(2.95)***	(3.47)***	(-0.89)	(5.05)***	(4.19)***

Note: t-statistics are included in parenthesis below each coefficient. *, **, and *** denote significance at the 10%, 5%, and 1% level.

our results may still be preliminary, perhaps the earlier stages in the development of social media lead to stronger links between tourists and their local markets and, implicitly, to at least temporarily lower levels of international tourism.

Table 5 presents abridged results for individual social media dummy variables from panel regressions with RENTED-SA as the dependent variable. The full regressions (not shown) are largely similar to those in table 4 using all the same control variables except SOCIAL. In row 1, we display the results for all eight social media dummy variables that, instead of SOCIAL, we entered separately and simultaneously into a single panel regression.[15] In row 2, we present the coefficients for each social media dummy variable from eight separate panel regressions. In each of those regressions, we used only one social dummy variable, and neither SOCIAL nor any of the other seven social media dummy variables.[16]

According to row 1, adding social media was statistically associated with higher levels of tourism for only one (Facebook) out of eight forms of social media. However, as table 1 showed above, many of the social media dummy variables were highly correlated with one another. Thus, including multiple of these variables in a single model could mask the statistical significance of the associations between the dependent variable and the individual independent variables. In turn, the results from the second row show that, including the social media dummy variables one at a time, we found that introducing social media was statistically associated with higher levels of tourism for six of the eight forms of social media that we tested (i.e., all but electronic newsletters and Flickr). Averaging the coefficients across those six forms of social media, we find that having introduced them was statistically associated with an increase of 0.8 in RENTED-SA (or more than half of its standard deviation).[17]

Conclusion

Our paper bridges the fields of marketing and economics to assess the potential economic impacts of the early stages of introducing social media as marketing tools to tourism websites. Using panel techniques, we provide evidence which indicated that adding new forms of social media to the tourism websites of the Atlantic Canada provinces during 2005-2010 had substantial and statistically significant positive impacts on measures of tourism-related economic activity.

The dynamic nature of information technology in general, and of social media in particular, likely means that early results on the relationships between social media, marketing, and tourism-related economic activity should be interpreted with caution, especially as many studies in the marketing literature tend to be qualitative in nature [20]. Moreover, future studies will likely have at their disposal far richer data on the relative popularity and usage of various forms of social media, and of their use in regard to tourism in the provinces of Atlantic Canada. While the precise relationships we have estimated may not continue to prevail in the future, our paper provides a first step toward showing that (1) one may estimate the economic impacts of using new technologies and marketing techniques, such as social media, and (2) that those impacts may, at least at times, be positive and significant. Furthermore it is our hope that this research might provide others with an initial point to conduct similar studies that would evaluate continued use of the social media tools discussed here and potentially consider the usage of new social media applications such as Pinterest or Google+.

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15. This regression used a fixed effects panel technique.
16. All eight of these regressions used a random effects panel technique.
17. The average standard deviation of the eight individual social media dummy variables is 0.4. Thus, the average estimated effect of a one-standard deviation change in social media (from models that implicitly use one form of social media as a proxy for all forms) yields an impact on RENTED-SA that is roughly comparable to our results using our aggregate index across all eight forms (SOCIAL).

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