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QUANTIFYING THE IMPACTS OF THE 2007 ECONOMIC CRISIS ON A LOCAL
TOURISM INDUSTRY AND REGIONAL ECONOMY

by

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B.S. Ji Nan University, 2005

A thesis submitted in partial fulfillment of the requirements
for the degree of Master Science in Tourism Hospitality Management
in The Rosen College of Hospitality Management
at the University of Central Florida
Orlando, Florida

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ABSTRACT

The purpose of the study is to explore the accuracy of the Input-Output model and its derivative, the Occupation-Based model in investigating the impacts of the 2007 economic crisis on the tourism-related industries and the local economy in the Metro Orlando Area, Florida. The 2007-2008 total visitor expenditure change is taken as an initial shock from the economic crisis on the region's tourism-related industries, and the total impacts are measured in terms of industry output (sales), employment and annual occupational wage. The estimation results are compared with the actual data to verify the accuracy of the modeling results. Paired-sample T tests are performed to determine whether the difference between the actual and estimated results are statistically significant or not.

The findings suggest that the Input-Output model tends to overestimate the negative effects from the 2007 economic crisis in terms of output and employment, especially on the tourism-related industries. While the estimation results indicate the 2007 economic crisis greatly damaged the local tourism-related industries between 2007 and 2008, the actual data show that most of these industries experienced output and employment growth in that one year period. Moreover, the study findings also indicate that the Occupation-Based model has the tendency of overestimating the annual wage loss, especially for the occupations which take up large employment ratio in an industry. By investigating the local economic activities during the study period, this study made some explorative efforts in explaining such discrepancies. Theoretical and practical implications are then suggested

For my families who love me dearly

ACKNOWLEDGMENTS

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CHAPTER ONE: INTRODUCTION

As the National Bureau of Economic Research announced, in December 2007 the US economic recession emerged from the burst of the housing market bubble, ending a 73-month economic expansion period (NBER, 2008). In September 2008, the recession took a dramatic dive to a crisis as the major financial institutions of Lehman Brothers and American Insurance Group faltered unexpectedly. Soon, the originally mild recession spread throughout the world and became a "global and all-encompassing" economic crisis (Smeral, 2009, p3).

During this downturn period, the news, concerning the AIG executive's retreat in a luxury resort shortly after its receipt of a $ 85 billion "bail-out" in taxpayer money, attracted extensive publicity and public rage (Whoriskey, 2009). This incident induced the US government's rhetoric discouraging corporations and executives to make unnecessary travel or extravagant trips (Skolnik, 2009). Some hotels even dropped the very word of "resort" from their names to contend with the public backlash against corporate luxury travel (Hudson, 2010).

Research Gaps

Against such a background, the US tourism industry has been severely affected. Although there is some research investigating the impacts of the current crisis on tourism industry, all are discussed at the national level (Ritchie, Molinar & Fretchling, 2010; Semera, 2009; Song & Lin, 2010). So far, there is rarely a study quantifying the effects on the tourism industry from the crisis at a local level, where immediate decision making often required assessment of the economic impact of the region. The lack of quantified estimations on the damages experienced

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by the local tourism industry could pose daunting challenges for its industry professionals and related government agencies in coping with the current unfavorable circumstances. It is especially true when considering these two entities need to provide justifications when soliciting public resources or general business support for boosting tourism (Jones & Munday, 2004; Tyrrell & Johnston, 2006).

Facing the aforementioned challenges, the Input-Output Model (thereafter the I-O model)can be a useful tool for local tourism industry decision makers in estimating the impacts of the current economic crisis. In tourism literature, the I-O model has been extensively used to estimate the economic contributions of the industry, and it is also applied to estimate the impacts of the external events on tourism industry and local economy. These may include such things as new policies, facility constructions and even terrorist attacks (Fletcher, 1989; Hara, 2004; Kock, Breiter, Hara, &DiPietro, 2008).Also, for a local tourism destination, the application of the I-O model seems to be more practical, as it is generally less costly to construct than some more sophisticated models (Dwyer, Forsyth, & Spurr, 2004).However, most impact studies utilizing the I-O model does not compare the estimation results with the actual data to verify the prediction accuracy. The lack of modeling validation not only results in some researchers' skepticism, but also may lend to a serious leading in policy making.

More recently, the Occupation-Based model was proposed as a derivative of the I-O model by Daniels (2004). The model is able to extend the I-O employment estimate to project the wage change by occupations of various industries due to a final demand shift. The model has been demonstrated in assessing the economic impacts of local sport events in term of occupational wage, and their results generally suggested that the events brought additional

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employment and total wage increase for various host residents (Daniels, 2004; Daniels, Norman & Henry, 2004). Unfortunately, so far there is a lack of research further validating the model's prediction accuracy and its applicability in a negative context such as the current economic crisis.

Research Objectives and Questions

This study is an exploratory effort in examining the accuracy issue of the I-O model and the Occupation-Based model by comparing the calculated results with the actual data. A case study approach is adopted, and the two models are applied to quantify the current economic crisis's impacts on the tourism industry and related ripple effects on other industries in the Metro Orlando area, Florida. The total visitor expenditure change between 2007 and 2008 is taken as an initial shock from the economic crisis on the tourism industry, and the total impacts are measured in terms of industry output (defined as sales value in an industry), employment and occupational income. The paper intends to answer the following three questions:

1. How do the total visitor expenditure changes impact the industry output and employment in the local economy?

2. How do the total visitor expenditure changes impact the occupational wage in the local economy?

3. How accurate are the model simulation results as compared to the actual data? What does it imply?

Organization of the Study

The remainder of the paper is structured as follows. Chapter Two is a literature review on three regards: (1) the research background: the development of the 2007 financial/economic crisis and its impacts on national tourism industry; (2) A thorough review of the research on the impacts of current and prior economic/financial crises in the context of tourism; (3) A discussion of the theoretical frameworks: the I-O model and the Occupation Based I-O model. Chapter Three explains the research methodology and data collection. Chapter Four presents the modeling and comparison results, and lastly Chapter Five further discusses the study findings, explains the implications of the results, and suggests future research directions.

CHAPTER TWO: LITERATURE REVIEW

Part One

Introduction

This chapter contains thorough literature reviews on three main topics. The following second section is to delineate the progression path of the current US economic crisis and its impacts on the tourism industry at the national level. Then, the third section is to survey the existing literature on the impacts of both the current and prior economic crises in the context of tourism. Identifying that there is scare research in quantifying the all compassing impacts of economic crises, especially at the local level, this study proposes that the I-O model and the Occupation-Based model could be two useful tools. Thus, the fourth section is to describe the conceptualization of the two models. As the Occupation-Based model is a derivative of the I-O model, and shares its ancestor's limitations, thus the thereafter section concentrates on the discussion of the latter model in its computation, assumptions/strength/weakness and application in tourism impact analysis.

The Current US Economic Crisis

The Chronology of the U.S. Economic Crisis

The recent economic crisis resulted in such profound impacts to the globe that the

International Monetary Fund called it "the deepest post-World-War II recession" (IMF, 2009,

p.xii). According to the April 2009 IMF report, the current economic crisis reduced the global

real GDP from 5.2% in 2007 to 3.2% in 2008and to the projected negative 1.3% in 2009. The

advanced economies suffered badly, with their growth in real GDP shrinking from 2.7% in 2007

to 0.9% in 2008 and being expected to slide into negative 3.8%in 2009. The upward course of

the emerging economies was also disrupted, down from 8.3% in real GDP growth in 2007 to 6.1%

in 2008 to the projected 1.6% in 2009.

However, this broad economic crisis was originated from the US stumbling housing and

financial markets. The US last economic boom is fueled with low interest rate, rapid credit

expansion and rising house price. The housing market was stimulated buoyantly by the low

interest and easily available credits. As seen in Figure 1, the US housing price kept along-term

upward trend through 2001 to 2006. Despite that real estate market started to decelerate in 2006,

it still remained growing until the third quarter of 2007. During the housing market boom, banks

and financial institutions made more aggressive lending, often to the subprime customers, who

were previously excluded due to their shaky financial situation. Innovative and complex

financial instruments related to subprime mortgages and real estate-backed securities were

created and traded among banks and financial investors, betting on the promising housing market

outlook. The stock market was boosted by strong market confidence and positive economic projection (Barrell& Davis, 2008).

However, since the third quarter of 2006, home loan delinquency and foreclosure start to mount. According to the Mortgage Banker Association's National Delinquency Survey, the seasonally-adjusted delinquency rate for mortgage loans on one-to-four residential properties were 4.67%, up 28 basic points from its previous quarter, and reached to 9.64% in the third quarter of 2009, the highest record rate dating back to 1972. The percentage of loans in the process of foreclosure was up from 1.05% in the third quarter of 2006 to 4.47% in the third quarter of 2009, an increase of 342 basic points (MBA, 2006, 2009). The surging delinquency and foreclosure rate were notably in subprime loans. In its January 2010 Mortgage Monitor Report, the Lender Processing Services Inc., observed that the subprime mortgage had a far steeper slope than other types of mortgage in the delinquency rate. At the beginning of 2007, the subprime loan delinquency embarked on an upward course and rapid reached at a rate higher than 35% in December 2009 (LPS, 2010)

The subprime crisis started to crash the decelerating real estate market, which can be attributed to increasing interest rate and rising inventories of unsold home (MBA, 2006). As Figure 1 shows, the US seasonally-adjusted purchase-only house price index experienced its first negative growth rate of 0.88% in the third quarter of 2007. Since then, each quarter had seen continuous price drop from its previous quarter. In the fourth quarter of 2008, the index had the largest drop of 2.88% from its previous quarter, and a decrease of 8.27% from the same period of last year (FHFA, 2010).
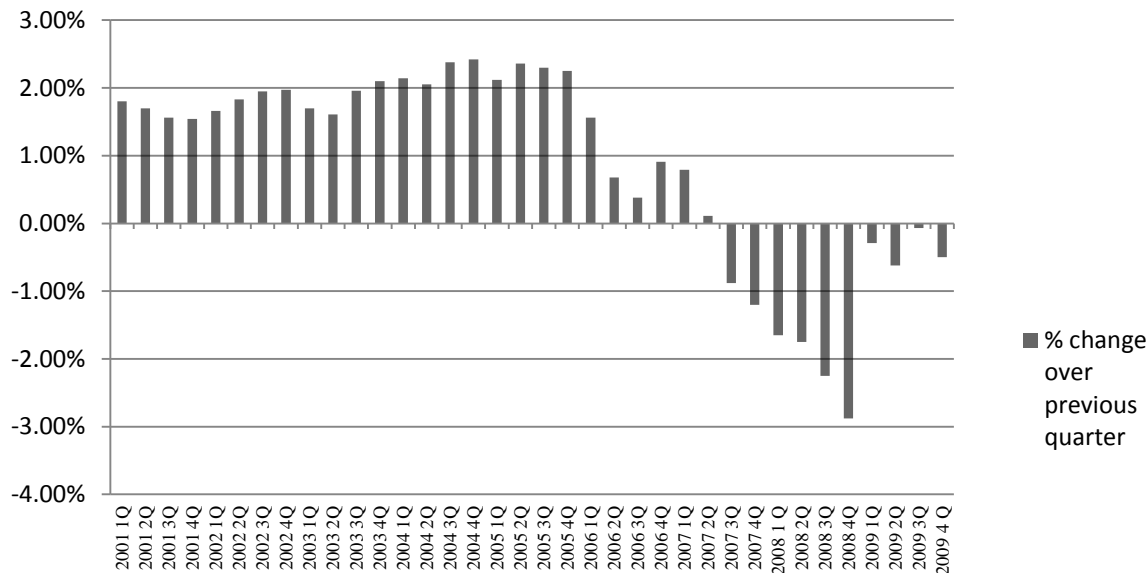
Source: The Federal Housing Finance Agency (2010), graphic made by author.

Figure 1: Seasonally adjusted percentage change in housing price over quarter 2001-2009

The soaring loan defaults and deflating house value led to substantial bank asset write-down and deterioration of real estate-back financial instruments, which, as a result, severely affected the liquidity of banks and financial institutions. The plummeting housing market and emerging credit crunch exerted a downward pressure on stock market, consumer and business confidence and eventually the economic performance. In order to break this vicious cycle, the government undertook various monetary and fiscal policies. To rescue the cash-strapped financial system, the Federal Reserve pumped $ 24 billion and another $ 38 billion into the system in August 9 and 10, 2007 (CBS News, 2009). Meanwhile, the Reserve aggressively lowered its interest rate by 1% in the last four months of 2007 and by 2.25% in the first four months of 2008 (NBER, 2010). In January 2008, the Congress and the administration consented on a stimulus package, which would put $ 150 billion into the hands of consumers and business (Timeline of a crisis, 2008).

Despite of the great efforts of the US government, the financial crisis was worsened into an economic crisis with the enormous shocks from the unexpected collapse of some of the nation's largest banks. In September 7, 2008, the government announced to take control of the two troubled mortgaged giants, Freddie Mac and Fannie, Mae, which held half of the nation's Mortgage loans of $ 10 trillion. In September 14, 2008, Lehman Brothers filed for Chapter 11 bankruptcy after reporting a $4 billion loss. In a wake, Bank of America acquired Merrill Lynch in a $ 50 billion transaction in September 15, and the government announced to bail out the American International Group in September 16, concerning the fall of its largest insurance bank would become a breaking-point of the already-delicate financial system. In September 25, Washington Mutual was sold to the J.P Morgan Chase for 1.9 billion (CBS News, 2009, CNBC News, n.d.).

The shakeup of the financial industry drew the public to seriously doubt the bank's solvency and provoked a confidence crisis. As the situation deteriorated rapidly, the government stepped up to take unprecedented actions to prevent the economy from a freefall. Between October and December 2008, the Federal Reserve cut its interest rate dramatically down to 0.25% to 0. It also sought to bring down the long-term interest rate by massive asset-purchasing. In March 2009, the Reserve announced its plan to purchase up to $ 500 billion of the long-term Treasury debts and debts of the Government Sponsored banks, including the Fannie Mae, Freddie Mac and Federal Home Loan Banks.

The Administration, on the other side, rapidly hammered out and executed the Emergency Economic Stabilization Act in October 2008, which provided up to $700 billion for the Trouble Asset Relief Program (TARP) to rescue the distressed financial sector and later the

faltering national automobile industry. In February 2009, the Administration announced the Financial Stability Plan, a key part of which was to require the nation's 19 largest financial institutions to carry out a "stress test". The purpose of the test is to assess the institutions' capital needs should the economic and financial situations worsen further. In order to jolt consumer spending and economic activities, the Administration also approved the American Recovery and Reinvestment Act in February 2009, which was intended to boost government spending and provide tax cut at an estimated cost of $787 billion. The Recovery Act also attempted to lift up the housing by providing $8000 first-time home owner credit for home purchase made by December1, 2009 (NBER, 2010).

Even with the unprecedented actions from the government, the stalling credit market and confidence crisis had made a broad and profound damage on the nation's production activities and employment opportunities. The nation's real GDP started to enter a downward trend since the third quarter of 2007. In the first quarter of 2008, the real GDP experienced its first negative growth rate of 0.7%, but soon it dipped sharply into the bottom of negative 5.4% and negative 6.4% in the fourth quarter of 2008 and the first quarter of 2009 respectively (as shown in Figure 2). Corresponding to the significant drop of the GDP in the first quarter of 2009, the gross private domestic investment, as one key component of the real GDP, also reached its trough of negative 50.5% respectively in this period, This was the seventh consecutive decline for the domestic investment since the fourth quarter of 2007 (BEA, 2010a).
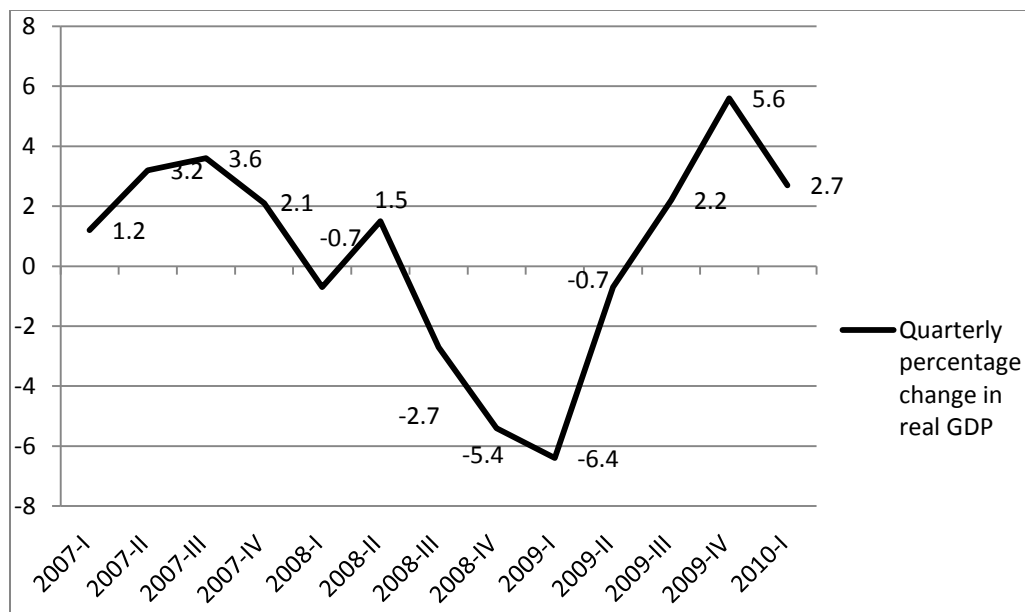
Source: BEA (2010a). National Income and Production Accounts Table 1.1.1; Graphic made by author.
Figure 2: Quarterly percentage change in real GDP (seasonally adjusted at annual rates)

Increasing job loss is another indicator for the suffering economy. As Figure 3 shows, the

nation experienced continuous job loss since January of 2008. The Americans lost a total of 3,

623,000 jobs in 2008, and even more in 2009, with 4,740,000 cases. Between 2008 and 2009, the

nation reduced employment on the average of 348,000 jobs per month. Between the peak of last

four month of 2008 and the first month of 2009, the job loss averaged at 638,400 (BLS, 2010a).

This was "the highest level of job loss since the demobilization at the end of World War II", as

stated in the Economic Report of the President (NBER, 2010, P.6). In October 2009, the national

unemployment topped at 10.1%, as compared to the 5.0% in December 2007, the beginning of

the crisis.
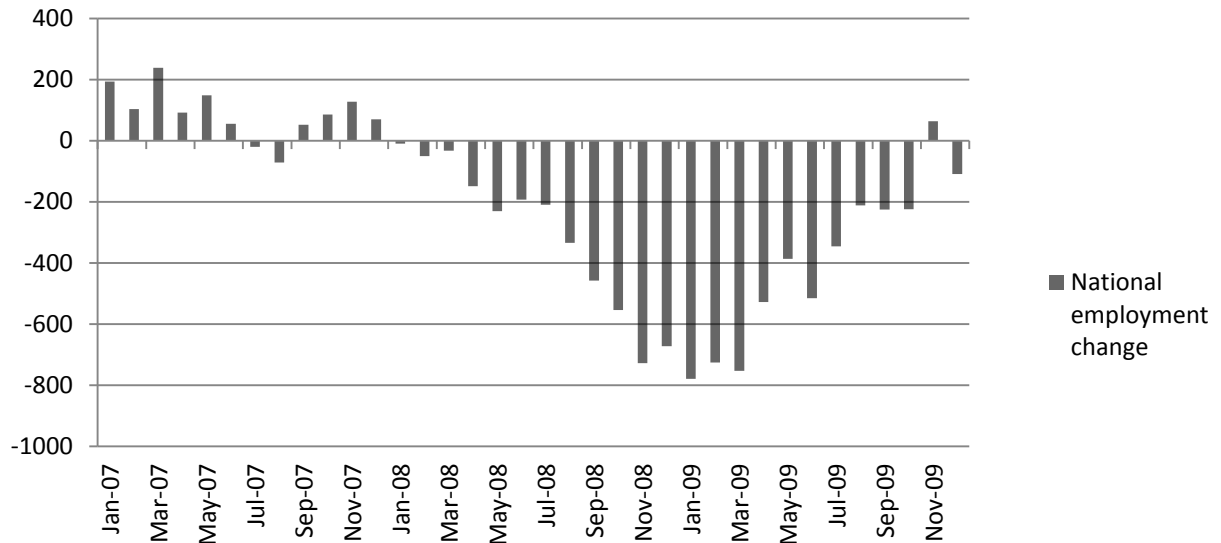
Source: BLS, (2010a). Current Employment Statistic Survey, CES0000000001; Graphic made by the author.
Figure 3: National total non-farm seasonally adjusted employment change

Falling home value, deteriorating stock market and darkening job market inevitably restrained consumers from personal consumption. According to the 2010 National Income and Production Accounts (as illustrated in Figure 4), overall, the personal consumption expenditures (PCE) went downward between first quarter of 2007 and the last quarter of 2008. With the stimulus of the American Recovery Act, the PCE started to pick up in the first quarter of 2009, but the recovery road was bumpy. At the end of 2009, it still could not reach to the same level as the beginning of 2007.
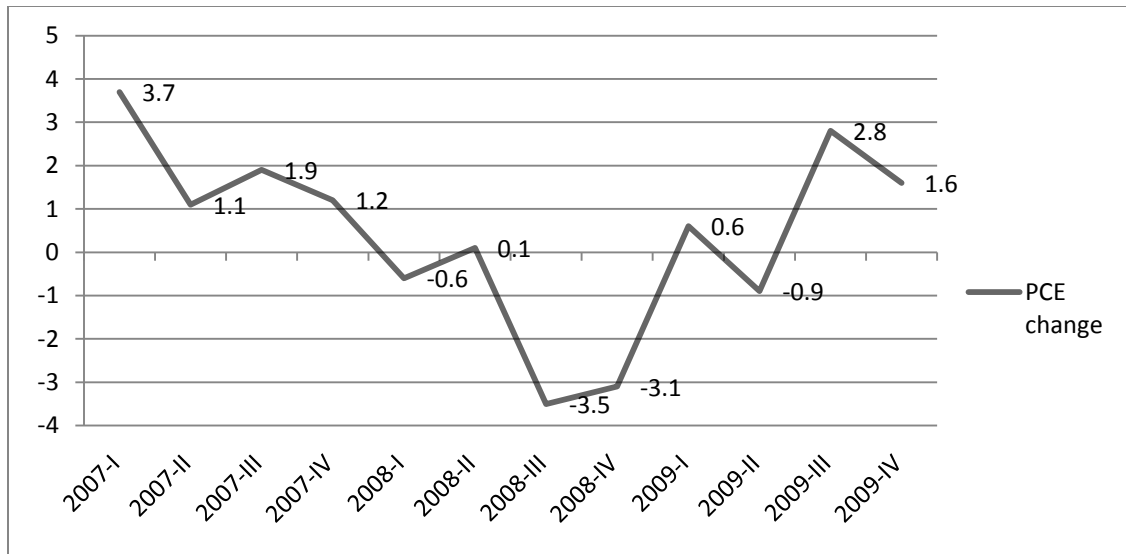
Source: BEA (2010a).National Income and Production Accounts Table 1.1.1; Graphic made by author.
Figure 4: Seasonally adjusted personal consumption expenditures percentage change

The National Travel and Tourism Industry in the Current Crisis

As consumers were experiencing financial tight and uncertain about future earning prospect, they would tend to incur more saving or concentrate their spending on the necessities while delay or forego leisure activities, luxury products and durable goods (Smeral, 2010). The US travel and tourism industry, thus, was slammed harshly in this crisis.

The real tourism demand, which is defined as "all goods and services purchased by tourists", started to experience a sharp drop of 5.1% at the fourth quarter of 2007, as compared to a positive growth of 2.1% in GDP (BEA, 2010b). The tourism output fell severely at the rate of 8.6%, 7.6% and 8.9% in the third and fourth quarters of 2008 and the first quarter of 2009 respectively. During these periods, the US GDP was also sliding, but at a much lower rate of 2.7%, 5.4% and 6.4% correspondingly. Although the travel and tourism industry saw increasing output in the first two quarters of 2008 and the second and third quarters of 2009, these

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recoveries were short-lived and mainly reflected the positive but temporary effects of the

government policies in those periods of time. In the fourth quarter of 2009, the tourism output

declined again at a rate of 1.5% while the GDP was growing (see Figure 5).

As the industry was experiencing decreasing output, jobs were slashed. Starting from the

second quarter of 2008, the industry underwent seventh consecutive quarters of employment

drop. This was the first continuous job-loss period since the year of 2003. In the second quarter

of 2009, the employment decline reached its trough of negative 7.5%, which translated to

163,700 cases of tourism-related job loss (BEA, 2010b). Even though the pace of job loss was

decelerating in the quarters afterwards, it still did not climb back to the level of positive growth

(See Figure 6). The continuous job slashing in the industry, undoubtfully, would put a heavy

burden on the government for providing unemployment benefits.
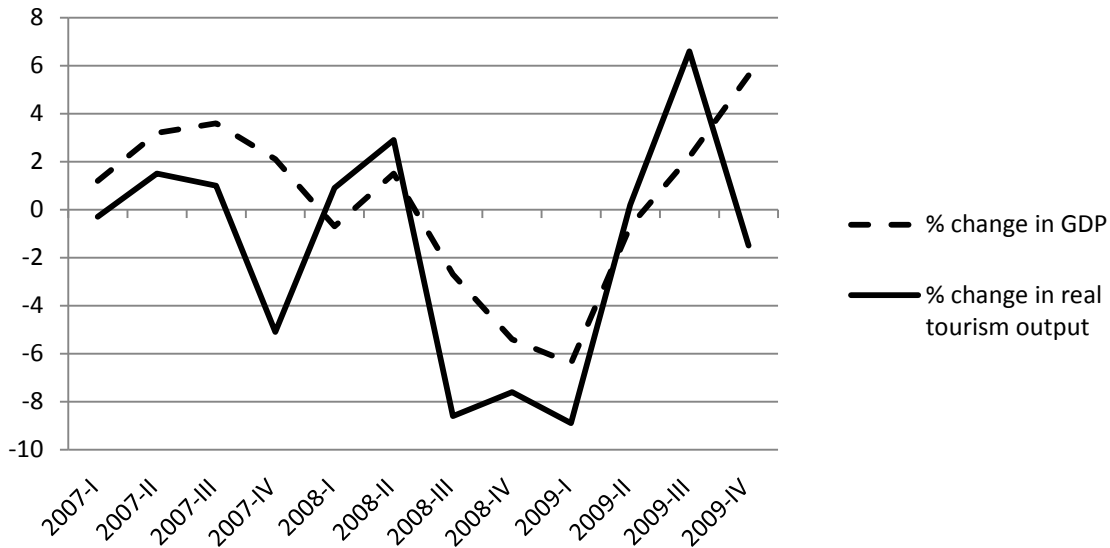
Source: BEA (2010 a, b), National Income and Production Accounts Table 1.1.1;   U.S. Travel and Tourism Satellite Accounts; Graphic made by the author.

Figure 5: Quarterly percentage change in GDP and real tourism output
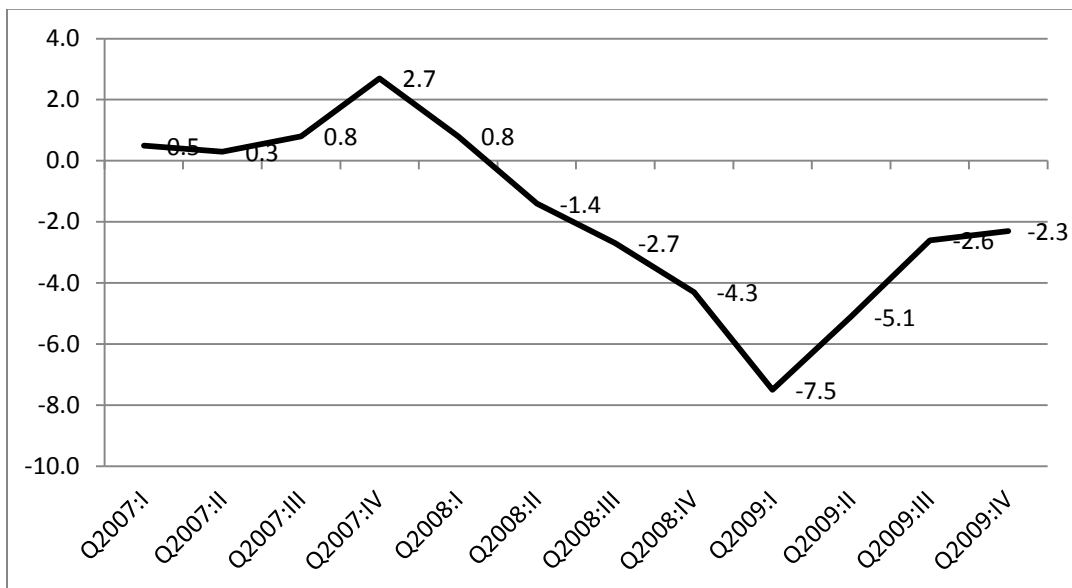
Source: BEA (2010b), the U.S. Travel and Tourism Satellite Accounts; Graphic made by the author.

Figure 6: Quarterly percentage change of total tourism related employment

Literature on the Tourism Impact of Economic Crisis

The Impacts of Current Economic Crisis on Tourism

Although the current economic crisis has attracted much attention from government bodies, media agencies and business schools, there is scarce research on its impacts in the context of tourism industry; and all of the research is devoted to the investigations at the national level (Ritchie, Molinar & Fretchling, 2010; Semera, 2009; Song & Lin, 2010).

In a recent study, Ritchie and his colleagues (2010) compiled available statistics from various sources, and documented the current and evolving status of the tourism industry during this difficult economic time in the three countries of the North America: Canada, US, and Mexico. Their examination revealed that the tourism of the three countries had been unevenly affected by the current unfavorable circumstance, with Mexico appearing to be the most resilient. The researchers also put the examination into a historic perspective; and they found that the US tourism experienced a milder damage from the current crisis than it did from the 9/11 terrorist attack, while the Mexican tourism was affected to a less extent than it was in the past natural disasters.

Besides the countries in the North America, Other countries in Europe and Asia were also investigated with respect to the effects of the current crisis on tourism industry. These studies mainly concentrate on tourism demand modeling and forecasting. Examining the current economic crisis in the EU 15 countries, Semeral (2009) focused on predicting the demand for international travel of these countries in 2009 and 2010 (tourism import) The researcher

identified and incorporated the explanatory factors of disposal income, relative prices, habits and dummy for special developments in an econometric model, and projected that the countries, depending on their economic outlook, could experience a tourism demand decrease ranging from 8% to 15% in 2009 and from 0.5% to 8.4% in 2010. In the case of Asian countries, Song & Lin (2010) apply the autoregressive distributive lag model to forecast the tourist arrivals from the 12 major source markets to Asia and the expenditures of the Asian tourists to the 11 non-Asian countries. Their study suggests that 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 from Hong Kong and mainland China.

Besides tourism literature, the US Travel and Tourism Satellite Accounts (TTSA) also enable researchers and policy makers to track the US tourism activities in response to the current economic dynamic. Quarterly updated by the Bureau of Economic Analysis, the TTSA is a national account, which documents the trends of the US nationwide visitor expenditures, tourism commodity price and total tourism-related output and employment (Griffith &Zemanek, 2009).

Although the value of this macro-perspective research is not disputable, it might be less informative to the local tourism professionals and decision makers. To make decisions and take measures in minimizing the damages from the economic crisis, the local tourism stakeholders need to understand the extent of the impacts specifically of their region. The research at the national level at most only serves as an information backgrounder to the local stakeholders, and is not able to provide specific directions. While the local convention and visitor bureaus may collect data and compile reports with a particular interest of their areas, these reports oftentimes only provide information on visitor expenditures and visitor profiles in a certain year, and do not

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necessarily make any reference to the ripple effects of the tourism expenditure change as ascribed to the current economic crisis, therefore, they only paint a partial picture. It is extremely important to measure the total effects of the crisis on tourism industry and the entire regional economy, as tourism stakeholders, especially the related government officials, oftentimes have to provide justifications when soliciting public resources to support tourism industry (Jones & Munday, 2004; Tyrrell & Johnston, 2006,).

The Impacts of Prior Economic Crisis on Tourism

In order to better understand the body of knowledge built on the impact of economic crisis on tourism, this study delves further into the literature regarding the prior economic/financial crisis. Most prior research is related to the 1997 Asian financial crisis and the 2001 Turkey's economic crisis. In general, these studies are devoted to two areas.

One area is concerned with crisis management (De Sausmarez, 2004; Henderson, 1999a, b; Prideaux, 1999; Okumus, Altinay, &Arasil,2005). One commonality of these studies is to evaluate the impacts of the crises and examine the coping strategies at both national and organizational levels. Their purpose is to build a bank of efficient crisis management strategies to deal with similar challenges in the future. For example, examining the 1997 Asian financial crisis, Prideaux (1999) reviewed the tourism-related responses from the East Asian countries, and concluded successful strategies include maintaining political stability, refocusing promotional priority, forging marketing collaboration, and gaining governmental support. Consent with Prideaux, Henderson (1999a) found that effective marketing campaigns and stable political environment are two main reasons for the tourism industry recovering more rapidly in

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Thailand than in Indonesia. At the organizational level, Henderson (1999b) focused on the attractions in Singapore, and found that they generally did not prepare any crisis management plan for the outburst of the Asian financial crisis. In the case of the 2001 Turkey's economic crisis, Okumus, Altnay&Arasil (2005) also found a lack of pre-crisis preparations in the government and accommodation sector of Cyprus. To investigate the feasibility of establishing a crisis management framework specifically for the tourism industry, De Sausmarez (2004) discovered that although tourism operators generally agreed upon the necessity of making a proactive plan, they were reluctant in contributing funds and disclosing business information.

Another main area the prior economic crisis literature concentrates on is the tourism demand forecasting (Goh& Law, 2002; Law, 2001; Song, Witt, & Li, 2003; Song, Wong, & Chon, 2003; Prideaux, Laws, &Faulkner, 2003). Most the studies are with regard to the application of various forecasting techniques in the context of the 1997 Asian financial crisis. Song, Witt & Li (2003) utilized the general-to-specific econometric modeling to identify the determinant factors for the Thai tourism demand from its seven major sourcing markets between 2001 and 2010. They found that the financial crisis exerted a significant impact on the arrivals from Singapore, Malaysia, Korea, and the UK. However, the direction and magnitude of influence were different for each of these impacted countries. Goh& Law (2002) also agreed that the Asian financial crisis was a major disruption for the tourist arrivals to HK from its ten primary origin countries from 1999 to 2000. They thus proposed two advanced time series methods (SARIMA and MARIMA with intervention analysis) to forecast the HK tourism demand, which appeared to experience stochastic seasonality and various interventions from 1980 to 1999. In order to uncover the most optimal technique to forecast tourism demand in a

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context of unexpected environmental change, Law (2001) employed seven frequently used forecasting methods to perform an ex-post estimation on Japanese arrivals to HK during 1997 and 1998. Comparing the modeling results with the officially published data, the researcher suggested that the artificial neural network model generally outperformed the others in term of forecast accuracy.

Despite researchers' attention on tourism demand forecast, the limitations of forecasting techniques in predicting the unforeseen and dynamic future has been noted. Heavily based on the historic performances, the forecasting methods, both econometric-based and time series are not able to quantify the initial sudden change during or immediately after an unprecedented event (Hara, 2004). Also, they have limited ability in generating long-term results which account for future unforeseen occurrences. Prideaux, Laws, & Faulkner (2002) thus proposed that the tourism forecasting should be synthesized with risk analysis, environmental scanning, and political audit.

Summary

A careful literature review on the tourism impacts of the current and prior economic crises reveals that the related research mainly focuses on the areas of crisis management and demand forecasting. Although these studies undoubtedly bring great insights, they do not pay specific attention to the linkage between tourism industry and other industries in an economy, and quantify the changes in series of multiple variables which are concurrently affected by an external event. In addition, there appears to be a lack of investigations at a local level. To investigate the economy-wide impacts from an external shock such as the current economic

crisis, the Input Output Model appears to be an appropriate tool (Hara, 2004). Besides, the

Occupation-Based model, an extended Input Output model, is also proposed as a promising

alternative to investigate the impacts on occupational income (Daniel, Norman & Henry 2004)

Part Four

Literature on the I-O model

The Conceptualization of the I-O model and the Occupation-Based model

The I-O model

The I-O model is a general equilibrium framework, which is able to quantify the

interdependency among various industries and households in an economy (Fletcher, 1989). That

is, in the context of tourism, the model is able to quantify the additional indirect and induced

effects from the tourism demand change due to the inter-industry consumption and employee's

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 by consumers, and it suggests that the change in final demand

will stimulate changes in the 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, of which the variables are represented in a matrix form(Hara, 2008).

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

where: ΔX is a Nx1 vector for gross output change; ΔY is a Nx1 vector for final demand change,

and $(I-A)^{-1}$ is known as the Leontief inverse matrix, which is a NxN matrix specifying the total

effects (multipliers for N industries) on an economy resulting from one unit 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 (Hara, 2008).

It is noteworthy that the multipliers in the Leontief inversed matrix are greater than one. This indicates that the output change will be greater than the initial demand change (Hara, 2008). The rationale behind it is simple. The boost in tourism demand can stimulate additional production activities in other industries, thus it leads to a greater total output (Dwyer, Forsyth, & Spurr, 2004). By the same token, it is expected that the total output will drop at a steeper slope than the decrease in the final demand. That is to say, if the visitor expenditures decreased in this study, it is reasonable to expect that the tourism-related and the rest of the economic system will experience greater magnitude of negative impacts than the direct shock

The I-O model in this study will include both productive sector and household sector. Thus, indirect impacts from the industry interdependency and induced impacts from household consumptions are considered in calculating the total impact of the 2007 economic crisis on a local tourism industry and economy.

The Occupation-Based Model

The Occupation-Based model is proposed by Daniels and her colleagues to estimate the distribution effects of a local sport tourism event on host resident's income as specifying by wage and occupations (Daniels, 2004, Daniels, Norman, & Henry, 2004). Extended from the employment estimate generated by the I-O model, the Occupation-Based model makes further inference of wage income effects by occupations ascribed to a final demand change. The equation for the Occupation-Based model is

$$W = E * R * A$$

Where: W=occupation-specific wage estimates attributed to a final demand change; A= average industry-occupation annual wage; R= employment ratio by industry occupations; E=employment estimate attributed to a final demand change (generated by the I-O modeling). The equation indicates that there is a linear relationship between an occupation's wage income and its corresponding employment change ascribed to a final demand shift.

One major merit of the Occupation-Based model is its ability to consider the short-term employment and occupational-wage impacts of an initial shock (Daniels, 2004; Daniels, Norman, & Henry, 2004). This is of particular significance in examining the impacts of transient tourism events. As the researchers reasoned, oftentimes, tourism events will lead to increasing employee overtime and hiring temporary helps, rather than incurring new hires. The employment estimates offered by the IO analysis was not sufficient to capture this aspect of reality, because they only measure the total amount of physical labor in a year to fulfill a final demand. Complementarily, the Occupation-Based model is able to realistically reflect the resulting change in man hours and associated income from an event. In addition, the Social Accounting Matrix, which is a more

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thorough method than the I-O model, can also assess the income distribution effects on households. However, it only examines the income allocations to households categorized by income level, rather by occupations and industries.

So far, there exist only two studies regarding the Occupation-Based model. Daniels (2004) proposed the model and illustrated its application in analyzing the impacts of a local youth softball tournament. Another study is conducted by Daniels, Norman & Henry (2004) to examine the income effects of a local road race. This study compared the results of four models, which included the Social Accounting Matrix and three Occupation-Based models using various aggregated-levels of occupational wage data, and it concluded that the Occupation Based model using the aggregated full-time equivalent wage data provided the most promising results.

Both studies acknowledged that one shortcoming of their research was the use of mixed-level data: the employment estimates derived from the I-O model is at the county level while the industry-occupational wage data are at the national level. Also, the two studies only provided modeling results as an end point, and they did not validate its estimation accuracy. Finally, the researchers focused solely on the local tourism events, which are generally assumed to bring positive economic effects to the host residents. They did not make further discussion on the model's applicability in a negative scenario. Unfortunately, up to date there is no further investigation to address the aforementioned issues with respect to the Occupation-Based model.

This study will be an exploratory study in applying the Occupation-Based model analyzing the occupational wage effects on tourism industry from the negative shock of the current economic crisis. The model uses the aggregated full-time equivalent wage data, which

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are derived from the local level as the employment estimates are. In the end, the accuracy of the estimation results will be validated with actual data.

As the Occupation-Based model is considered a derivative of the I-O model, and heavily depends on the employment estimates derived from the latter model, a better understanding of the "ancestor" model definitely provides more insights on its "descent" model. Therefore, the following sections are dedicated to discuss the I-O model, including its computation, its assumption/limitations/strength, and its applications in tourism literature.

The Computation of the I-O model

In the I-O analysis, all computations are operated in a matrix format. One major part of the computation is to obtain the Leontief inversed matrix, and it all starts from a transactional table, which is a set of accounts recording the flows of commodity outputs from industries to the commodity users either as a production input by industries or as consumption by final users for a period of usually one year(BEA, 2009). As Figure 7illustrates, the transaction table is a two-dimension table which includes rows and columns. The row shows the output flows of each industry to other industries and final users, which consist of households, firms, government and export sectors. The column demonstrates the input requirements of each industry, which include intermediate products from other industries and value added factors such as labor, capital, government taxes and imports (Hara, 2008, Fletcher, 1989).

The next step is to convert the transaction table into an A matrix, a square matrix which shows the standardized input coefficients of various industries. The input coefficient denotes the proportion of input to produce one-dollar output in a certain industry and it is obtained from

dividing the value in each cell by the total input in the corresponding column. Then, the A matrix

needs to be deducted from the I Matrix, which assigns the value one to the cells where the same

industry intersects and zero in other cells. By inverting the square (I-A) matrix, the Leontief

inversed matrix thus can be obtained (Hara, 2008)

		Productive sectors			Final Demand sectors					Total Output
		X1	X2	X3	PCE	PFI	I	EX	G	
Productive sectors	X1									
	X2									
	X3									
Value-added factors	Labor (wages/ salaries)									
	Capital (dividend earned)									
	Government taxes									
	Imports									
Total Input										

Source: Fletcher (1989) and BEA, (2009).
Note: (1)PCE= Private Consumption Expenditure; PFI = Private Fixed Investment; I = Change in Private Inventory;
EX =exports, and G = Government Consumption.(2) The grey area, a square matrix including only productive
sector.The black-bound area, a square matrix including both productive sectors and household.
Figure 7: A basic I/O transaction table

The Assumptions, Weaknesses and Strengths of the I-O model.

Just like all other forms of economic modeling, the IO analysis has its own assumptions, weaknesses and strengths (Archer, 1995). One of its principal assumptions is *constant input coefficient* (Briassoulis, 1991; West, 1995). Constant input coefficient implies that there is a linear relationship in the production function, which does not allow any interference of economic scale and input substitution. Studying the tourism economic impact of Victoria, Australia, West & Gamage (2001) held that this I-O model assumption could result in inflated estimation results, by arguing that the tourist service expansion may not bring new employment opportunities, but rather increase employee's overtime or efficiency. In addition, constant input coefficient suggests the static nature of the model. The IO analysis assumes that the economic structure, as reflected by the transaction table for a certain period of time, remains stable over time. Furthermore, the I-O model is not able to capture temporal distributions of the impacts. Thus, it is not suitable to investigate issues concerning seasonal fluctuation, lag response to final demand change and short-term impacts (Briassoulis, 1991; West, 1995).

Another major assumption of the I-O model is *no capacity/supply constraint* (Briassoulis, 1991; Fletcher, 1989). This assumption implies resources are freely and readily available, price mechanism does not take effect, and production activities are isolated from other markets which include factor and consumer markets and rest of the world. Under such a simplifying assumption, the IO estimates have a tendency to overestimate the impacts because it ignores (1) other industries may compete for resources, resulting the designated industry short of inputs to produce required output; (2) consumers may spend money on other products, thus resulting weaker demand stimulus for a designated industry; (3) In a short term, the final demand boost may not

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accelerate production, but rather push price upward or encourage imports (Briassoulis, 1991; Dwyer, Forsyth, & Spurr, 2004).

In additional to its assumptions, the I-O model also has its own limitations. For example, the model only assesses the impacts in the economic aspect, and it does not cover the social, culture and environmental impacts (Briassoulis, 1991). Besides, the model has deterministic nature. In other words, it provides single values as resultant estimates, without referring to any error terms and confidence interval (Hara, 2004). Some researchers may find it "less informative" because "the associated variability is completely unknown" (Song & Lin, 2010, p. 18).

In spite of its stringent assumptions and limitations, the I-O model is commonly used in analyzing the tourism impact on a regional economy (West & Gamage, 2001). That is because its own incomparable advantages, including (1) comprehensiveness: it is able to depict a holistic picture of the structure of an economy and focus on the sectoral interdependency; (2) objectivity: the general equilibrium approach underlying the I/O model helps mitigate researcher's subjectivity; (3) flexibility: data can be disaggregated or aggregated to suit the purposes (Briassoulis, 1991; Fletchler, 1989).

The Applications of the I-O model in Impact Analysis

Since the 1930s when the I-O model was pioneered by Sir Wassily Leontief, it has been prominently utilized in various branches of economics, analyzing a wide range of economic and policy issues (Lahr & Dietzenbacher, 2001). The application of the I/O model is also advocated in tourism field. Most studies are to examine the tourism economic contributions on the national, regional, or local levels (Archer1995, Archer & Fletcher, 1996; Frechtling& Horvath, 1999;

Heng & Low, 1990; West & Gamage, 2001). Some other studies also applied it to evaluate the impacts of external events such as facility constructions, sporting events, and even terrorist attacks (Hara, 2004; Kock, Breiter, Hara &DiPietro, 2008; Lee & Taylor, 2004; Tyrrell & Johnston, 2001).

The aforementioned study, as referred to the proponents of the I-O model, generally emphasized the model's advantages of being objective, comprehensive and flexible. In an empirical study, Kock, Breiter, Hara & Dipietro (2008) proposed that the IO framework could be a more plausible method than the traditional feasibility study in evaluating the economic benefits of a convention center for justifying public funds investment. They contended that the traditional feasibility study tended to yield overly optimistic results and were tremendously subject to researchers' judgments on projected tourism flows and economic outlooks. On the contrary, the IO framework can generate more unbiased estimates, because its simulation is based on the IO accounts, which objectively reflect the linkages among industries and other factors. In addition, the IO framework can also evaluate the secondary effects of the convention center on every industry, painting a holistic picture.

Furthermore, some proponents maintained that the IO analysis could provide such detailed information that it was of great significance in aiding policy makers and marketing experts to formulate related polices and strategies (Archer, 1995; Archer & Fletcher, 1996; Heng & Low, 1990). Against the background of declining international tourism demand to Bermuda, Archer (1995) applied the I-O model to examine the impacts of the foreign visitor expenditures on the nation's export earnings, income, government revenue and employment. The estimation results were then compared to the economic contributions of the other two export sectors, which

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were international business/finance sector and foreign military stations. The findings suggested that the tourism industry was still the major job creator while the growing international business/finance sector had surpassed the former industry to become the most significant generator of income and government revenue; and the researcher concluded that the IO analysis confirmed that the Bermuda's government was heading to a positive policy-making direction of continuously attracting foreign business/finance investment and constantly improve the nation's competitiveness as an up-market tourism destination. In the case of Singapore, Heng & Low (1990) also provided insightful policy recommendations based on the I-O modeling results. The researchers found that the Singapore tourism industry exhibited a larger multiplier effect on the nation's output, income and employment as it was compared to the manufacturing and overall export sectors, and the economic contributions made by the "high value" visitors (from developed countries) were not distinctively different from the one by the "low value" visitors (from developing countries). Accordingly, they suggested that in order to sustain a steadfast growth in tourism, the nation should continue to develop tourism-related human resource, enhance its comparative advantage of being a world-class business and convention destination, and include developing countries into its marketing campaigns.

While the researchers in this supportive view point mostly promote the strengths of the I-O model, they are also aware of its shortcomings. However, they insist that the model's limitations are minimized when the investigation is intended for a limited time period and an open small economy (Archer, 1995; Fletcher, 1989). Archer (1995) explicitly expressed the following statement.

"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)

As to the boundary of "a limited time period", the researcher did not provide a specific definition. Nevertheless, in his study of the tourism industry in Bermuda, the researcher constructed three I-O models for three individual base periods, each of which lasts for one year. Hara (2004) confirmed that one year was a reasonable for the I-O model to capture the economic effects from an initial shock, because the foundation of the transaction data were derived from the income statements which are based on annual time span. With regard to the model's applicability in an open small economy, Fletcher (1989) held that the I-O model proved to be a successful technique in evaluating the tourism's economic impacts in Western Samoa, Paula and the Solomon Islands. This is because that the I-O model assumptions approximate a local area where resources generally move more freely and price is not determined by the internal demand change (Dwyer, Forsyth, & Spurr, 2004).

Though the I-O model proponents made sound arguments on its applicability in the tourism-related impact analysis, there is rarely any researcher performing model validation by comparing estimation results with actual data. One exception is Hara's study(2004), which examines the immediate effects of the 9/11 terrorist attack on the tourism industry and regional economy in New York City. Defining the initial shock as the employment decrease between September and October 2001, the researcher performed an IO analysis and learned that the incident caused the city a decrease in total output by $ 18 billion and job loss by 73, 400 in the coming year. The estimation results were found to be close to the actual data, and thus the researcher concluded that the I-O model could be a useful method to estimate short-term effects

from a negative event. Here the critical question is whether the validity of the I-O modeling results is ascertained in all other negative events.

There is another stream in the tourism literature which tends to consider the I-O model as an inadequate tool due to its limitations. The salient criticisms are directed to the model's two strict assumptions of constant input coefficient and absence of supply constraint (Briassoulis, 1991; Dwyer, Forsyth, &Spurr, 2004; West, 1995). As Dwyer and his colleagues (2004) reasoned, because the I-O model ignored the restraining effects from the resource limitation and market interaction and only counted for the additional stimulated production activities, it would inevitably yield positive results when it was given a positive shock. However, this was very likely to go against the reality, as Dwyer and his colleagues argued, and one example was the 1970s' Australian mineral boom. In accordance with the logic of the I-O model, the increase in mining activities should have benefited its close-related manufacturing industry. However, the fact was that the manufacturing industry was actually negatively affected because of the declined import demand resulting from the boom-bred value- rise of the Australian dollar. As a conclusion, the researchers warned that the I-O model could cause serious misleading. Striving for a simulation closer to the reality, some researchers started to turn their attentions to the more sophisticated modeling such as the Social Accounting Matrix (SAM) and Computable General Equilibrium (CGE) (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, the SAM model incorporates the other economic flows from factors, institutions, and the rest of the world (ROW). Here factors are referred to the factors of

production, namely labor, land and capital; institutions are the factor holders, including

households, governments and enterprises; and the ROW indicate transactions with the outside

areas such as import and export (Hara, 2008; Thomas & Bautista, 1999). In a sense, SAM is a

broader framework embodying the core of an I-O model (Wagner, 1997; Sugiyarto, Blake, &

Sinclair, 2003). Primarily, the I-O model is applied to investigate the inter-industry dependency,

and the SAM is to address the issues in income distribution, consumption patterns and resource

endowment among distinct socioeconomic groups (Hara & Naipaul, 2008). Although a closed I-

O model can also capture the induced effects from household consumption, it only concerns their

wage income spending. In this respect, the SAM offers a more thorough estimation, as it entails

other household income sources (e.g. capital rent) and enterprise/ government spending. In spite

of its ability to depict the interactions among factors, institutions and inter-industry activities, the

SAM is bound to the same limitations of its ancestor, the I-O model. Besides, the complexity of

the SAM demands more robust data, and thus could become costly and labor intensive (Wagner,

1997).

Whereas the SAM expands the I-O modeling scope, the CGE seeks to relax the I-O

model's assumptions by incorporating the supply-demand mechanism, input substitution and

market interactions (West, 1995).To some degree, the CGE is rendered as a further development

of an I-O model, as its simulation is heavily based on the SAM accounts (Sugiyarto, Blake, &

Sinclair, 2003). Recently, the CGE is applied to investigate a variety of issues including

tourism's economic contribution, the SARS epidemic, foot and mouth disease and globalization

impacts (Sugiyarto, Blake, & Sinclair, 2003; West, 1995; Yang & Chen, 2009; Zhou, Yanagida,

Chakravorty, & Leung, 1997). Zhou and his colleagues (1997) conducted a comparative study

using the IO and CGE models to estimate Hawaii's economic impacts from a hypothesized reduction in visitor expenditures; and they find that the former model incline for overestimation than the latter one. However, there is one intriguing question left answered here: how valid are both the IO and CGE modeling results as compared to the actual data? The fact that the CGE model engenders more conservative results does not indicate that its estimates are more accurate. As a matter of fact, it is noted that the CGE model makes more assumptions than the I-O model, specifying individual, production and market behaviors. The assumption specification, as some researchers acknowledged, is subject to the modeler's discretion and heavily affects the estimation results (Dwyer, Forsyth, &Spurr, 2004; Yang & Chen, 2009). Also, since the core component of the CGE method is the I-O/Sam data, inaccuracy associated with the I-O/Sam data would be mitigated by a set of discretional constraints of the CGE modeling. It is just as if the basic performance of a car is confined to an engine, even though extra amenities would provide additional comfort to passengers.

Summary

Unfortunately, the tourism impact analysis literature has done little in investigating the accuracy issue of the estimates gendered by I-O model or its extended methodological family. Oftentimes estimation results are taken as the end point of a study, and the estimation accuracy is left to the discretion of readers. This study adopts the I-O model to assess the impacts of the current economic crisis on the local tourism industry and its economy, and verify the modeling accuracy by comparing the estimated results with actual data. There are a couple of reasons in choosing the I-O model other than the other more sophisticated ones. First, the I/O model is

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deemed appropriate and adequate for a local area. The Metro Orlando area is an open and small economy, where the restraints of the I-O model assumptions becomes minimal (Fletcher, 1989). Also, it is extremely costly and labor intensive to build a more sophisticated model such as CGE. The complexity of the CGE could easily create an unrecognizable black-box to lead to the results at the discretions of its modelers, unless all constraints are clearly presented. For a local area, the employment of the I-O model is rendered sufficient in terms of cost and practicality. Second, the previously-mentioned complex models are derived from the I-O model. A better understanding of the basic model could enumerate more insights for the more complex ones.

CHAPTER THREE: METHODOLOGY

Part One

Introduction

The purpose of this study is to apply the I-O model and Occupation-Based model to investigate the impacts of the current economic crisis on a local economy, and to validate the accuracy of the modeling results. The Metro Orlando Area in Florida was chosen as the study area. There are a number of reasons for this. First, known as a world-class business and leisure destination, the area highly benefit from the development of tourism. Second, the current economic crisis has negatively affected the area, as evidenced by the remarkable decrease in visitor arrivals and expenditures. Third, the local visitor and convention bureau and related government agencies collect and compile detailed data on visitor spending, output, employment and income, hence making the modeling estimation and validation possible.

The time frame for this study is set between 2007 and 2008. This is mainly because the data availability issue and the purpose to exclude the confounding effects of the avian flu in 2009. Because "tourism is an expenditure-driven economic activity", this study takes the change in visitor expenditures during the studied period as a proxy measurement of final demand change from the current economic crisis (Mihalic, 2002, cited in Fretchling, 2006, p.26). The resulting total (direct+ indirect) effects are estimated in terms of industry output, employment and occupational income. The estimation results are then compared to the officially published data for validation purpose. The following sections of this chapter will cover: (1) a brief description of the study area; (2) delineation of modeling sequences; (3) explanation of data collection.

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Part Two

The Study Area

The Metro Orlando Area and its Tourism Industry

The Metro Orlando Area is one of the US Metropolitan Statistical Areas defined by the

Office of Budget and Management for the purpose of collecting and tabulating uniform federal

statistics (US Census Bureau, 2010a). Also referred to the Orlando-Kissimmee-Sanford

Statistical Metropolitan Area, it is officially defined to be comprised of Osceola, Orange,

Seminole and Lake Counties, as shown in Figure 8 (MOEDC, 2009a). However, this study

excludes the Lake County because of a lack of data on its visitor spending.

Located in the center of Florida and the Americas, the tri-county area is a world-known

leisure and business destination. The region is the home to seven of the top 10 theme parks in the

country, which include four theme parks in World Disney World Resort, SeaWorld, Universal

Studio, and Islands of Adventure. In 2008, the seven theme parks draws 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 by exhibition space, is also another draw for visitors. In 2007, the convention center hosts

a total of 257 events, and attracts 1.45 million visitors to the area (Orlando CVB, 2008, P25).

With such a huge influx of visitors, the state-of-art transportation infrastructures become crucial

and essential. The Metro Orlando area is well served by the world-class Orlando International

Airport together with other small regional airports. The International Airport is the 3rd largest in

the US, and provides non-stop flights to74 domestic destinations and 17 international

destinations. Serving more than 33 million passengers in 2009, it is ranked as the 2nd busiest

airport in Florida, the 13th in the US, and the 26th in the world (GOAA, 2009a,b). Major

highways and roads crisscross within the region and link the airport, convention facilities and

major attractions to nearby hotels, eateries and shopping places. The Metro Orlando Area has 2nd

highest lodging inventories in the nation, with approximately 115, 875 hotel rooms (GOAA,

2009a). The area also has 4,154 restaurants and 65 major shopping centers/malls, providing

visitors with plenty of options for creating a wholesome experience (MOEDC, 2009b)

     The tourism industry is a top economic and employment contributor in this area. In 2007,

Metro Orlando area receives 48.7 million visitors, which generates 31.1 billion dollars into the

local economy. It generates 236, 556 direct industry jobs, representing 24% of the total

employment in the area excluding Lake County (Orlando CVB, 2008, P.1). According to the

2009 estimate of MOEDC (2009b, P.4), seven out of the fifteen major employers in the area are

businesses in tourism industry, and Walt Disney World Company tops as the leading employer

with 62,000 hires. Parallel with its economic power, tourism industry is also a significant

contributor in tax revenue. In 2007, the industry generates a total of 202.87 million dollars in

resort tax (Orlando CVB, 2010c).
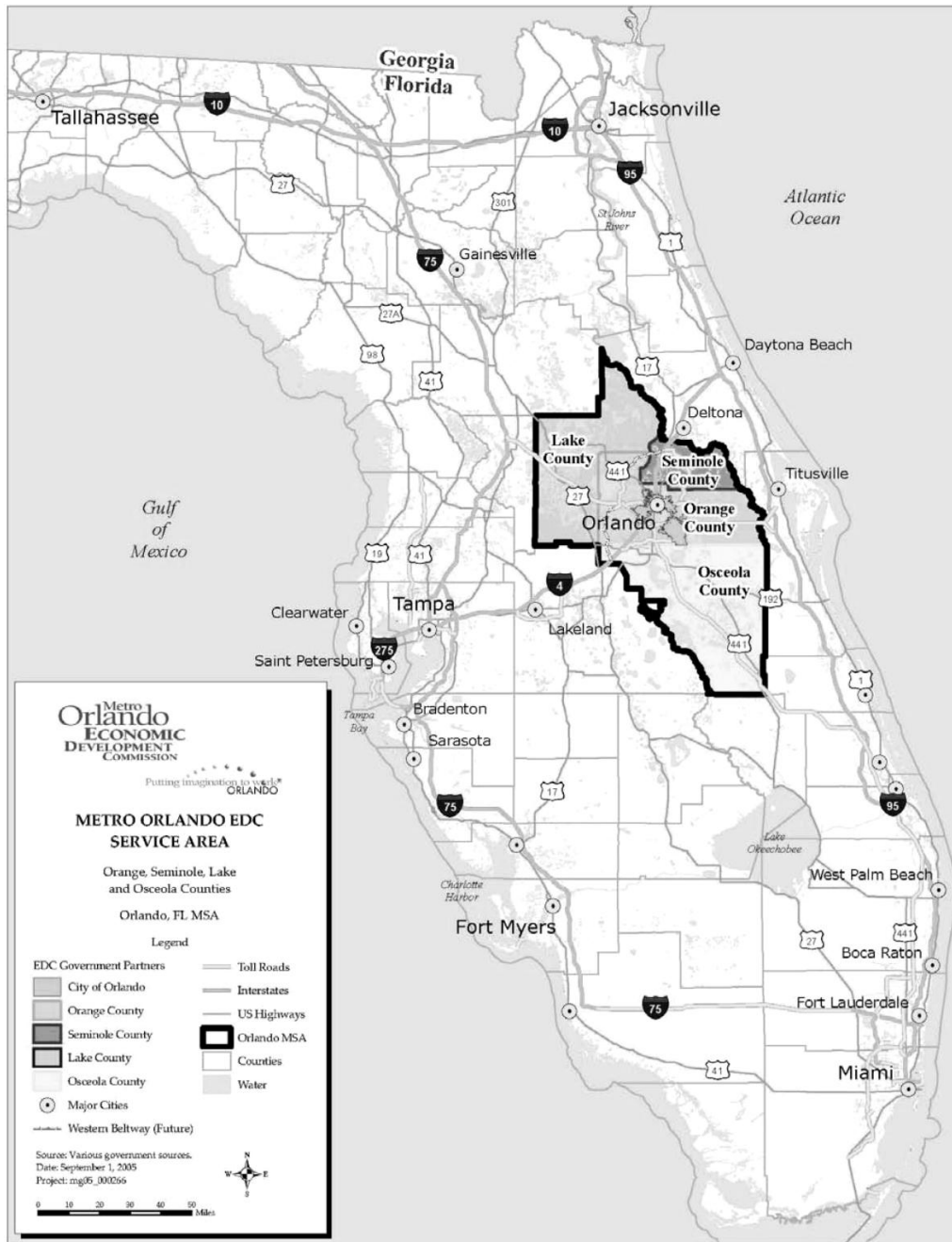
Source: the Metro Orlando Economic Development Commission.

Figure 8: The map of the Metro Orlando Area

The General Impact of the Current Economic Crisis on the area's tourism

In the current economic crisis, the tourism industry in the area also experienced a challenging time. Between 2007 and 2008, the domestic visitor arrival was down by 0.9%, as compared to 1.8% increase in the previous one year (Orlando CVB, 2009a, P.7). To worsen the situation, the average expenditure per person per trip was also reduced from $584 to $456 for the domestic leisure visitors and from $740 to $654 for domestic business visitors (Orlando CVB, 2009a, P.14; 2009b, P.9). During this period, though international arrivals surged by 3.7%, their average spending per person per trip was down from $ 980 to $963 (Orlando CVB, 2009c, P.3, P.16).

As visitors arrivals declined, the tourism related industries and the whole economy suffered. From 2007 to 2008, the passenger traffic in the Orlando International Airport declined by 2.2%, and hotel occupancy rate dropped from 67.9% to 65.8%, which translated into a reduction of 0.6 million room night demand (GOAA, 2009c; Orlando CVB, 2010a.). As a result, the growth of the area's resort tax dramatically decelerated, with only 0.1% increase from 2007 to 2008 as compared to a 17.3% increase in the previous period (Orlando CVB, 2010c). The growth of the real GDP in the area was also jeopardized. According to the Bureau of Economic Analysis (2010c), the area's GDP was up by $ 1.3 billion from 2006 to 2007 while only by $ 6 million in the studied period. The job loss was on the rise, and the claimed unemployment benefits were on a continuous upward trend (as illustrated in Figure 9).

The deterioration of the tourism industry and the surge of unemployment have urged the local tourism professionals and government officials to take remedial actions. However, the statistics available are usually piecemeal and scattered from various sources. Therefore, they are

not able to provide a wholesome image on how the current economic crisis impacts the regional

economy through inter-industry linkages.
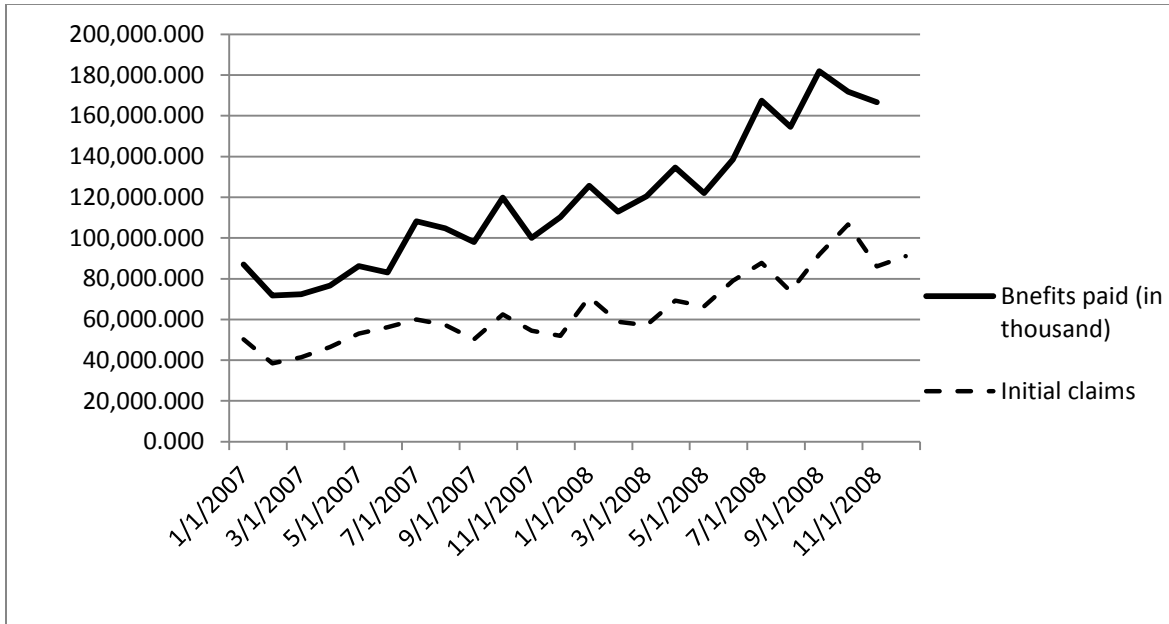
Source: DOL(2009). Graphic made by the author.
Figure 9: Florida state monthly unemployment benefits

Modeling Procedures

To estimate the economy-wide impacts of the current crisis in the Metro Orlando Area, the I-O model is applied to capture the effects in terms of output and employment. Based on the employment estimate offered by the IO analysis, the Occupation-Based model is able to assess the effects with regard to occupational income. The simulations are based on the following two equations as mentioned in the earlier chapters.

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

$$W = E * R * A$$

In total, there are four steps to construct an I-O model and Occupation-Based model and to validate their 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 categories, including room, transportation, entertainment, food, shopping and miscellaneous services.

(2) Extract the 2008 tri-county IO table from the IMPLAN software to an Excel file for further maneuver. Plug in the final demand vector to the 2008 IO table and calculate the output and employment estimates.

(3) Obtain the occupational ratio and wage data for the tri-county area. Multiply the occupation ratio, wage data and the input-output employment estimate to determine the wage income distribution by occupations in various industries. .

(4) Compare the simulation results with the actual data and verify the validity of the two

models.

Step One: Construct the Final Demand Change Column Vector

To appropriately estimate the visitor expenditures is of significant importance in ensuring

an accurate impact assessment (Lee & Taylor, 2005; Tyrrell & Johnston, 2001).Adopting the

WTO definitions cited by Fretchling (2006, p. 27), this study defines visitor as "any person

travelling to a place other than that of his/her usual environment for less than 12 months and

whose main purpose of visit is other than the exercise of an activity remunerated from within the

place visited" and visitor expenditure as "the total consumption of or on behalf of visitors".

The 2008 visitor profile reports compiled by the Orlando/Orange County Convention and

Visitor Bureau (hereafter Orlando CVB)is the main data source in determining the 2007-2008

total visitor expenditure changes in the study area. The reports concentrate on the three main

visitor groups: domestic leisure visitors, domestic business visitors and oversea visitors

excluding those from Canada and Mexico.

Because of the importance of the appropriate estimation on the visitor expenditure change

in this study, the methodologies in collecting these visitor data warrant some further explanation.

The data on the domestic visitors are generated by the tourism research firm, D.K. Shifflet. It

sends monthly surveys to a consumer panel of 45,000 households, which are selected to

demographically represent the US population. In the survey, the panel members are asked to

retrospect their trips taken during the three previous months (Orlando CVB, 2009a, b). The data

on the oversea visitors are collected in the US In-Flight Survey Program, which is directed by the

US Department of Commerce, Office of Travel and Tourism Industry. Monthly surveys are conducted among passengers on board major international airports (Orlando CVB, 2009c).

In accordance with the visitor categorization in the Orlando CVB reports, the 2007-2008 total visitor expenditure change is calculated by aggregating the spending changes of domestic leisure visitors, domestic business visitors and overseas visitors. It should be pointed out that the CVB report on domestic business visitors only examines the group meeting visitors, who "visited Metro Orlando for the purposes of a convention, seminar/training or other group meeting". The transient business visitors, who account for almost half domestic business visitors, are ignored. Due to data unavailability, this study does not consider the impacts made by the domestic transient business visitors. Under the adverse influences of the current economic crisis and AIG effects, it is reasonable to presume a decrease in total expenditure from the transient business group in 2008. The exclusion of this group very possibly leads to a smaller negative shock and thus results in more conservative modeling estimates.

For each group, the total expenditure is calculated by multiplying Average expenditure per person per trip and annual visitor number (see Table 1 and 2). The expenditure change is attained by subtracting the 2007 total out of the 2008 total. The spending difference can be further disaggregated into six basic tourism-related industries, which are room, transportation, food, entertainment, shopping and miscellaneous services. At this step, a couple of assumptions are made. The first assumption is that the domestic leisure and group meeting visitors spent the same amount on the in-area transportation as the Floridian visitors do. The transportation expenditures shown by the CVB reports include airfare for both domestic groups. Considering that including airfare could seriously inflate impact estimation results, the transportation

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spending of the Floridian visitors is used as a proxy for the ground transportation spending within the area. The assumption is rendered rational for two reasons. One is that most domestic leisure visitors (78%) and Floridian visitors (96%) drove to the study area, thus incurring similar transportation expenditures. As Table 2 shows, the transportation spending for the domestic leisure visitor is adjusted from $136 to $38 and from $ 109 to $27 in the years of 2007 and 2008 respectively. The other reason is that the analysis unit in this study is the expenditure change between 2007 and 2008. Even though each visitor group had quite different spending on transportation in term of absolute value of expenditure, the 2007-2008 expenditure change among them is oftentimes quite similar, or at least not too distant. For example, the domestic group meeting visitors experienced a decline of $12 in the average transportation expenditure, from $218 in 2007 to $ 206 in 2008. The Floridian visitors also saw a similar extent of reduction in this regard, from $38 in 2007 to $27 in 2008.

The second assumption is that the overseas visitors had the same expenditure distribution ratios over the six basic industries as the domestic leisure visitors did. Because the majority of overseas visitors came to the study area for leisure purposes (91% in 2007 and 88% in 2008), this assumption is deemed to be the most optimal one which could be made without any available data with respect to the categorical consumption patterns of this visitor group. Although it is highly debatable that the domestic and overseas visitors exhibit the same characteristics in consumption, this study maintains that instead of totally ignoring the impacts from the overseas visitors, it is more sensible to have a complete estimation of a direct shock, even though it involves in making further assumptions.

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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%
Total visitor (excluding domestic transient business visitors)	43,438,000	43,459,000	21,000	0.05%

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

Table 2: Average visitor expenditure per person per trip for domestic leisure visitors

Domestic leisure visitor								
	Year 2007				year 2008			
	Actual $	Actual %	Adjusted $	Adjusted %	Actual $	Actual %	Adjusted $	Adjusted %
Room	$94	16%	$94	19%	$74	16%	$74	20%
Transportation *	$136	23%	$38	8%	$109	24%	$27	7%
Food	$127	22%	$127	26%	$105	23%	$105	28%
Entertainment	$111	19%	$111	23%	$89	20%	$89	24%
Shopping	$90	15%	$90	19%	$60	13%	$60	16%
Miscellaneous	$26	4%	$26	5%	$19	4%	$19	5%
Total*	$584	100%	$486	100%	$456	100%	$374	100%

Source : Orlando/ Orange County CVB, and adjustment made by author.
Note: * denote the expenditure items needing adjustment. The transportation spending reported by the CVB includes airfare. The transportation spending is adjusted to remove the airfare, thus resulting the change in total spending.

Table 3: Average visitor expenditure per person per trip for domestic group visitors

	Domestic group meeting visitor							
	Year 2007				year 2008			
	Actual$	Actual %	Adjusted $	Adjusted %	Actual $	Actual %	Adjusted $	Adjusted %
Room	$209	28%	$209	37%	$154	24%	$154	32%
Transportation*	$218	29%	$38	7%	$206	31%	$27	6%
Food	$139	19%	$139	25%	$139	21%	$139	29%
Entertainment	$76	10%	$76	14%	$70	11%	$70	15%
Shopping	$64	9%	$64	11%	$61	9%	$61	13%
Miscellaneous	$34	5%	$34	6%	$24	4%	$24	5%
Total*	$740	100%	$560	100%	$654	100%	$475	100%

Source: Orlando/ Orange County CVB, and adjustment made by author.
Note: * denote the expenditure items needing adjustment. The transportation spending reported by the CVB includes airfare. The transportation spending is adjusted to remove the airfare, thus resulting the change in total spending

Table 4 : Average visitor expenditure per person per trip for overseas visitors

	Overseas visitor			
	Year 2007		year 2008	
	$	percentage	$	percentage
Room	$190	19%	$191	20%
transportation	$77	8%	$70	7%
Food	$256	26%	$270	28%
Entertainment	$224	23%	$229	24%
Shopping	$181	19%	$154	16%
Miscellaneous	$52	5%	$49	5%
Total	$980*	100%	$963*	100%

Source: Orlando/ Orange County CVB, and adjustment made by author.
Note: the * marked number are the actual data retrieved from the CVB report

The total expenditure difference between 2007 and 2008 is obtained by summing up the difference of the three visitor groups (See Table 5). As the calculation results reveal, the Metro Orlando Area lost approximately $ 4.31 billion in visitor expenditures during the study period, down by 19% of the total expenditures in 2007. In term of absolute difference, the retailing sector (shopping) had the largest decrease ($ 1.1 billion), followed by the accommodation sector ($ 1.0 billion). Nevertheless, when the difference was gauged by the change percentage from 2007, the transportation sector (26.2%) replaced the accommodation sector (20.4%) as the industry inflicted with the second largest loss.

The grand decrease in the total visitor expenditures is mainly attributed to the deterioration of domestic travel. The group of domestic leisure visitors alone reduced their spending by a startling amount of $ 3.97 billion, mostly in shopping, food and entertainment. The domestic group meeting visitors also cut back at their spending, albeit at a much less extent than their leisure counterpart. There is a total decrease of $0.66 billion for this group, and most of the spending cut incurred in lodging sector. The heavy loss for the lodging sector is conceivable, because the AIG effect was mainly directed against extravagant spending in luxury hotels. Against the receding tide of the domestic travel was the robust growth of the inbound travel of overseas visitors. In total, the overseas visitors raised their spending by $ 0.33 billion, with the restaurant and entertainment sectors as the biggest beneficiaries. Unfortunately, the overseas visitation took only a small portion in the total visitation to the study area, thus its expenditure growth was not able to compensate the huge decline from the domestic visitor spending

Table 5 : Total visitor expenditure change between 2007 and 2008

	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	-19.1%
Room	-$710,528,000	-$379,665,000	$74,064,327	-$1,016,128,673	-20.4%
Transportation	-$390,078,000	-$74,774,000	$11,680,111	-$453,171,889	-26.2%
Food	-$782,808,000	-$42,395,000	$131,522,173	-$693,680,827	-11.8%
Entertainment	-$781,976,000	-$57,644,000	$97,589,011	-$742,030,989	-15.3%
Shopping	-$1,063,140,000	-$36,752,000	$2,934,540	-$1,096,957,460	-27.8%
Miscellaneous	-$248,326,000	-$67,810,000	$11,288,839	-$304,847,161	-24.7%

Source: made by the author.

Step Two: Extract the IO Table from the IMPLAN Software and Calculate the Total Impacts on Output and Employment.

The IMPLAN software, or the impact analysis for planning, is created in 1993 as an extension of two researchers' work at the University of Minnesota, and is used for the economic analysis and study (Bonn, 2008). The IMPLAN database is comprised of multiple social accounting matrices of national, state and county levels, reflecting the unique structures and functions of each economy. (Minnesota IMPLAN Group Inc, 2010a). Since 1997, the IMPLAN data has been recorded according to the 6-digit North American Industry Classification System (NAICS), which is jointly developed by the US, Canada and Mexico in classifying industries for the purpose of collecting, analyzing and publishing uniform business statistics (US Census Bureau, 2010b). The IMPLAN data can be extracted at five levels of NAICS coding industry detail, with the 2-digit the most aggregated and the 6-digit the most detailed (Minnesota IMPLAN Group Inc, 2010b).

This study uses the 2004 IMPLAN Florida county-level data deflated to represent the 2008 data. It consists of a total of 440 sectors in an economy at the most detailed level

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(Minnesota IMPLAN Group Inc, 2010a). The IO data of the study counties (Orange, Osceola, and Seminole) are integrated and extracted into an Excel file for further maneuver. The data extraction is conducted at the level of the 2-digit NAICS coding, which consist of a total of 20 sectors. The yielded 20x20 IO table is further converted to the Leontief Inverse Matrix, as described in the section of "the computation of I-O model" in Part Two. The final demand column vector is constructed in the way that the disaggregated expenditure changes in the six tourism-related industries were recorded in their corresponding NAICS coded sectors, and the other sectors are set as zero (See Table 6 for the matching scheme). Multiplying the Leontief Inverse Matrix and the final demand column vector generates a 20x1 column vector, which shows the direct and indirect impacts in term of output. Based on the output impact estimation, the employment impact can be calculated.

Table 6: The matching scheme between the NAICS coded industries and the expenditure items in Orlando CVB reports

NAICS Industry Coding	CVB Report Categorization
48-49 Transportation & Warehousing	Transportation
44-45 Retail Trade	Shopping
71 Arts- Entertainment & Recreation	Entertainment
72 Accommodations & Food Services	Room, Food
81 Other Services	Miscellaneous

Source: Made by the author.

Step Three: Obtain the Occupational Employment and Wage Data, and Calculate the Total
Impacts on the Occupational Wage.

The data of the 2007 and 2008 occupational employment and wage by industries are

obtained from the Florida Agency for Workforce Innovation, Labor Market Statistics. The

dataset records the occupational employment ratio, average hourly wage and annual wage in

each of the 20 industries coded in the NAICS. The occupations are grouped based on the

Standard Occupational Classification (SOC) system, which is utilized by the US Federal statistic

agencies for ensuring uniform data collection and analysis. In common with the NAICS, the

SOC also has different levels of aggregations: all jobs can be categorized into the 23 major

groups, which can further be disaggregated into 96 minor groups, 461 broad occupations, and

840 detailed occupations (BLS, 2010c).Because of the issue of data manageability, this study

only concentrates on the 23 major occupation groups in the 20 NAICS-coded industries, and

pays specific attentions to the occupational employment and income fluctuations in the five

tourism-related sectors (See Table 7 for the list of 23 major groups).

The average annual wage and employment ratio in 2007 are applied to calculate the

impacts on the occupational wage income from the direct shock of visitor expenditure decrease.

According to the Agency of Workforce Innovation, the mean annual wage is generated by

multiplying the hourly mean wage by a 'year-round, full-time' hour figure of 2080 hours, and the

average hourly wage was calculated based on the reports of both salaried and hourly-paid

employees (Personal communication). It is noteworthy that the wage estimation accounts for the

hourly-paid employees. Because of this consideration, the Occupation-Based model is able to

consider the income change due to the temporary work-hour changes, which the I-O model is not

able to assess.

Table 7: The list of the 23 major occupation groups

SOC Coding	Occupations
11-0000	management occupations
13-0000	business & Financial operations
15-0000	computer & mathematical occupations
17-0000	architecture & engineering
19-0000	life, physical & social science
21-0000	community & social service
23-0000	legal occupations
25-0000	education, training, & library occupations
27-0000	arts, design, entertainment, sports & media
29-0000	healthcare practitioners & technical occupations
31-0000	health care support
33-0000	protective service
35-0000	food preparation & serving related occupations
37-0000	building & grounds cleaning & maintenance
39-0000	personal care & service
41-0000	sales & related occupations
43-0000	office administrative support
45-0000	farming, fishing & forestry
47-0000	construction & extraction
49-0000	installation, maintenance & repair
51-0000	Production
53-0000	transportation & material moving
55-000	military specific occupations

Source:BLS, Bureau of Labor Statistics (2010d).

Step Four: Model Validation

The estimation accuracy of the impacts on output, employment and occupational income are validated with actual corresponding data. The actual statistics on industrial output and employment by industry are obtained from the US Bureau Economic Analysis and the Metro Orlando Economic Development Commission respectively. The occupational income data is from the report provided by the Florida State Agency for Workforce Innovation.

The estimation accuracy is examined in the absolute discrepancy, which is the result of subtracting the actual annual change from the estimated one. If the difference is positive, the investigated variables are overestimated; and if it is negative, they are underestimated. Then the discrepancies among each of the 20 NAICS designated sectors are ranked to clearly demonstrate the sectors which bear the largest estimation errors 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 with regards to output, employment and occupational wage income respectively.

CHAPTER FOUR: RESEARCH RESULTS

Introduction

This chapter presents the study results on the impacts of the current economic crisis on the output and employment in the 20 NAICS coded industry and the occupational annual wage change in the accommodation and food service industry. The chapter includes three sections, which are dedicated to explain the findings on each of the three identified variables, 1) output; 2) employment; 3) occupational wage income in the accommodation and food service sector. Each section first presents the modeling results, and then compares the simulation results with its corresponding actual data. The last is to reveal the paired-sample t-test results

The Impacts on Industry Output

As noted, between 2007 and 2008 the studied area experienced a total of $ 4.3 billion decrease due to the economic deterioration and the AIG effects. The I-O model estimation results show, as predicted, that the direct negative shock from the tourism industry exerted a downward pressure to all other industries in the area, resulting in a total of $7.1 billion output decrease. Among the 20 industries examined, the tourism-related sectors are the most inflicted. The accommodation and food service industry appeared to suffer the most, with a total of $ 1.7 billion loss in industry output. Ensuing are the retail industry ($1.3 billion), the art and entertainment industry ($ 0.8 billion) and the transportation and warehouse industry ($ 0.55 billion). On the other side, the mining industry experienced the least output decrease, followed by the educational services and management of company (see Table 8).

Surprisingly, the comparison between the estimation results with the actual data reveals large discrepancies. In reality, the study area seemed to be quite resilient to the economic downturn in term of output. Totally, it experienced$1.98 billion increase in output between 2007 and 2008, with the real estate and rental industry generating the most output growth of $ 1.13 billion. Following are the government and non-NAICS sector ($ 0.57 billion), professional-scientific and technical services ($ 0.53 billion), arts-entertainment and recreation sector ($ 0.375 billion) and health and social service ($ 0.374 billion). It is noteworthy that five tourism-related industries are not the most severely affected as shown by the I-O modeling results. On the contrary, almost all the tourism-related industries kept an upward momentum except the retail trade sector. Even so, the retail sector only experienced a moderate downturn, as compared to the other four industries which were damaged the most from the economic crisis. Conceivably, the construction sector underwent the most dramatic decrease of $ 0.931 billion and the finance & insurance sector was the second most inflicted, with $ 0.444 billion in output reduction. See Table 8 for detailed numbers on the estimated and actual results on output changes from 2007 and 2008.

Table 8: The estimated and actual annual changes on Output

Aggregated Industrial Sectors (NAICS 2 digit)	Estimated impact on output	Actual impact on output
11 Ag, Forestry, Fish & Hunting	(7,326,237)	N/A
21 Mining	(115,464)	N/A
22 Utilities	(36,600,096)	109,000,000
23 Construction	(45,925,864)	(931,000,000)
31-33 Manufacturing	(338,680,064)	127,000,000
42 Wholesale Trade	(176,435,712)	(47,000,000)
48-49 Transportation & Warehousing	(551,179,520)	40,000,000
44-45 Retail trade	(1,332,153,216)	(228,000,000)
51 Information	(94,529,224)	119,000,000
52 Finance & insurance	(235,026,928)	(444,000,000)
53 Real estate & rental	(294,343,904)	1,127,000,000
54 Professional- scientific & tech services	(266,227,024)	526,000,000
55 Management of companies	(86,184,256)	51,000,000
56 Administrative & waste services	(141,768,736)	(29,000,000)
61 Educational services	(29,743,808)	13,000,000
62 Health & social services	(285,241,088)	374,000,000
71 Arts- entertainment & recreation	(812,585,088)	375,000,000
72 Accommodation & food services	(1,720,924,160)	190,000,000
81 Other services	(413,197,600)	39,000,000
92 Government & non NAICs	(238,388,448)	567,000,000
Total	(7,106,576,436)	1,978,000,000

Note: The estimation was made by author using the IMPLAN database, and the actual output change is calculated by author based on the data from the US Bureau of Economic Analysis.
N/A: data are not available

A more visual comparison is illustrated by the following line chart (Figure 10). Only 18 industries are compared, because the actual data of "agriculture, forestry and fishing" and "mining" are not available. As shown, the line of estimation results are generally below the one of the actual results, indicating that the I-O estimates tend to overestimate the negative impacts of the current economic crisis on industry output. This finding is accordance with the study results from Zhou and his colleagues (1997) who concluded that the I-O model has the overestimation propensity as compared to the CGE model. The sample-paired t-test is performed to further determine whether the estimated output results significantly deviate from the actual results. The test confirms that differences are statistically significant at the 0.05 confidence level (t=3.299, shown as Pair 1 in Table 13), which indicates the modeling inflate the estimation to such an extent that the estimated results is not able to reasonably represent the reality.
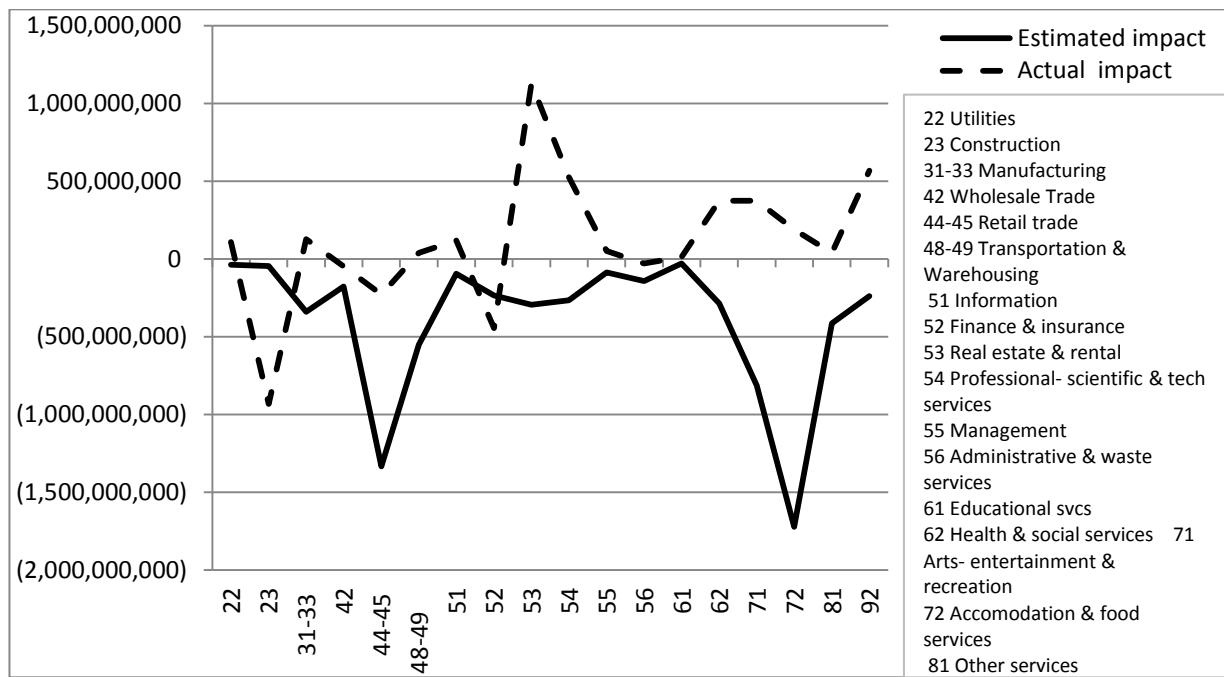
Source: graphic made by the author, the agriculture, forestry and fishing sector and the mining sector are excluded due to unavailability of actual data.

Figure 10: The line chart of the estimated and actual annual change in output

The ranking in discrepancy reveals that the negative impacts on "accommodation & food service" is most overestimated, with a almost $2 billion difference. The negative impacts on the output are also greatly inflated in the real estate & rental ($ 1.4 billion), the arts-entertainment & recreation ($ 1.2 billion), retail trade ($ 1.1 billion) and government & non NAICS, ($ 0.81 billion) and the professional-scientific and technical services ($ 0.79billion). Remarkably noted, there are two sectors which the I-O model underestimate their output decrease. They are the construction sector d the finance & insurance sector, of which the I-O estimates fall short of $ 885 million and $ 208 million respectively. See Table 10 for the detailed ranking based on the discrepancy between estimation results and actual data.

Table 9: The output discrepancy rankings

Ranking	Industrial Sectors	Discrepancy
1	72 Accommodation & food services	1,910,924,160
2	53 Real estate & rental	1,421,343,904
3	71 Arts- entertainment & recreation	1,187,585,088
4	44-45 Retail trade	1,104,153,216
5	92 Government & non NAICs	805,388,448
6	54 Professional- scientific & tech services	792,227,024
7	62 Health & social services	659,241,088
8	48-49 Transportation & Warehousing	591,179,520
9	31-33 Manufacturing	465,680,064
10	81 Other services	452,197,600
11	51 Information	213,529,224
12	22 Utilities	145,600,096
13	55 Management of companies	137,184,256
14	42 Wholesale Trade	129,435,712
15	56 Administrative & waste services	112,768,736
16	61 Educational services	42,743,808
17	52 Finance & insurance	(208,973,072)
18	23 Construction	(885,074,136)

The Impact on Employment

Similar to its estimation on output, the I-O model suggests 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: first, the accommodation and food service sector tops in the list with 27,191 job reductions, followed by the retail trade (19450), then the art-entertainment and recreation (9091), the fourth, other service (6124) and the fifth, transportation and warehousing (4760) sectors. The least affected industries, as the I-O model predicts, are the mining, utility, constructions and the information industries.

The actual data shows that there is a total of 20,700 job losses in the area between 2007 and 2008, a less magnitude than its I-O prediction. The area's gloomy job prospect is overwhelmingly attributed to the server job-shedding of two industries: the administrative/ waste service sector reduced 19,500 jobs and the construction sector cut 7,700 jobs. Surprisingly, against such an adverse circumstance, the tourism-related industries did not become a heavy unemployment generator as predicted. Rather, they absorb a considerable amount of surplus labor. As a matter of fact, the accommodation and food service sector employed 5,400 new hires, making itself as the strongest employment generator. The arts-entertainment/recreation and retail sectors also take in 2,400 and 900 extra labor respectively. Parallel with their large growth in output as mentioned previously, the health and social service sector and the real estate/rental service sectors increase employment by 3,900 and 1,600 respectively. Furthermore, the educational services sector also becomes a significant employment contributor, with 1,900 new hires. Interestingly, in spite of the rising output produced, the information, and professional-

scientific and technical services sectors experienced a moderate job cut, reducing employment by

700 and 100 respectively.

Table 10: The estimated and actual annual changes in employment

Aggregated Industrial Sectors (NAICS 2 digit)	Estimated employment impact	Actual Employment Impact
11 Ag, Forestry, Fish & Hunting	(127)	0
21 Mining	(0)	0
22 Utilities	(74)	N/A
23 Construction	(369)	(7700)
31-33 Manufacturing	(1268)	(100)
42 Wholesale Trade	(1130)	(500)
48-49 Transportation & Warehousing	(4760)	(2100)
44-45 Retail trade	(19450)	900
51 Information	(374)	(700)
52 Finance & insurance	(1273)	(2200)
53 Real estate & rental	(1655)	1600
54 Professional- scientific & tech services	(2246)	(100)
55 Management of companies	(456)	600
56 Administrative & waste services	(2125)	(19500)
61 Educational services	(492)	1900
62 Health & social services	(2975)	3900
71 Arts- entertainment & recreation	(9091)	2400
72 Accommodation& food services	(27191)	5400
81 Other services	(6124)	(4600)
92 Government & non NAICs	(2214)	100
Total	(83393)	(20700)

Note: The estimation was made by author using the IMPLAN database, and the actual output change is calculated by author based on the data from the Metro Orlando Economic Development Commission.
N/A: data are not available.

Another interesting observation is that the actual employment tends to be on downward

trend as the estimated employment, even though they do not completely overlap (as shown in the

Figure 11). This is quite different from the line pattern of the output, in which the actual output

appears to still be on a growth path while the estimated output embarks on the opposite direction.

In this case, the employment seems to be an indicator more sensitive to reflect the negative pull of the economic downturn. The paired-sample t-test shows that the employment estimation is not statistically insignificant from the actual employment data at the 0.05 confident level (t=1.365, shown as Pair 2 in Table 13). This surprising finding may suggest that the I-O model is not able to capture the lag response (like in the output simulation), but it is perhaps suitable to assess the variables which exhibit a short response lag to an external shock (e.g. the employment in this case).
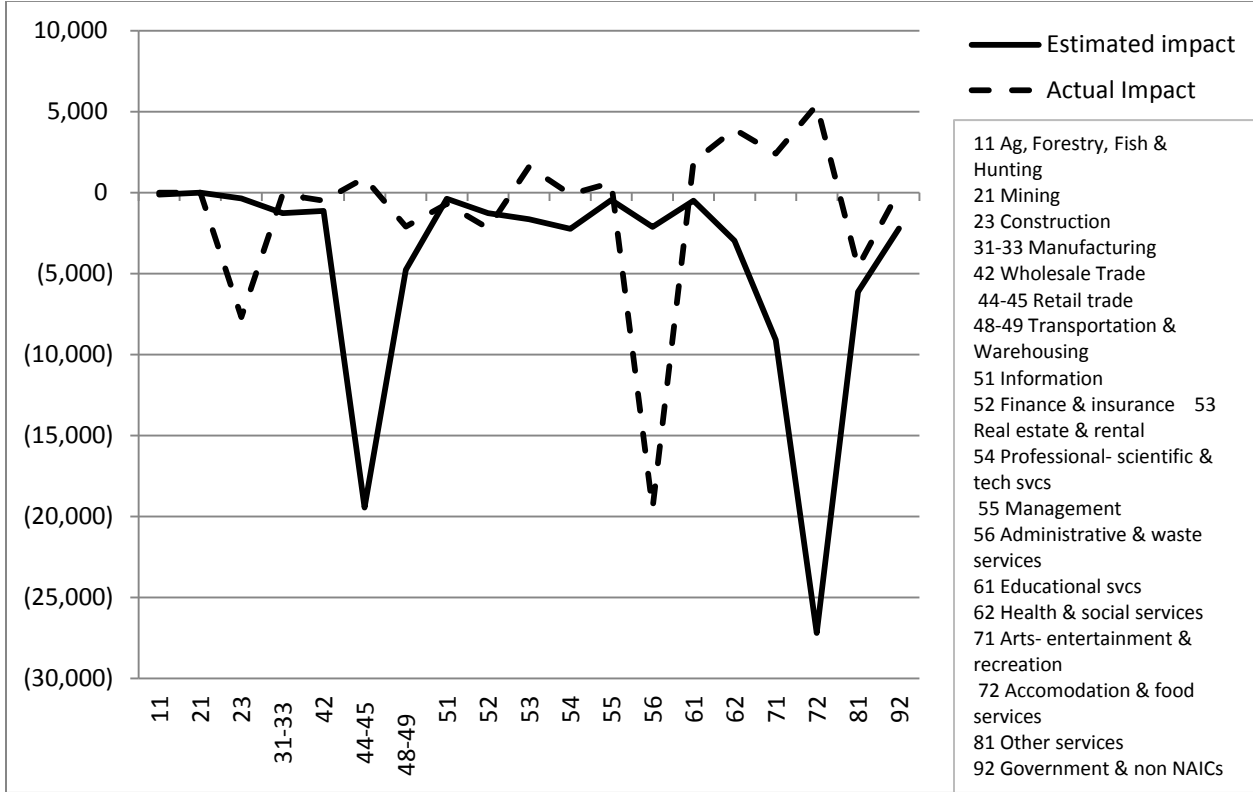
Source: Graphic made by the authors. The utility industry is excluded due to a lack of actual data
Figure 11: The line chart of the estimated and actual annual change in employment

As mentioned previously, the I-O model inclines to greatly overestimate the negative impacts on the tourism-related industries, thus it is not surprising to find that the accommodation and food services, the retail trade and the art-entertainment and recreation sectors are ranked as the top three sectors with largest discrepancy from the actual data. In addition, the I-O model overestimates the job loss in the health/social service and real estate/rental sectors by 6,875 and 3,255 respectively. Unexpectedly, the model underestimates the job reduction the construction and the administrative & waste services sectors. Especially in the administrative and waste service sector, there is a stark discrepancy of 17, 375 from the actual data. See Table 11 for more details on the employment discrepancy ranking.

Table 11: The employment discrepancy rankings

Ranking	Industrial Sectors	Discrepancy
1	72 Accommodation & food services	32,591
2	44-45 Retail trade	20,350
3	71 Arts- entertainment & recreation	11,491
4	62 Health & social services	6,875
5	53 Real estate & rental	3,255
6	48-49 Transportation & Warehousing	2,660
7	61 Educational svcs	2,392
8	92 Government & non NAICs	2,314
9	54 Professional- scientific & tech svcs	2,146
10	81 Other services	1,524
11	31-33 Manufacturing	1,168
12	55 Management of companies	1,056
13	42 Wholesale Trade	630
14	11 Ag, Forestry, Fish & Hunting	127
15	21 Mining	0
16	51 Information	(326)
17	52 Finance & insurance	(927)
18	23 Construction	(7,331)
19	56 Administrative & waste services	(17,375)

Source: made by the author.

The Impact on Occupational Income

All jobs in each of the 20 industries can be categorized into 23 major occupation groups at the most aggregated level. Due to the reasons of data manageability, this study chooses the accommodation and food service industry for the Occupation-Based model simulation and validation.

As explained previously, the Occupation-Based model assesses the annual wage change for a specific occupation of a certain industry by multiplying the I-O employment estimate for this industry and the employment ratio of each occupation and its annual full-time equivalent occupational wage. As the I-O model suggests that the accommodation and food service sector experienced 27,191 job loss (as in Table 10), the Occupation-Based model thus assumes that all occupations in this industry inevitably incur lay-off in proportion with their individual employment ratio, thus eventually result in annual wage decrease. The food preparation & serving related position, which constitutes 68.13% of the total employment as the largest occupational group in the industry, is projected to experience the largest annual wage reduction of $ 36.6 billion. Apparently, the modeling results tend to indicate that the higher employment ratio the occupation has, the larger annual wage it loses.

The only exception is the management occupation. With an employment ratio of 1.87%, the management occupation is predicted to decrease by $ 3.2 billion in annual wage. Its wage reduction is larger than the sales and related occupation, which takes up 5.43% employee in the accommodation and food service sector and is estimated to lose a total wage of $ 3.0 billion. The cleaning and maintenance related occupations as well as the office administrative support are

projected to experience large loss of $ 4.2 million and $ 3.8 million respectively (See Table 12 for details).
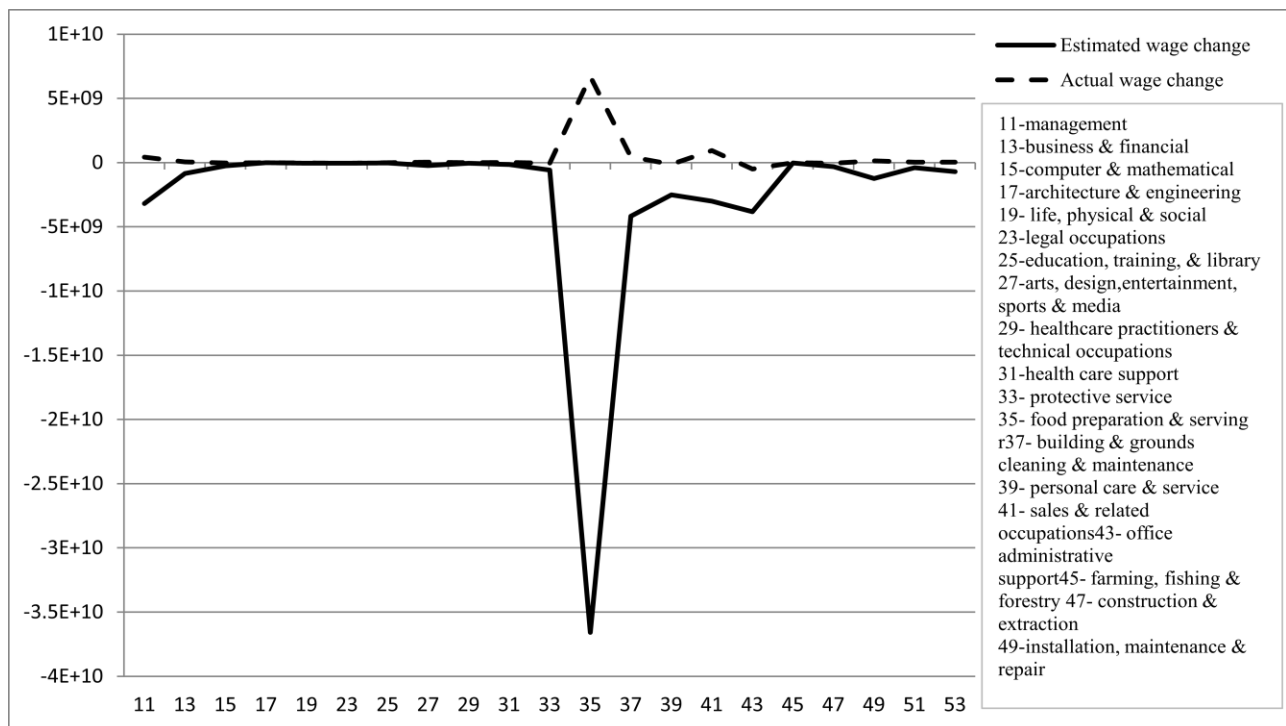
The actual annual occupational wage changes are at much less magnitude than estimated. As a matter of fact, quite many occupations have wage increase. The food preparation & serving related occupations pose the biggest gain of $ 6.7 billion in annual wage, a stunning total of $ 43 billion discrepancy from its estimation. The other top four occupations, which are predicted to suffer most annual wage reduction, turn out to attain the most increase except for the office administrative support occupations. The administrative occupation has an actual wage decrease of $495.5 million. However, there is still an extremely large discrepancy of $ $ 4.3 billion from the estimate (See Table 12 for details).

Table 12: The estimated and actual impact on occupational wage income

Standard Occupational Coding	Employment ratio in 2007	Estimated annual income change	Actual annual income change
35-0000 food preparation & serving related occupations	68.13	-36,569,360,158	6,712,468,650
37-0000 building & grounds cleaning & maintenance	8.15	-4,175,133,164	451,972,410
43-0000 office administrative support	5.79	-3,825,750,659	-495,576,080
11-0000 management occupations	1.87	-3,179,013,706	433,505,950
41-0000 sales & related occupations	5.43	-3,001,712,078	941,461,510
39-0000 personal care & service	4.19	-2,514,479,971	-124,485,830
49-0000 installation, maintenance & repair	1.61	-1,240,235,833	148,792,200
13-0000 business & Financial operations	0.66	-839,170,605	65,966,320
33-0000 protective service	0.96	-584,724,210	-52,502,480
51-0000 production	0.76	-404,836,678	41,808,300
47-0000 construction & extraction	0.31	-303,371,909	-46,111,960
15-0000 computer & mathematical occupations	0.18	-258,769,830	-16,296,540
27-0000 arts, design, entertainment, sports & media	0.25	-240,712,010	41,241,910
31-0000 health care support	0.13	-140,158,154	13,433,810
29-0000 healthcare practitioners & technical occupations	0.04	-50,162,724	-14,882,780
23-0000 legal occupations	0.02	-40,156,283	-45,580,580
19-0000 life, physical & social science	0.03	-38,715,138	-25,441,400
25-0000 education, training, & library occupations	0.04	-31,183,116	-12,526,090
45-0000 farming, fishing & forestry	0.02	-18,370,521	3,357,480
17-0000 architecture & engineering	N/A	N/A	N/A

Source: made by the author. N/A: data is not available.

Surprisingly, the paired-sample t-test finds that the estimated occupational annual wage changes are not statistically significant from the actual data at the 0.05 confident level (t=1.551, shown as Pair 3 in Table 13). Considering the strong influence of the outliner of food preparation and related occupation, (as illustrated in Figure 12), the t-test is repeated without the outliner. As expected, the estimated-actual difference is statistically significant (t=3.349, shown as Pair 4 in Table 13)

Source: made by the author.

Figure 12: The line chart of estimated and actual annual change in the occupational wage income

Table 13: Paired sample T-test statistics

		Paired Differences							Sig. (2-tailed)
					95% Confidence Interval of the Difference				
		Mean	Std. Deviation	Std. Error Mean	Lower	Upper	t	df	
Pair 1	estimatedoutput - actualoutput	-5.04285E8	6.48507E8	1.52855E8	-8.26780E8	-1.81790E8	-3.299	17	.004*
Pair 2	estimatedemploy - actualemploy	-3350.33333	10413.14680	2454.40224	-8528.66941	1828.00274	-1.365	17	.190
Pair 3	estimatedwage – actualwage	-3.15292E9	9.31496E9	2.03269E9	-7.39304E9	1.08720E9	-1.551	20	.137
Pair 4	estimatewage2 - actualwage2	-1.14648E9	1.53082E9	3.42301E8	-1.86292E9	-4.30034E8	-3.349	19	.003*

Source: made by the author. * denotes statistically significant at the 0.05 confidence level.

CHAPTER FIVE: DISCUSSION & CONCLUSION

Introduction

The goals of this study are twofold: (1) to apply the I-O model and the Occupation Based model to estimate the impacts of the current economic downturn on the tourism related industries and its ripple effects on the rest of the economic system at the local level, and (2) to verify the models' prediction accuracy by comparing the estimation results and the actual data. Taking the Metro Orlando Area as a case study, the study finds: while the models predicts that the recent economic crisis exerted a strong downward pressure on all industries in terms of output, employment and annual occupational wage, the actual data shows that the local economy was more resilient against the recent downturn than estimated. This chapter is going to explain what possibly have caused such significant discrepancies between the estimation results and actual data. Then, based on the discussion, implications are drawn for destination marketers, tourism researchers, and policy makers. Lastly, the limitations of the study and future research directions are presented.

Discussions

It should be noted that the model estimates and the actual data do not reflect the total impacts from exactly identical sources. The model simulations in this study consider the multiplier effects of the recent downturn on the tourism-related industries in the Metro Orlando Area, and the negative ripple effects the inflicted tourism industries passed on to the rest of the economic system, while the actual data reflects the total impacts of all industries' interactions under the

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influence of the economic crisis. Because of this, the apparent large discrepancies between the estimation results and actual data might not be attributed to the methodological inadequacy. This section makes an attempt to explain some high-ranked discrepancies by investigating the local economic activities between 2007 and 2008, which could possibly explain the worse/better-than-estimated performance of some industries.

Sectors with Performance Less Than Estimated

The construction industry and the finance & insurance industries are two of the sectors which the I-O model underestimates the most in both output and employment. As the current economic crisis was driven by the slumping housing market and tumbling financial sector, it is not surprising to find that the two industries suffered more than estimated. Reported by Wall Street Journal as of June 2008, Florida had been the second highest state after California in the numbers of foreclosure filings (Peck, 2008). As vacant homes increased and housing price fell at a rapid pace, the home builders in the Metro Orlando area was severely hampered, purportedly working on 59% fewer subdivisions home in the fourth quarter of 2007 than they did in the previous year (Jackson, 2008). Accompanying with the contracting construction activities, the employment outlook in this industry became dismal, with 7,700 job cuts between 2007 and 2008 as shown in Table 11. Surprisingly, the administrative and waste service industry led the construction industry and became the sector with the largest job reduction. A total of 19,500 jobs were cut in this industry , which represents 17,375 more cases of job loss than the IO estimate.

Better-Performing Sectors in Output

Among the top seven sectors which bear the largest positive discrepancy in output, three are tourism-related, namely, the accommodation and food services, the arts-entertainment and recreations and retail trade. Surprisingly, these tourism-related sectors except the retail trade underwent fairly strong growth despite a negative shock from the decreasing visitor expenditures. As a matter of fact, the accommodation and food services experienced an output increase of $375 million and $190 million respectively (as shown in Table 8).

One explanation could be that there were some expansion activities in these two sectors to counteract the negative effects. Between 2007 and 2008, the Metro Orlando theme park and hotel industries had been busily engaging in expansions. To maintain the visitors' repeated arrivals, Universal Orlando added the Simpsons Ride, and was constructing the 167-feet tall Hollywood Rip Ride Rockit roller coaster (Bevil, 2009). It also announced the 200-million-dollar investment on building the Wizarding World of Harry Porter, whose ground-breaking took place in the summer of 2007 (Bevil, 2010; Powers, 2007;). SeaWorld, meanwhile, introduced its 60-acre water park, Aquatica; and was gearing towards the completion of constructing the new undersea-themed thriller coaster, Manta (Bevil, 2009; Giezl, 2007). The Walt Disney World was also riding on the bandwagon of expansion. Early in 2007, the company announced a 900-acre luxury resort development plan, which "includes the luxury (Four Season) hotel, a 18-hole championship golf course, single- and multi-family vacation homes and fractional ownership vacation homes". In addition, the company also scheduled to build a 450-acre value-oriented retail, dining and lodging district on the western edge of the Disney resort (The Disney Company, 2007).

The Hilton hotel family did not stay idle. The 497-room Waldorf Astoria, paired with the 1000-room Hilton Orlando Bonnet Creek, was under construction in 2007. Being a highly anticipated $ 550 million development, the two hotels completed the construction in May 2008, and were slated to open in October 2009 (Waldorf Astoria Orlando, 2008).

While the expansions in the theme park and hotel sectors could be said as opportune occurrences in the area, more likely, they were manifestations of the investors' strong confidence on the area's competitiveness as a tourist destination and its capability in navigating through the crisis. Arguably, such confidence greatly stemmed from the concerted efforts of the private and public efforts in fending off the negative impacts of the crisis. Though in a challenging economic time, the area's convention and visitor bureaus were still provided with ample funds to sustain constant and effective marketing campaigns inside the US and abroad. According to its 2008 annual budget, the Orlando/Orange County CVB was granted with a total of $ 64.3 million, and planned to spend $ 42.5 million in leisure and travel industry marketing in that year (the Orlando CVB, 2008b).

In 2008, the marketing organization launched a "creativity"-centered campaign towards domestic meeting planners, actively promoting the Metro Orlando area as the business destination "where creative minds meet". It also cooperated with AirTran Airways, JetBlue, Southwest Airlines, Travelocity and Visit Florida and initiated the "Say Yes to Orlando" campaigns towards domestic leisure visitors. In addition, the organization reached out to main foreign feeder markets (e.g. The UK, Canada, and Mexico) with diverse marketing programs (Orlando CVB, 2008c).

The private sector was also actively involved. The representatives of and the lobbyists for the area's tourism industry maintained mutual communications with local government officials, sharing the industry's concerns and strategies on effective use of tourism tax in fighting against the economic crisis (Garcia, 2009). To attract more visitors, the local tourism venues were offering ticket deals, hotel discounts and value meals. Both Disney World and Universal, partnered with their on-property hotels, offered a free overnight stay in hope of capturing extra park ticket and merchandise revenues (Powers, 2009). From the author's observations, there was a thread through most of the strategies employed. That is, they focused on the value concept and maintained price integrity so that a tarnished destination image could be avoided.

The area's strenuous efforts of maintaining the tourism industry viability echoed the essential strategies summarized in the study on the tourism impacts of the 1997 Asian Financial Crisis in East Asia by Prideaux (1999). As suggested by the researcher, for a destination to effectively mitigate the harm from an unfavorable economic climate, governments should maintain if not boost the tourism marketing funding; Destination marketing organizations should actively engage in promotional campaigns and re-oriented promotional priorities towards relatively robust source markets; Private sector should step up for more promotions through both cooperative and individual efforts. The successful implementation of these strategies secured Thailand to withstand the turbulent shifts of the Asian financial crisis, and so did the Metro Orlando between 2007 and 2008, which was manifested by a quite stable visitor flow (only 0.1% decrease from 2007 to2008), and the increasing output and employment.

Besides the tourism-related industries, the professional-scientific & technological service as well as the health &social service are other two sectors which exhibit large differences in

output between estimated results and actual data. As Table 8 shows, the former sector reaped an impressive gain of $ 526 million and the latter sector had an increase of $374 million. The outstanding performance of these two sectors against such a volatile time could be mainly if not all credited to the local government's continuous endeavors in promoting a vibrant and diverse regional economy. In 2008, the area secured some major projects on life science and medical technology. These projects included the Disney's Children Hospital, the $ 656 million Veteran Affair Hospital medical complex, a $ 40 million research fund received by the Burnham Medical Research Institution, and an emerging "medical city" clustered with a pediatric healthcare complex, medical research institutions, medical labs, a college of medicine and the like (Gilley, 2008). Closely related to the two above-mentioned uprising sectors is the information technology sector, which also experienced a moderate growth of $119 million.

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 counteracting impacts from other occurrences such as some sectors' expansion activities by capital formation. Therefore, the apparent large I-O overestimation of negative impacts cannot be definitely said as an evidence of complete methodological invalidity. However, the above analysis does expose that the company's strategic orientation and government policy stance do profoundly influence the extent which the crisis could damage the local tourism-related industry and the economic system. Unfortunately, it has to be admitted that the I-O model does not specifically incorporate these factors, and thus has limited capability in capturing the feedback effects of the reactions from the private and public sectors.

Better-Performing Sectors in Employment

In term of the employment estimation, among the top seven sectors in discrepancy ranking, four are tourism-related, which are the accommodation& food services, retail trade, art-entertainment & recreation and transportation & warehousing (see Table 12). Indeed, it is not difficult to conceive that the employment growth in these sectors might be corresponding to some expansion activities, which brought new capital injection to some local theme parks and hotels.

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. 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 the tourism-related sectors to deploy automation and mechanization to replace personal interactions. As in this case, the area saw only a slight decrease of 0.03% in visitor arrivals in 2008, thanks to the large increase of 18.39% in oversea visitor arrival (as shown in 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 prepare sufficient labor to provide premier service to visitors, whose arrival was relatively stable. Since the I-O model in this study only estimates the effects of the drastically decreased total visitor expenditure, it does not capture the 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 downturn. Because the I-O model does not account for the tourism-related industries' ability in absorbing surplus labor, it over emphasizes the crisis's negative effects on the employment of these industries.

Interestingly, the two sectors of the information and professional-scientific & technology services, which experienced large surges in their output, slashed quite a number of jobs. Actually, the information sector cut 326 more jobs than the I-O model predicted. The output and employment results in opposite directions could indicate that the productivity and efficiency of the two sectors were enhanced during the downturn. Being capital intensive, the two sectors highly depend on capital assets rather than labor, and employment reduction tends to become the first cost-cut strategy in order to survive in this economic crisis. However, in the macroeconomic perspective of perhaps local government officials, this does little to help create employment and curb rising unemployment in the area. Fortunately, the tourism-related industries exhibited a complimentarily high versatility in absorbing excessive labor force in the area.

Another noteworthy finding is that the difference between the estimated and actual results in employment is not statistically significant while the ones in output and occupational wage are. This implies that the estimated employment is close to the actual results, while the other variables deviate greatly from the reality. The observation of the actual annual change data in employment and output reveals that generally the employment is on a downward trend while the output was still on the upward trajectory. It seems that employment is an indicator which exhibits a shorter lag than output in reflecting the negative impacts of the recent economic crisis. Because the I-O model does not consider the factor of response lag in its simulation, it could be more accurate in estimating impacts of the variables which have shorter lag response to an external shock (e.g. employment in this case). It should be reminded that this finding should be interpreted with cautions, because the sample size of the employment data is quite small (only 19 pairs).

<center>Overestimation in Occupational Income</center>

Apparently, the Occupation Based model has greatly overestimated the decreases in wage income across all occupations in the accommodation and food service sector. The model projects that the larger the occupation group is in the industry employment, the more severely it will be inflicted. For example, it suggests that workers on positions of food preparation & serving, cleaning & maintenance, administrative support and sales will see some of the largest wage loss as a group. On the contrary, in reality, all these groups have experienced remarkable growth in the total annual wage income. Especially the food preparation & serving related occupation, the

major constituent of employees in the accommodation and food service industry, have the largest wage increase of $ 6.7 billion.

A couple of reasons could possibly cause such enormous differences. One is that the Occupation-Based model highly depends on the accuracy of the IO employment estimates. Because the IO model overestimates the job losses in the accommodation and food services, as discussed previously, the decreases in its occupational wage income are exaggerated. Another reason could be the unrealistic linear relationship between industry employment and occupational employment, as assumed by the Occupation-Based model. In the hospitality and tourism industry, the main producers and deliverer of valuable products and services are the front-line employees, such as those on the "food preparation and serving related" and "cleaning & maintenance" positions in the case of "accommodation and food service" industry. As a matter of fact, these occupations respectively take up 63.18% and 8.15% of the total employment in the "accommodation& food service" industry of the Metro Orlando area. When a negative shock hits, it is unlikely that the employees on these essential positions will be massively laid off corresponding to their large ratio of occupational employment. Rather, they are the biggest asset. As Table 12 shows, most frontline positions have seen decent wage increases, while the traditionally "high-value" positions such as legal service have experienced considerable decrease.

<u>**Conclusions**</u>

The I-O model has been extensively used in tourism impact analysis in investigating topics as diverse as the impacts of tourism policies, facility construction, sport events/festivals as well as the 9/11 terrorist attack. For a local tourism destination with limited financial resources, the I-O model appears to be more practical because it usually costs less to construct than some more sophisticated model such as the Computable General Equilibrium model (Dwyer, Forsyth & Spurr, 2003). However, the impact studies utilizing the I-O model usually takes its estimation results as an end point and do not put them into the perspective of reality. The lack of accuracy validation not only elicits some researchers' skepticism on the model, but also could result in serious consequences in misleading policy endorsement and project investments. As a derivative of I-O model, the Occupation-Based model is able to apply the I-O employment estimates to further assess the annual wage income across occupations of various industries simulated by an external shock. Although it is suggested as a promising tool in analyzing impacts of local sport events (Daniels, 2004; Daniels, Norman, & Henry, 2004), its estimation results are also not held in check with the reality. Moreover, its applicability in investigating the impacts of a negative event has not been explored.

This study explores the estimation accuracy issue of the I-O model and the Occupation-Based model in the case study of investigating the impacts of the recent economic crisis on the tourism-related industries and its ripple effects on the economic system in the Metro Orlando Area. The study results show that there are large differences between the estimated and actual results in the annual changes of output, employment and occupational wage income in the accommodation and food service sector. The paired-sample t-test statistics further reveal that the

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differences are statistically significant at a 0.05 confidence level except in employment (See table 13). As the study examines the local economic activities between 2007 and 2008, it finds that the I-O model and its derivative do not incorporate some counteracting factors into their simulations, such as supportive government policies, rigorous marketing activities, optimistic business strategic orientation and the flexibility of absorbing surplus labor of the tourism-related industries. Therefore, the models have the tendency to overestimate the negative impacts of the recent crisis, especially on the tourism-related industries. However, the significant differences among the estimated and actual results can not be solely attributed to the methodological limitations, because the actual data reflect the total effects from the crisis on the entire regional economy while the simulations presented here only focus on impacts from the crisis-led decrease in visitor expenditures. Yet, it is highly surprising to find that the area's economy in reality demonstrate higher resiliency than estimated even when it had to overcome the crippled construction and finance sectors.

Study Implications

The study provides meaningful insights for tourism professionals, policy makers and researchers. It puts the modeling results into the perspective of reality and helps the aforementioned tourism stakeholders better understand and utilize the I-O model and the Occupation-Based model. The study also discovers the unexpected resiliency of the Metro Orlando economy and investigates possible reasons behind it. Thus, it generates some insights for other tourism destinations in successfully navigating through an economic crisis. These implications are elaborated in the third aspects as follow.

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First, although the study suggests that the I-O model has the propensity to overestimate the impacts, it does not totally denounce the model's significance in impact analysis. Rather, this study should serve 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 important 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. Thus, the tourism professionals and policy makers should not solely focus on the absolute estimation value, but should also pay attention to a set of researcher's assumptions as to what variable is set for the direct exogenous shock. They should consider what other external shocks could affect the relationship among investigated variables, and in what way. As in this case study, the supportive government policies, active marketing campaigns and optimistic business strategic orientation could be considered to offset the negative impacts of decreased visitor expenditures on the area's output, employment and occupational wage income.

Tourism researchers, on the other side, should clearly utter the assumptions and their implications for the modeling results. They should also point out to their readers or audiences the principal exogenous factors that would strongly influence the simulation results. Also, as the I-O model has the overestimation tendency, perhaps it would be more appropriate to express its estimation results in the upper-bound statements such as "the total impacts of $xx decrease in visitor expenditure result in no more than $xx decline in the output in accommodation and food service". In addition, researchers could seek to improve the prediction accuracy of the I-O model by applying the Delphi technique. Some researchers suggest that the Delphi technique can help

adjust forecasting results to better reflect reality based on opinions of a group of experts in a related field (Landeta, 2006; Song & Lin, 2010).

Third, the unexpected growth in many tourism-related industries in the Metro Orlando area between 2007 and 2008 has demonstrated that effective strategies to fend off the negative impact of the current economic crisis include continuous supports with tourism funding, active marketing campaigns, and regular communications between related government official and tourism professionals. The observation of how different industrial sectors responded to the apparent negative shock in term of employment might have revealed an interesting argument regarding the under-recognized versatility and flexibility of the tourism-related sectors. 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 information sector. For the tourism professionals and policy makers, this study has highlighted that economic crisis not only brings threats but also opportunities for the tourism industry. Okumus, Altinay, & Arasil (2005) studied the perceptions of the hotel managers in Cyprus on the effects from the 2001 Turkey's economic crisis. They found that the hotel managers generally overlooked the opportunities brought by the economic crisis. While we originally expect the tourism industries would be vulnerable in an economic recession, this study has shown that they may have been a strong buffer for soaring unemployment. Also, in a much larger talent pool, the tourism industries are able to select better-quality workers.

Study Limitation and Future Research

There are some limitations of this study that should be noted. First, as mentioned earlier, the modeling estimates and actual data are not the results from the exactly same sources. While the I-O model takes the decrease in total visitor expenditures between 2007 and 2008 as a direct shock, the actual data reflects the total impacts from the current crisis on the whole economic system. However, it is practically impossible to separate the share of negative impacts resulted from the decreased visitor expenditures out of the actual total, thus lending to no way in directly comparing the actual and estimated results initiated by the expenditure drop. Second, this study mainly uses secondary data for the model simulation, and the validity of these data is assumed. At the best knowledge of the author, the changes in total visitor expenditures have been conservatively estimated to reflect the monetary flow change in the area. Third, this study makes an attempt to explain the large discrepancies between the estimation results and actual data. However, these explanations might not fully account for the entire discrepancies, and their causal relations need to be confirmed by further research. Fourth, the study only investigates the one year between 2007 and 2008, which was the very beginning of the recent economic crisis. A further investigation is needed to understand how the progression of the economic recession impacts a local tourism industry and economy system. Also, other tourism destinations should be investigated in better understanding how various industries respond to the recent economic crisis against the I-O estimation.

Another direction for future research is to replicate the study with the Computable General Equilibrium (CGE)model. Because the CGE model is able to set discretionary constrains on various exogenous factors such as business investment, government policy and sector labor

distribution as mentioned in this study. It would be interesting to find whether the CGE simulation results will be close to the real numbers on the ground by manipulating these exogenous variables to better reflect reality.

Lastly, a field-based research needs to be conducted to investigate the labor mobility among industries during the economic downturn period. The issue can be examined from the employer's perspective. For example, what are the human resources strategies during the tough economic time? What are the reasons to lay off employees and rehire new ones? It can also be investigated from the employee's perspective. Some research questions can be: what positions and industries do they look for a new job after being unemployed? Why do they look into these positions and industries? Future research is warranted to address these issues.

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