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Quantifying the Impacts of the Recent Economic Crisis on Regional Tourism Industry and Economy

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Keywords
Tourism Impact Analysis, Input-Output Model, Economic Crisis, Modeling Accuracy, Negative Shock

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Abstract

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Introduction

The Input-Output model (thereafter, the I-O model) has been extensively applied in the literature of tourism impact analysis (West, 1995). It is commonly used to examine the tourism economic contributions on both national and local levels (Archer1995, Archer & Fletcher, 1996; Heng & Low, 1990; Mazumder, Ahmed, Murad, & Al-Amin, 2011). The model is also employed to evaluate the impacts of external events such as facility construction, sporting events, and even terrorist attacks (Hara, 2004; Kock, Breiter, Hara & DiPietro, 2008; Lee & Taylor, 2004).

Some researchers caution that the I-O model estimates can be misleading because of its structural limitations and deterministic nature (Briassoulis, 1991). Overall, the model has the propensity to overestimate both negative and positive impacts (Dwyer, Forsyth, & Spurr, 2004, Zhou, Yanagida, Chakravorty, & Leung, 1997). Although the I-O model advocates are aware of the model's short-comings, they insist that the model's limitations can be minimized when the investigation is intended for a limited time period (usually for one year) and an open small economy (Archer, 1995; Fletcher, 1989). As Archer (1995) wrote:

"Provided that the relationships in the (I-O) model are used only for a limited time period, the effects of these limitations are minimized." (p. 922)

Though both proponents and opponents of the I-O model make sound theoretical arguments regarding the model's applicability and accuracy in tourism impact analysis, there is rarely any research validating the modeling accuracy by comparing estimation results with actual data. It is still unclear whether the I-O estimates tend to overestimate as compared to the reality. If so, how much will be the discrepancy?

This study explores the accuracy issue of the I-O model using an exploratory approach. The I-O model is applied to estimate the impacts of the 2007 economic crisis on a local tourism industry

and its ripple effect on the local economy. Specifically, two research questions are going to be answered.

1. How does the recent economic crisis impact industry output and employment (including tourism-related industries and other industries) in a local economy according to the I-O estimation?
2. How accurate are the I-O model simulation results as compared to the actual data?

The remainder of the paper is structured as follows. The next section provides a literature review on the impacts of the 2007 economic downturn and on the I-O model. The section following it explains the research methodology and data collection. Then the modeling and comparison results are presented. The last section further discusses the study findings, explains the study implications, and suggests future research directions.

Literature Review

Research Background: The 2007 Economic Recession

The US economy officially entered a recession in December 2007 (NBER, 2008). Soon, it deteriorated rapidly after the leading US financial institutions of Lehman Brothers and American Insurance Group (AIG) failed unexpectedly in September 2008. Under such an adverse economic circumstance, the US tourism industry started to suffer. To worsen the situation, the news on the AIG executives retreating in a luxury resort shortly after receiving a $85 billion "bail-out" attracted enormous negative publicity (Roger, 2009). This incident caused the US government to discourage corporations and executives to make unnecessary or extravagant travel (Skolnik, 2009). Some hotels even dropped the sheer word of "resort" from their names to contend with the public backlash against corporate luxury travel (Hudson, 2010). The US tourism industry was thus given a heavy blow.

According to the US Travel and Tourism Satellite Accounts, the national tourism output decreased at a faster pace than the GDP, especially at the beginning of the recession. While the former fell severely at the rate of 5.4% and 9.4% in 2008 and 2009 respectively, the latter fell at a much lower rate of 0.3% and 3.1% (BEA, 2011a, 2012). Afterward, the US tourism industry experienced a stronger recovery than the national GDP, with 2.9% and 3.2% output growth in 2010 and 2011 respectively. In addition, the tourism industry underwent three consecutive years of employment decrease nationwide starting from the 2nd quarter of 2008. This was the first continuous job-loss period since 2003. In 2009, the employment decline reached its trough of negative 8.3%, which translated to 479,000 cases of tourism-related job loss from its previous year (BEA, 2012).

Besides the national tourism account statistics, there are a few research papers studying the impacts of the 2007 economic crisis on the tourism industry (Ritchie, Molinar & Fretchling, 2010; Semera, 2009; Song & Lin, 2010). All these studies are devoted to the investigations at the national level. In a recent study, Ritchie and his colleagues (2010) documented the current and evolving status of the tourism industry during this difficult economic time in Canada, US, and Mexico. Their examination revealed that the tourism of the three countries had been unevenly affected. Besides the countries on the American Continent, other countries in Europe and Asia were also investigated. These studies mainly concentrate on tourism demand modeling and forecasting. Semeral (2009) predicted the demand for international travel of the EU 15 countries (tourism import) would decrease from 8% to 15% in 2009 and from 0.5% to 8.4% in 2010. Song & Lin (2010) forecasted the inbound tourism to Asia drop significantly in 2009, especially from the long-haul markets such as Europe and North America, and the outbound tourism from Asia also decline remarkably except Hong Kong and mainland China.

To local governments, the above-mentioned national statistics and studies are helpful yet not sufficient to make their own tourism-related decisions. However, to understand the impacts of the 2007 economic recession in a local area is extremely beneficial, especially when its government agencies need justifications to solicit public funds and resources to support tourism-stimulating policy during the recession. The I-O model appears to be particularly useful in such a situation. That is because (1) local areas have less resources, and the I-O model is less costly and complex as compared to other more sophisticated ones.(2) In local areas, resources tend to mobilize more freely, which approximates one of the model's assumptions, the absence of capacity/supply constraint (Dwyer, Forsyth, & Spurr, 2004).

Theoretical Discussions of the I-O Model

The I-O model is an equilibrium mathematical framework, which quantifies the interdependency among various industries and households in an economy (Fletcher, 1989). That is, the model can measure the additional indirect and induced effects from the tourism demand change due to the inter-industry consumption and household's income spending (Frechtling & Horváth, 1999).

The I-O model conceptualizes the output of an industry as the sum of intermediate use by other industries, and final demand, and it suggests that the change in final demand will stimulate changes in output at certain ratios reflecting the linkages among industries and households. The conceptualization of the I-O model can be expressed in the following linear equation, which is operated in the matrix format (Hara, 2008).

$$\Delta \mathrm{X} = \left(I - A\right)^{-1} \Delta Y$$

Where: $\Delta \mathrm{X}$ is a n x 1 vector for gross output change; ΔY is a n x 1 vector for final demand change, and $(I-A)^{-1}$ is known as the Leontief inverse matrix, which is a nxn matrix specifying the

effects in n industries resulting from one unit of change in final demand (Lee & Taylor, 2005). When the I-O model solely focuses on production activities, the Leontief inverse matrix captures the direct and indirect effects. When the I-O model incorporates household sector into the production sector, the total impact represented by the inverse matrix is the summation of direct, indirect and induced effects. It is noteworthy that $(I-A)^{-1}$ is greater than one, and it indicates that the estimated change in output will always be larger than the change in final demand (Hara, 2008).

The I-O model has two principal assumptions. One is the constant input coefficient, which implies that the production of one unit output requires fixed amounts of inputs (Briassoulis, 1991; West, 1995). This assumption does not allow the I-O model to simulate nonlinear economic relationships, which are resulted from various sources such as economic scale and input substitution. Another crucial assumption is the absence of capacity/supply constraint (Briassoulis, 1991; Fletcher, 1989). This assumption suggests that there are no constraints for production activities. It infers that the model does not consider the role of price in allocating factor resources and the interaction between production activities and other markets (e.g. Labor markets, or imports and exports).

In tourism literature, the I-O model is widely applied to examine the tourism's economic and ecological impacts on the national, regional, or local levels (Archer1995, Archer & Fletcher, 1996; Frechtling & Horvath, 1999; Hara & Naipaul, 2008; Heng & Low, 1990; Mazumder et. al., 2011; West & Gamage, 2001; Wiedmann, 2009). Some other studies also employ it to evaluate the impacts of external events on tourism industry. These events include facility constructions, sporting events, and even terrorist attacks (Hara, 2004; Kock et al., 2008; Lee & Taylor, 2004). The aforementioned studies, as referred to the proponents of the I-O model, generally emphasize the model's advantages of being objective, comprehensive and flexible. There is another tourism literature stream, which tends to consider the I-O model as an inadequate tool. The salient criticisms are directed to the

model's static nature and its strict assumptions (Blake, 2009; Briassoulis, 1991; Dwyer et al., 2004; West, 1995). As some researchers (Blake, 2009; Dwyer et al, 2004) reasoned, because the I-O model's simulation is based on fixed input coefficients and static factor price, it will inevitably yield a total positive change when given a positive shock, and a total negative change when given a negative shock. However, reality might not be the case. Factor price (e.g. labor wage) can increase resulting from a rising tourism demand and the limited amount of resources, and it can in turn harm other industries which compete for the same factors. Considering the interactions across industries and markets, the economic-wide change can turn out to be in the opposite direction with the final demand change (Blake, 2009).

To overcome the limitations of the I-O model, some researchers started to turn their attentions to some more sophisticated modeling such as the Social Accounting Matrix (SAM) and Computable General Equilibrium (CGE) (Sugiyarto, Blake, & Sinclair, 2003; West, 1995). In essence, the SAM and CGE models are an extended I-O framework with more complexity and flexibility. As compared to the basic I-O model which traditionally concentrates on the production activities, SAM incorporates the other economic flows from factors (namely, land, labor and capital), institutions (including households, enterprises and government), and the rest of the world (Hara, 2008; Thomas & Bautista, 1999). The CGE, on the other hand, relaxes the I-O model's assumptions by incorporating the supply-demand mechanism, input substitution and market interactions (West, 1995). However, some researchers also acknowledged that the CGE model had to make more assumptions, which were subject to the modeler's discretion (Yang & Chen, 2009).

Methodology and Data Collection

This study takes an empirical approach, and selects the Metro Orlando Area in Florida as the study area. The region is highly dependent on tourism, and remarkably suffered from the recent

economic crisis, as evidenced by the large decrease of more than $ 4.3 billion dollars in visitor expenditures from 2007 to 2008 (Orlando CVB, 2009a, b, c). The study time period is set between 2007 and 2008. The timeframe is selected with a purpose of avoiding the confounding effects of the 2009 avian flu pandemic on the tourism industry (Centers for Disease Control and Prevention, 2010). The more recent time frame (e.g. 2010-2011) is not selected due to the consideration that as economic recession prolongs, it can permanently change an economic structure, which is not readily reflected in the available I-O transaction table. Since "tourism is an expenditure-driven economic activity", this study takes the change in visitor expenditures between 2007 and 2008 as a proxy measurement of final demand change from the current economic crisis (Mihalic, 2002, cited in Fretchling, 2006, p.26). The resulting total effects are estimated in terms of industry output (or sales value) and employment. The modeling results are then compared to the actual data for accuracy verification.

The Metro Orlando Area and its tourism industry

The Metro Orlando Area officially is comprised of Osceola, Orange, Seminole and Lake Counties (MOEDC, 2011). However, the Lake County is excluded in this study because of data unavailability. The exclusion of Lake County only minimally impacts the expenditure change estimation, because the county is not a primary tourist area within the Metro Orlando Area.

Located in the center of Florida, the tricounty area is a world-known leisure and business destination. The region is home to seven of the top 10 theme parks in the US, which include four theme parks in World Disney World Resort, SeaWorld, Universal Orlando, and Islands of Adventure. In 2008, the seven theme parks draw 64.6 million visitors, accounting for 72% of the total attendance of the 10 most visited theme parks in US (Orlando CVB, 2010b). The Orange County Convention Center, the nation's second largest convention facility, is another draw for

visitors. The area is well served by the world-class Orlando International Airport, which is the 3rd largest in the US and provides non-stop flights to89 domestic destinations and 27 international destinations (GOAA, 2010). The area also has the nation's 2nd highest lodging inventory of 115, 875 hotel rooms, 4,154 restaurants and 65 main shopping centers/malls, which provides visitors a wholesome experience (GOAA, 2010; MOEDC, 2011; Orlando CVB, 2010a).

The tourism industry is a top economic and employment contributor in this area. In 2007, Metro Orlando area received 48.7 million visitors, which generated 31.1 billion dollars for the local economy. It created 236, 556 direct industry jobs, representing 24% of the total employment in these three counties (Orlando CVB, 2008a, P.1). Moreover, the industry also contributed significantly in tax revenue. In 2007, it generated a total of 202.87 million dollars in resort tax (Orlando CVB, 2010c).

Data collection & modeling procedures

This macro-economic study primarily uses secondary data. The visitor expenditure data are obtained from the 2008 visitor profile reports compiled by the Orlando/Orange County Convention and Visitor Bureau. The data on output and employment are retrieved from the databases of the US Bureau Economic Analysis (BEA, 2011b) and the Metro Orlando Economic Development Commission (MOEDC, 2010) respectively.

There are four steps in constructing the I-O model to assess the impacts of the 2007 economic crisis on the region's output and employment, and validating the estimation accuracy.

1. Construct the final demand column vector of total visitor expenditure differences between 2007 and 2008. The expenditure differences are disaggregated into six basic tourism-related categories: room, transportation, food, shopping, entertainment and miscellaneous.

2. Extract the tricounty I-O transaction table to the MS-Excel file to calculate the Leontief inverse matrix. This study utilizes the 2004 IMPLAN Florida county-level data deflated to 2008. The transaction table extracted incorporates both industries and households; thus, the total impact include direct, indirect and induced effects. The industries are coded at the 2-digit North American Industry Coding System (NAICS), and there are total 20 industries.

3. Plug in the final demand column vector to the Leontief inverse matrix, and calculate the output and employment estimates. The six tourism-related expenditure categories are matched with the five NAICS industries (The five NAICS industries are: accommodation & food services; art-entertainment & recreation; retail trade; transportation & warehousing; and other services).

4. Accuracy verification. The absolute discrepancy is calculated as the difference between the actual and estimated results. If the difference is positive, the investigated variables are overestimated; and if it is negative, the variables are underestimated. Then the discrepancies are ranked in both positive and negative directions. Lastly, a paired-sample t-test is performed to confirm whether the differences among actual and estimated results are statistically significant or not.

Because the final demand estimation, the 2007-2008 visitor expenditure change, is the most critical in ensuring the accurate assessment of total impacts, thus its calculation procedures are detailed here. The visitor expenditures are retrieved from the Orlando CVB reports, and these reports concentrate on three main visitor groups: domestic leisure visitors, domestic business visitors and oversea visitors. The domestic business visitors are subcategorized into group meeting visitors and transient business visitors. Visitor number is provided for these four groups (see Table 1). Also, average visitor expenditure per person per trip is available at two data levels: aggregated and disaggregated (into six tourism-related categories). Both aggregated and disaggregated expenditure data are provided for domestic leisure visitors and group meeting visitors, and only aggregated data

for overseas visitors. Unfortunately, there are no expenditure data for transient business visitors; thus they are omitted in the final demand estimation. This procedure will result in a smaller estimated negative shock and should yield more conservative modeling results.

Table 1: Visitor arrivals to the Metro Orlando Area between 2007 and 2008

	Base Year 2007	Year 2008	Absolute Change	Change Ratio
Domestic leisure visitor	35,334,000	35,282,000	-52,000	-0.15%
Domestic group meeting visitor	6,049,000	5,744,000	-305,000	-5.04%
Overseas visitors	2,055,000	2,433,000	378,000	18.39%
Subtotal (three groups)	43,438,000	43,459,000	21,000	0.05%
Domestic transient business visitor	4,525,000	4,489,000	-36,000	-0.80%
Total (four groups)	47,963,000	47,948,000	-15,000	-0.03%

Source: Orlando CVB (2009a,b,c)

Total change in visitor expenditure is calculated by adding up the changes of domestic leisure visitors, group meeting visitors and overseas visitors between 2007 and 2008. The expenditure changes in each group is disaggregated to six tourism-related categories, namely room, transportation, entertainment, food, shopping and miscellaneous services. In this procedure, a couple of assumptions are made. First, this study assumes that the Floridian average transportation expense (per person per trip) is a close to the ground transportation spending for both domestic leisure visitors and group meeting visitors (the Floridian average transportation expense is obtained from the CVB reports). This step is to exclude the airfare from the all-inclusive transportation expenditures reported in the CVB documents. Second, since the CVB reports only provide the aggregated average expenditure for oversea visitors, this study assumes that the visitor group has the same expenditure distribution ratios over the six categories as the domestic leisure visitors do. This assumption is

made based on the observation that most overseas visitors came to the study area for leisure purposes (91% in 2007 and 88% in 2008). While it is highly debatable that the domestic and overseas visitors exhibit the same characteristics in consumption, it is more sensible to have a complete estimation of a direct shock, instead of totally ignoring the impacts from this group, even though this step involves in making further assumptions.

The total change in visitor expenditure is presented in Table 2. The Metro Orlando area experienced a total decrease of visitor expenditure of $ 4.3 billion. Among the six tourism-related categories, shopping, room and entertainment suffer the most, with reduction of $ 1.09 billion, $ 1.01 billion and $0.74 billion respectively.

Table2: Total change in visitor expenditure between 2007 and 2008 (Unit: $)

	Domestic Leisure Visitor	Domestic Group Meeting	Oversea Visitors	Accumulative Difference	% Change from 2007
Total difference	(3,976,856,000)	(659,040,000)	329,079,000	(4,306,817,000)	-19.10%
Room	(710,528,000)	(379,665,000)	74,064,327	(1,016,128,673)	20.40%
Transportation	(390,078,000)	(74,774,000)	11,680,111	(453,171,889)	-26.20%
Food	(782,808,000)	(42,395,000)	131,522,173	(693,680,827)	-11.80%
Entertainment	(781,976,000)	(57,644,000)	97,589,011	(742,030,989)	-15.30%
Shopping	(1,063,140,000)	(36,752,000)	2,934,540	(1,096,957,460)	-27.80%
Miscellaneous	(248,326,000)	(67,810,000)	11,288,839	(304,847,161)	-24.70%

Note: Based on the authors' calculation. Numbers in parentheses indicate negative value.

Study Results

The estimated and actual impact on output is presented in Table 3 below. The I-O model estimates that the Metro Orlando area experienced a total decrease of $ 7.1 billion in output between 2007 and 2008, due to the dramatic visitor expenditure reduction of $4.3 billion. The estimation results show that all industries in the area were negatively affected, with the five tourism-related sectors the most inflicted. "Accommodation and food services" and "retail trade" sectors appeared to suffer the most, reducing total output of $ 1.7 billion and $ 1.3 billion respectively.

Table 3: The estimated and actual annual changes on output (Unit: $)

Discrepancy Ranking	Industrial Sectors (NAICS 2 digit)	Estimated Impact	Actual Impact	Discrepancy (Actual-Estimated)
1	72 Accommodation & food services	(1,720,924,160)	190,000,000	1,910,924,160
2	53 Real estate & rental	(294,343,904)	1,127,000,000	1,421,343,904
3	71 Arts- entertainment & recreation	(812,585,088)	375,000,000	1,187,585,088
4	44-45 Retail trade	(1,332,153,216)	(228,000,000)	1,104,153,216
5	92 Government & non NAICs	(238,388,448)	567,000,000	805,388,448
6	54 Professional- scientific & tech	(266,227,024)	526,000,000	792,227,024
7	62 Health & social services	(285,241,088)	374,000,000	659,241,088
8	48-49 Transportation & Warehousing	(551,179,520)	40,000,000	591,179,520
9	31-33 Manufacturing	(338,680,064)	127,000,000	465,680,064
10	81 Other services	(413,197,600)	39,000,000	452,197,600
11	51 Information	(94,529,224)	119,000,000	213,529,224
12	22 Utilities	(36,600,096)	109,000,000	145,600,096
13	55 Management of companies	(86,184,256)	51,000,000	137,184,256
14	42 Wholesale Trade	(176,435,712)	(47,000,000)	129,435,712
15	56 Administrative & waste services	(141,768,736)	(29,000,000)	112,768,736
16	61 Educational services	(29,743,808)	13,000,000	42,743,808
17	52 Finance & insurance	(235,026,928)	(444,000,000)	(208,973,072)
18	23 Construction	(45,925,864)	(931,000,000)	(885,074,136)
	11 Ag, Forestry, Fish & Hunting	(7,326,237)	N/A	N/A
		(115,464)	N/A	N/A
		,106,576,436)	1,978,000,000	9,084,576,436

Note: Numbers in parentheses indicate negative values

The actual data reveal a surprisingly different picture. The area had a total $1.98 billion output growth during the study period. Most industries in the area maintained a decent output increase, including the four tourism-related industries, which are "accommodation and food services", "arts-entertainment and recreation", "transportation and warehouse" and "other services". Some non-tourism industries also achieved truly impressive output growth. The outputs of the "real estate and rental", "government and non NAICS", "professional-scientific and technological", and "health and social services" sectors were up by $ 1.1 billion, $ 0.56 billion, $0.52 billion and $ 0.37 billion respectively. However, "construction" and "finance and insurance" sectors underwent a much larger decrease than estimated, with a reduction of $ 0.931 billion for the former and $ 0.444 billion for the latter.

The discrepancy shows that the negative impact on "accommodation and food services" sector was the most overestimated, with a difference of nearly $2 billion. Among the top four industries receiving the largest overestimation of negative impact, three were tourism-related. Among the non-tourism industries, "real estate and rental", "government and non NAICS", "professional-scientific and technological" and "health and social services" sectors also had inflated negative estimates. On the other spectrum, the negative impacts on the "construction" and "finance and insurance" sectors were underestimated, with $ 885 million and $ 208 million falling short from the actual data respectively. The sample-paired t-test statistics confirm that difference between the estimated and actual results are statistically significant at the 0.05 confidence level (t=3.30, see Table 5)

The Impacts on Employment

The estimated and actual impact on employment is presented in Table 4 below. As it shows, the I-O model indicates that the direct negative shock created a strong traction for all industries to shed jobs, resulting in a total of 83,393 job losses in the study area. The five tourism-related industries are projected to generate the most job cuts.

However, the study area, in reality, experienced a much smaller magnitude of job loss: 20,700 cases, only one quarter out of the estimated amount. The area's gloomy job prospect was overwhelmingly attributed to the server job-shedding of the "administrative/ waste service" sector (19,500 job cuts) and "construction" sector (7,700 job cuts). Surprisingly, the tourism-related industries demonstrated a strong ability to absorb a large amount of surplus labor, which was totally against the Input-Output estimation. "Accommodation and food services" sector employed 5,400 new hires, which made it the strongest employment generator in the area between 2007 and 2008. "Arts-entertainment/recreation" and "retail trade" sectors also took in 2,400 and 900 extra labor respectively. Along with their large growth in output, "health and social service" and "real estate/rental service" sectors increased employment by 3,900 and 1,600 respectively. Interestingly, despite their robust output growth, "information" and "professional-scientific and technological" sectors incurred a moderate job cut, reducing employment by 700 and 100 respectively.

Table 4: The estimated and actual annual changes in employment

Discrepancy Ranking	Industrial Sectors (NAICS 2 digit)	Estimated impact*	tual Impact*	Discrepancy* (Actual - Estimated)
1	2 Accommodation & food services	(27,191)	5,400	32,591
2	44-45 Retail trade	(19,450)	900	20,350
3	1 Arts- entertainment & recreation	(9,091)	2400	11,491
4	62 Health & social services	(2,975)	3900	6,875
5	53 Real estate & rental	(1,655)	1600	3,255
6	49 Transportation & Warehousing	(4,760)	(2,100)	2,660
7	61 Educational services	(492)	1900	2,392
8	92 Government & non NAICs	(2,214)	100	2,314
9	54 Professional- scientific & tech	(2,246)	(100)	2,146
10	81 Other services	(6,124)	(4,600)	1,524
11	31-33 Manufacturing	(1,268)	(100)	1,168
12	55 Management of companies	(456)	600	1,056
13	42 Wholesale Trade	(1,130)	(500)	630
14	11 Ag, Forestry, Fish & Hunting	(127)	0	127
15	21 Mining	(0)	0	0
16	51 Information	(374)	(700)	(326)
17	52 Finance & insurance	(1,273)	(2,200)	(927)
18	23 Construction	(369)	(7,700)	(7,331)
19	56 Administrative & waste services	(2,125)	(19,500)	(17,375)
	22 Utilities	(74)	N/A	N/A
	Total	(83,393)	(20,700)	62,693

Note: numbers in parentheses indicate negative value.

Among the top four positive discrepancy ranking, three are tourism-related, including "accommodation and food services", "retail trade" and "art-entertainment and recreation" sectors. The estimated employment change in the administrative and waste services sector has a significant negative difference of 17, 375 from the actual data. The paired-sample t-test statistics shows that the difference between the estimated and actual results in employment is not statistically significant at the

0.05 confident level (t=1.37, shown as Pair 2 in Table 5). However, this insignificant finding should be interpreted with caution. Since the sample size is small (n=18), the test might not have sufficient power to detect the differences between means that actually exist.

Table 5: Paired-Sample T Test Statistics

Variables	lean Difference	rd Deviation	. Error Mean	t	df	Sig
Output	($504,285,000)	$648,507,000	$152,855,000	-3.3	17	0.004**
Employment	(3,350)	10,413	2,454	-1.37	17	0.19

Note: numbers in parentheses indicate negative value. ** P<0.01

Discussion and Conclusions

Though there are large discrepancies between the estimated and actual results in output and employment, it should be reminded that these two results are not based on exactly identical sources. The model simulation in this study only considers the multiplier effects of the 2007-2008 visitor expenditure decrease attributed to the recent economic crisis while the actual data reflects the total impacts of all industries' interactions under the influence of the economic crisis. This could explain why the I-O model underestimates the negative impacts on "construction" and "financial and insurance" sectors in terms of output. Since this economic crisis was driven by the slumping housing market and tumbling financial sector, the two above-mentioned industries not only negatively affected indirectly from the visitor expenditure reduction, but also impacted directly from the recent economic crisis. The same logic can explain why "construction" and "administrative and waste service" industries incurred more job loss than estimated.

Although the estimated and actual results are not exactly the same, the comparisons between them, especially for the tourism-related industries, are still meaningful. For these industries, their output and employment changes are primarily attributed to the tourist expenditure decrease, thus

leading the estimates and actual data to a quite equitable comparison. Considering that the simulation omitted the tourism expenditure decrease from the Lake County and the transient business group, the final demand shock was smaller than it should be, and the simulation results were more conservative. Under such a circumstance, it was quite astonishing to see the estimates not only have large discrepancies with the actual data, but also in the opposite direction. The next section will focus on the tourism-related economic activities in the area between 2007 and 2008, and make some explorative explanations for the discrepancies.

Better-performing sectors in output

As Table 3 indicates, the "accommodation and food services" and "arts-entertainment and recreations" were the two tourism-related sectors which performed far better than estimated. One explanation could be that the expansion activities in these two sectors counteracted the negative effects from the decreased visitor expenditures. Between 2007 and 2008, Universal Orlando started the 200-million-dollar development of the Wizarding World of Harry Porter (Bevil, 2010). SeaWorld, meanwhile, introduced its 60-acre water park, Aquatica (Giezl, 2007). Early in 2007, The Walt Disney World announced its development plans for a 900-acre luxury resort complex and a 450-acre value-oriented retail, dining and lodging district (The Walt Disney Company, 2007). The Hilton hotel family invested $ 550 million to build the 497-room Waldorf Astoria and the 1000-room Hilton Orlando Bonnet Creek (Waldorf Astoria Orlando, 2008).

Arguably, such a strong investment confidence was stemmed from the area's competitiveness as a tourist destination and its capability in navigating through the crisis. The area's private and public sectors were actively making concerted efforts to fend off the negative impacts of the recent crisis. Despite the tough economic time, ample funds were still granted to the area's convention and visitor bureaus in sustaining constant and effective marketing campaigns inside the

US and abroad. According to its 2008 annual budget, the Orlando/Orange County CVB was provided with a total of $ 64.3 million, and planned to spend $ 42.5 million in leisure and travel industry marketing in that year (Orlando CVB, 2008b). The representatives of the tourism industry convened regularly with local government officials and shared concerns and strategies on effective use of tourism tax (Garcia, 2009). To attract more visitors, the local tourism venues were offering various ticket deals, hotel discounts and value meals. Both Disney World and Universal, cooperating with their on-property hotels, offered a free overnight stay in the hope of capturing extra park ticket and merchandise revenues (Powers, 2009).

As the I-O model in this study takes the visitor expenditure reduction as a proxy measurement of the crisis's direct impact, and it certainly does not account for the positive effects of the new capital injection through expansion activities. Also, it is not able to capture the positive feedback effects of the crisis management efforts from the private and public sectors. Therefore, the I-O model tends to overestimate the negative impacts on the tourism-related industries in term of output.

Better-Performing sectors in employment

The "accommodation and food services", "retail trade", and "art-entertainment and recreation" are the three tourism-related industries which performed far better than the I-O model estimated in term of employment. As a matter of fact, these industries still experienced quite significant employment increase in such a turbulent economic time (see Table 4). The employment growth in these sectors could be possibly attributed to the expansion activities in some local theme parks and hotels as discussed previously.

Another possible explanation is that the apparently-stable number of visitors in 2008 encouraged tourism-related hiring, or at least, not a massive job shedding (See Table 1). The tourism-related industries mainly offer intangible service, which is delivered primarily through people-to-people contacts. Unlike the other sectors such as manufacturing, it is practically challenging for tourism-related sectors to deploy automation and mechanization to replace personal interactions. As in this case, the Metro Orlando area saw only a slight decrease of 0.03% in visitor arrivals between 2007 and 2008 (See Table 1). In order to ensure service quality, the amount of service staff needs to be in proportion with the visitor number regardless the latter's spending extent. Therefore, though the total visitor expenditures in 2008 reduced dramatically due to the falling average spending per person per trip, managers in the tourism-related industries still had to secure sufficient labor to provide premier service to visitors, whose arrival was relatively stable. Since the I-O model is expenditure-based, it does not incorporate tourism-related industry's labor requirement corresponding to the visitor number, and thus overestimates the effects in tourism-related employment loss.

In addition, the tourism-related employment could be explained by the labor supply-demand dynamic initiated by the economic crisis. As considerable workers were unemployed due to a worsening economy, especially in the administrative & waste service and construction sectors, the market is fraught with surplus labor. At the supply side, the unemployed labor tends to be mobilized to the tourism-related industries relatively smoothly as these industries have low entry barriers and require limited skill sets. At the demand side, the tourism-related industries are primarily filled with temporary positions, which are relatively low-wage; thus these industries could make a large "stretch" in absorbing high-quality talents without resulting in a heavy fixed cost burden during the general downturn of the regional economy. Because the I-O model does not account for the tourism-related

industries' ability in absorbing surplus labor, it overemphasizes the crisis's negative effects on the employment of these industries.

Interestingly, the "professional-scientific & technological" sector, which experienced a large increase in its output, slashed moderately 100 jobs (see Table 4). The opposite direction of the output and employment change indicated that the productivity and efficiency of this sector were enhanced during the downturn. Being capital intensive, this sector highly depended on capital assets rather than labor, and employment reduction tended to become the first cost-cut strategy. However, in the macroeconomic perspective of perhaps local government officials, this did little to help create employment and curb rising unemployment. Fortunately, the tourism-related industries exhibited a complimentarily high versatility in absorbing excessive labor force in the area.

Study and Implications

This study bears meaningful implications for tourism professionals, policy makers and researchers. First, it empirically demonstrates the I-O model's tendency in overestimating negative impacts, and makes explorative explanations in a case scenario. Though much research papers have theoretically argued the I-O model's limitation, rarely does one explain them in a concrete scenario. In this study, one possible explanation for the I-O overestimation is its static nature: its inability to consider the economic resilience of the tourism industry in Orlando: the positive feedback effects of the optimistic investment atmosphere and the area's crisis management and labor mobility. This study also reveals the model's limitation as an expenditure-based model, which is not able to incorporate the effects from unchanged visitor numbers, which appear to have more effect over changes in number of local employment.

Second, this study serves as a reminder for tourism professionals and policy makers to reconsider the validity of the estimation results from not only the I-O model, but all other economic

models, before they make any decisive decision based on modeling simulations. Indeed, conceptual models, no matter how sophisticated or complex, are not able to include all variables in the real world and to avoid making assumptions. While accuracy is an important criterion for selecting a model for impact analysis, other factors such as time, cost, and situational characteristics also need to be taken into consideration. Although the I-O model may display the propensity to overestimate negative impacts, it is argued that the model is a more effective tool for researchers and policy makers to quickly grasp the impact magnitude, especially in a disaster or crisis where estimation is more pressing and time-sensitive (Mantell, as cited in Okuyama, 2007). To have more precise estimation results, some suggested that a combination of impact modeling could be used. I-O model can be used to establish the upper-bound limit, while its more sophisticated extension CGE model can be employed to determine the lower-bound limit (Okuyama, 2007).

To account for some complexities associated with a crisis (e.g. economic resilience), some ad-hoc improvements had been made on the I-O model and its extension CGE model in the risk management literature. For example, Rose & Liao (2005) successfully operationalized an industry's inherent and adaptive resilience in the CGE analysis and illustrated its application in a case scenario of water service disruption. To capture the temporal nature of industry impact pursuant to a crisis, the Dynamic Inoperability I-O model was proposed and applied to estimate the cascading impacts in both short and long terms (Santos, 2006; Santos, Orsi, & Bond, 2009). The inoperability matrix of the I-O model captured the dysfunction of an industry induced by a negative shock, while the dynamic extension described the trajectory of the negative impact over a period of time (Santos, Orsi, & Bond, 2009). While these modified models can provide more sophisticated estimation and more precise results, they require more time and resources, which might not be allowed for quick decisions in a crisis.

Third, this study demonstrates effective strategies for a tourism-dependent regional economy to fend off the negative impact of the general economic crisis, including continuous supports with tourism funding, active marketing campaigns, and regular communications between related government official and tourism professionals.

Last, but not the least, the observation of how different industrial sectors responded to the apparent negative shock in term of employment might have revealed an intriguing argument regarding the under-recognized resilience and flexibility of the tourism-related sectors in economic downturn. The tourism industry is known to be labor-intensive with lower-barriers of entry, which appeared to provide greater flexibility in absorbing surplus labor force in recession than the capital intensive industries such as the "professional-scientific and technological" sector. It illustrates that the tourism industries can help a regional economy maintain stability of a local job market aimd a turbulent economic time.

There are several limitations for this study. First, this study mainly uses secondary data for the model simulation, and the validity of these data is assumed. Second, this study makes logical assumptions in explaining the large discrepancies between the estimation results and actual data. However, these explanations might not fully account for the entire discrepancies, and their casual relations need to be validated by further research. Third, this study focuses on the one-year period between 2007 and 2008 to explore the accuracy issue of the I-O model. Further research should investigate how the progression of the economic recession impacts a local tourism industry and economy system by examining a longer time span. Another direction for future research is to conduct a field-based research to understand the labor mobility among industries during the economic downturn period. Lastly, this study might be replicated using the Computable General Equilibrium (CGE) model, because the CGE model is able to set discretionary constrains on various

exogenous factors such as the industry's resilience, price change, and sector labor distribution as mentioned in this study. It would be appealing to find whether the CGE simulation results will be closer to the real numbers by manipulating these exogenous variables to reflect reality better, as long as those constraints imposed at researchers' discretion should always be stated explicitly, as are the cases with applied economics and regional science disciplines.

References

Archer, B. (1995). Importance of tourism for the economy of Bermuda. *Annals of Tourism Research, 22*(4), 918-930.

Archer, B., & Fletcher, J. (1996). The economic impact of tourism in the Seychelles. *Annals of Tourism Research, 23*(1), 32-47.

BEA, US Bureau of. Economic Analysis (2011a). Percent change from preceding period in real gross domestic product. Retrieved December 2011 from BEA Interactive Database on National GDP & Personal Income.

BEA, US Bureau of. Economic Analysis (2012). Travel and tourism spending increased in the fourth quarter of 2011. Retrieved June 2012 from http://www.bea.gov/newsreleases/industry/tourism/2012/tour112.htm.

BEA, US Bureau of. Economic Analysis (2011b). GDP by Metropolitan Area: Orlando-Kissimmee, FL (MSA). Retrieved December 2011 from BEA Interactive Database on Regional GDP & Personal Income.

Bevil, D. (2010, March). Potter theme park to open in June: Universal Orlando adding $200M Wizarding World. *Chicago Tribune*. Retrieved January 2012 from Proquest Database.

Blake, A. (2009). The dynamics of tourism's economic impact. *Tourism Economics*, 15 (3), 615-628.

Briassoulis, H. (1991). Methodological issues: tourism input-output analysis. *Annals of Tourism Research, 18*, 485-495.

Centers for Disease Control and Prevention (2010). The 2009 H1N1 pandemic: summary highlights, April 2009-April 2010. Retrieved January 2012 from http://www.cdc.gov/h1n1flu/cdcresponse.htm.

Dwyer, L., Forsyth, P., & Spurr, R. (2004). Evaluating tourism's economic effects: new and old approaches. *Tourism Management,* 5, 307-317.

Fletcher, J. E. (1989). Input-output analysis and tourism impact studies. *Annals of Tourism Research,* 16, 514-529.

Frechtling, D. C., & Horvath, E. (1999). Estimating the multiplier effects of tourism expenditures on a local economy through a regional input-output model. *Journal of Travel Research,* 37, 324-332.

Frechtling, D. C. (2006). An assessment of visitor expenditure methods and models. *Journal of Travel Research,* 45(1), 26-35.

Garcia, J. (2009, January). Lobbyists to share ideas on spending of tourism-tax dollars. *Orlando Sentinel.* Retrieved January 2012 from http://www.orlandosentinel.com/business/orl-touristtax1509jan15,0,1686826.story.

Gieszl, E. (2007, March). Aquatica SeaWorld, Orlando's third Park to Open March 2008. *Orlando Sentinel.* Retrieved January 2012 from http://www.ultimaterollercoaster.com/news/stories/20070305_01.shtml.

GOAA, Greater Orlando Aviation Authority (2010). Quick Facts Sheet-2010 Q4. Retrieved December 2011 from http://www.orlandoairports.net/statistics/summary/quickfacts.pdf

Hara, T. (2004). Estimating the immediate effects of an unprecedented event of terrorism. *Advances in Hospitality and Leisure*, 1, 237-254.

Hara, T., & Naipaul, S. (2008). Agritourism as a catalyst for improving the quality of the life in rural regions: a study from a developed country. *Journal of Quality Assurance in Hospitality & Tourism,* 9(1), 1-33.

Hara, T. (2008). Input-Output model and its application. In *Quantitative Tourism Industry Analysis: Introduction to Input-Output, Social Accounting Matrix Modeling and Tourism Satellite Accounts* (1st ed., pp.39-107). Oxford, UK: Elsevier.

Heng, T., & Low, L. (1990). Economic impact of tourism in Singapore. *Annals of Tourism Research,* 17, 246-269.

Hudson, K. (2010, January). Don't use the R-word: hotels find trick to business bookings *The Wall Street Journal.* Retrieved December 2011 from http://online.wsj.com/article/SB10001424052748703822404575019212570293060.html.

Kock, G., Breiter, D., Hara, T., & DiPietro, R. B. (2008). Proposing a regional impact based feasibility studies framework for convention centers: A qualitative analysis of the Orange County Convention Center. *Journal of Convention & Event Tourism,* 9(4), 309-340.

Lee, C., & Taylor, T. (2005). Critical reflections on the economic impact assessment of a mega-event: the case of 2002 FIFA World Cup. *Tourism Management, 26*, 595-603.

Mazumber, M., Ahmed, E., Murad, W., & Al-Amin, A. (2011). Identifying economically potential inbound markets for Malaysian tourism industry. *Journal of Vacation Marketing*, 17 (1), 31-50.

MOEDC, Metro Orlando Economic Development Commission. (2011). Metro Orlando (MSA) demographics and statistics. Retrieved December 2011 from http://www.orlandoedc.com/core/fileparse.php/98882/urlt/metro%20orlando%20data%20sheet_single%20pages.pdf.

MOEDC, Metro Orlando Economic Development Commission (2010). Employment by industry 1990-2009. Orlando, FL: Metro Orlando Economic Development Commission.

NBER, National Bureau of. Economic Research. (2008, December). Determination of December 2007 peak in economic activity. Retrieved January 2012 from http://www.nber.org/cycles/dec2008.html.

Okuyama, Y. (2007): Economic modeling for disaster impact analysis: Past, present, and future. *Economic Systems Research*, 19 (2), 115-124.

Orlando CVB, Orlando/Orange County Convention and Visitor Bureau (2008a). *The 2007 Annual Report. Orlando*, FL: Market Research & Insights Department.

Orlando CVB, Orlando/ Orange County. Convention & Visitor Bureau. (2008b). *The 2008 Annual Budget*. Orlando, FL: Market Research & Insights Department.

Orlando CVB, Orlando/Orange County Convention and Visitor Bureau (2009a). *The 2008 Domestic Leisure Visitor Profile* .Orlando, FL: Market Research & Insights Department.

Orlando CVB, Orlando/Orange County Convention and Visitor Bureau (2009b). *The 2008 Domestic Group Meeting Visitor Profile*. Orlando, FL: Market Research & Insights Department.

Orlando CVB, Orlando/Orange County Convention and Visitor Bureau (2009c). *The 2008 Overseas Visitor Profile. Orlando*, FL: Market Research & Insights Department.

Orlando CVB, Orlando/ Orange County. Convention & Visitor Bureau (2010a). *Lodging Statistics-Accommodation History*. Orlando, FL: Market Research & Insights Department.

Orlando CVB, Orlando/ Orange County. Convention & Visitor Bureau (2010b). *Market Summary: Attraction Attendance*. Orlando, FL: Market Research & Insights Department.

Orlando CVB, Orlando/ Orange County. Convention & Visitor Bureau (2010c). *Market Summary: Resort Tax*. Orlando, FL: Market Research & Insights Department.

Powers, S. (2009, January). Park deal to draw visitors. *Orlando Sentinel*. Retrieved December 2011 from http://articles.orlandosentinel.com/2009-01-12/business/parks12_1_seaworld-orlando-walt-disney-disney-hollywood-studios.

Ritchie, B., Molinar, C., & Frechtling, D. (2010). Impacts of the world recession and economic crisis on tourism: North America. *Journal of Travel Research, 49*(1), 5-15.

Roger, V. (2009, April). 'AIG effect' hits resorts, hotels: Companies cutting back on conferences in wake of reaction to insurance company's $443,000 junket after federal bailout. *Chicago Tribune*. Retrieved on January 2012 from Proquest Database.

Rose, A. & Liao, S. Y. (2005). Modeling regional economic resilience to disasters: A computable general equilibrium analysis of water service disruptions. *Journal of Regional Science*, 45 (1), 75–112.

Santos, J. R. (2006). Inoperability Input-Output Modelling of disruptions to interdependent economic systems. *Systems Engineering*, 9 (1), 20-34.

Santos, J. R., Orsi, M. J., & Bond, E. J. (2009). Pandemic recovery analysis using the Dynamic Inoperability Input-Output Model. *Risk Analysis*, 29 (12), 1743-1758.

Skolnik, S. (2009, Feburary). Mayor 'hot' over Obama's remarks backtracks on apology demand. *The Las Vegas Sun*, Retrieved December 2011 from http://www.lasvegassun.com/news/2009/feb/10/las-vegas-mayor-says-obama-owes-city-an-apology/.

Smeral, E. (2009). The impact of the financial and economic crisis on European tourism. *Journal of Travel Research, 48*(1), 3-13.

Song, H., & Lin, S. (2010). Impacts of the financial and economic crisis on tourism in Asia. *Journal of Travel Research, 49*(1), 16-30.

Sugiyarto, G., Blake, A., & Sinclair, M. (2003). Tourism and globalization: economic impact in Indonesia. *Annals of Tourism Research, 30*(3), 683-701.

The Walt Disney Company (2007, March). Four Seasons to Anchor New Disney Luxury Resort-Four Seasons to Anchor New Disney Luxury Resort. Retrieved January 2012 from http://mousepad.mouseplanet.com/showthread.php?67440-Four-Seasons-to-Anchor-New-Disney-Luxury-Resort-WDW-Press-Release.

Thomas, M., & Bautista, R. M. (1999). A 1991 social accounting matrix (SAM) for Zimbabwe (Discussion Paper No.36) Retrieved March 2012 from International Food Policy Research Institute: http://www.ifpri.org/sites/default/files/publications/tmdp36.pdf.

Waldorf Astoria Orlando (2008, May). The Waldorf Astoria Orlando and Hilton Orlando Bonnet Creek 'top out'- Landmark anticipates October 1, 2009. Retrieved December 2011 from http://www.waldorfastoriaorlando.com/archived-press-releases/05222008.

West, G. R. (1995). Comparison of input-output, input-outpt + econometric and computable general equilibrium impact models at the regional level. *Economic Systems Research, 7*(2), 209-227.

West, G. R., & Gamage, A. (2001). Macro effects of tourism in Victoria, Australia: a nonlinear input-output approach. *Journal of Travel Research, 38*(2), 101-109.

Wiedmann, T. (2009). A review of recent multi-region input-output models used for consumption-based emission and resource accounting. *Ecological Economics*, 69, 211-222.

Yang, H., & Chen, K. (2009). A general equilibrium analysis of the economic impact of a tourism crisis: a case study of the SARS epidemic in Taiwan. *Journal of Policy Research in Tourism, Leisure and Events, 1*(1), 37-60.

Zhou, D., Yanagida, J. F., Chakravorty, U., & Leung, P. (1997). Estimating economic impacts from tourism. *Annals of Tourism Research, 24*(1), 76-89.