Taking the Pulse of Tourism in Hawaii

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ABSTRACT

This study examines the dynamic employment behavior of Hawaii's tourism related industries due to external shocks. A better understanding of how industrial employments differ in response to external shocks may be useful to policymakers and other stakeholders in designing economic development policies or response programs to help mitigate adverse employment impacts. Using VAR analysis, the empirical results suggest that shocks in visitor arrivals and crude oil prices significantly help predict the employment changes in the food and drinks sector. Statistically significant bi-directional relationship exist between visitor arrivals and employment in the accommodation sector. No strong relationship was detected between shocks in visitors' arrivals, interest rate changes, and crude oil prices with the employment behavior in arts and entertainment sector. The statistically significant uni-directional causal relationship in the stochastic changes in interest rate to visitor arrivals validates the great sensitivity of demand for travel to financing constraints.
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INTRODUCTION

Tourism in Hawaii has long been touted as its main driving source of export earnings. However, with continued integration of the global markets and the emergence of competing travel destinations as well as the recent financial crisis, tourism in Hawaii proved to be vulnerable from external shocks and competition.

Beginning the second half of 2008, Hawaii saw a steep drop in visitors' arrivals due to continued tightening in airlift supply and rising jet fuel prices that hammered down the airline industry. The recent vulnerability of Hawaii's tourism is not only coming from the supply side but sadly enough, coupled too from lower demand due to the weakening of the general economy in the mainland US caused by the housing debacle and credit crunch which, are also showing signs of spreading to other countries.

To get a better handle on the economic impact of these external shocks to tourism in Hawaii, this study takes a closer look at the dynamic effect on employment behavior of related industries associated with tourism due to external shocks. A better understanding of how industrial employments differ in response to external shocks may be useful to policymakers and other stakeholders in designing economic development policies and overall strategic planning. For example, infrastructure building and aggressive expansion of hotel constructions may lead to misallocation of resources if the accommodation sector proved to be vulnerable to demand shocks such as visitor arrivals, financing constraint and/or supply shocks in oil prices. So, one may argue that better understanding of external factors that affect employment dynamics in tourism related industries can help direct workforce response programs in order to mitigate adverse employment impacts.

Tourism research studies have evolved considerably over time. Much of the applied or empirical tourism studies deal with factors affecting tourism demand and its effect on the economy. Several studies (Huang & Min, 2002; Pizam & Fleischer, 2002; Okumus, Altinay & Arasli, 2005; Bonham, Edmonds & Mak, 2006; Wang 2009) have examined the effects of natural disasters and man-made crisis or conflicts on tourism demand and planning. The interaction between macroeconomic variables and tourism has also been examined (Lee, 1995; Lim, 1999; Lim & McAleer, 2001; Dritsakis, 2004). Most frequently used macro variables are income, price level, and exchange rates.

In the area of tourism management, a paper by C.M Hall & S.J. Page (2009) provided a substantive review of the development of geographical contributions to the study of tourism ranging from themes of explaining spatiality, tourism planning, and economic development issues. Along the same notion of "tourism geography," the paper of Milne & Ateljevic (2001) explored the complex links between the tourism industry and local economic development process by reviewing major theoretical frameworks and the authors' subsequent argument for the need to embed understanding of tourism in a broader socio-cultural context.

Undoubtedly, tourism as a source of export earnings is vital to regional economic development and growth. Given the relationship of tourism with a great range of economic activities and its contribution to the economy as a whole, it is important to examine the relationship between tourism demand and industrial employment dynamics. Therefore, this paper intends to uncover dynamic employment behavior of Hawaii's tourism related industries in response to external shocks.

OVERVIEW OF TOURISM RELATED INDUSTRIES IN HAWAII

In accordance with the Tourism Satellite Account, tourism industry "represents the group of establishments whose main activity is the same tourism characteristic activity or the activity that typically produce tourism characteristic products." Approximating the typology set in the 2008 Tourism Satellite Account (TSA) report, the following industrial broad sectors will be deemed as tourism related industries in Hawaii namely: Accommodation; Food and Drink Services; Arts, Entertainment and Recreation, and to a certain extent the sectors of Transportation and Retail Trade.

The current industrial landscape in Hawaii relative to the national economy as shown in Figure 1 reflects the dominance of tourism or visitor related industries. Tourism-related industries in Hawaii such as Accommodation and Food, Transportation, and Arts, Entertainment and Recreation are outperforming the national level in terms of employment concentration.

To get a better idea as to how these industrial jobs concentration in Hawaii relative to the national economy have changed over time, location quotients were calculated for the period of 2002-2007. Location quotient (LQ) is commonly used to measure the extent to which an industrial sector in a local economy is more specialized or concentrated relative to a larger reference economy such as the national level. It is simply calculated by taking the ratio of a particular industry's share of local employment to the same industry's share of the national employment. Industries with a location quotient greater than one are typically export-oriented industries that bring or create new source of wealth for the economy.

As can be seen in Table 1, Hawaii's highly concentrated industries, that is, those with a location quotient greater than one belong to tourism related industries. However, what may seem alarming is the fact that majority of those industries show a declining LQ over time, which may suggest the erosion of a major part of Hawaii's export base. Hence, it is deemed important to examine the sensitivity of the time path of employment in tourism related industries in response to external shocks.

EMPIRICAL DATA AND MODEL SPECIFICATIONS

Given that changes in visitors' demand preference sets can induce changes in the range of activities and products supplied by tourism related industries and at the same token, changes in employment or activities of those industries can have an effect on visitors' demand for those products and activities, presents a compelling case to treat each variable symmetrically. The Vector Auto Regression (VAR) analysis provides an alternative non-structural approach to modeling the relationship between / among several variables. The VAR approach avoids the need for tight structural modeling especially when we are not confident that a variable is actually exogenous or endogenous. The VAR model uses only past regularities and historical patterns in the data as a basis for forecasting and for analyzing the dynamic impact of random disturbances on the system of variables.

The simple mathematical representation of a VAR is:

$$Y_t = A_1 Y_{t-1} + \ldots + A_p Y_{t-p} + B X_t + \epsilon_t$$

where Y_t is a k vector of endogenous variables, X_t is a vector of exogenous variables such as the constant terms and seasonal dummies, $A_1 \ldots A_p$ and B are matrices of coefficients to be estimated and ϵ_t is a vector of residuals or innovations that may be contemporaneously correlated but are uncorrelated with their own lagged values and uncorrelated with all of the right-hand side variables.

In this study, to analyze the dynamic behavior of regional employment in tourism related sectors to various external shocks, I constructed a log linear VAR model. I examined the traditionally accepted tourism related industrial sectors of Accommodation, Food & Drink Services and, Arts, Recreation and Entertainment. Also included in the VAR system are the total number of visitor arrivals as a measure of tourism demand and other external macroeconomic variables such as the prime lending rate and imported crude oil prices. Intercept and seasonal dummies were also included in the VAR specification.

To determine the direction of influence between variables, Granger causality test is used to measure whether current and past values of a given variable (example, visitor arrivals) help to forecast future values of another variable (example, jobs in the accommodation sector). The causality test may suggest uni-directional or bi-directional influence between variables.

Several diagnostic tests were done to determine the stationarity of data series and lag length criteria to specify the VAR model. The monthly employment data for the tourism related sectors were taken from the Hawaii's Department of Business, Economic Development & Tourism, prime lending rate and imported crude oil prices data cover the period of January 1990 to August 2008.

EMPIRICAL RESULTS

Based on several diagnostic lag length criteria such as the sequential modified Likelihood Ratio test (LR), Final Prediction Error (FPE) and Akaike Information Criterion (AIC), a lag length of 12 months is selected. It should be noted that it is important to determine the appropriate lag length to use since choosing too short of a lag length could lead to misspecification while too long a lag length leads to wasting of degrees of freedom.

To test for stability or stationarity of the data series, several unit root tests were used. Using the Augmented Dickey-Fuller (ADF) test on individual series with intercept included, the null hypothesis of non-stationarity was rejected only for the Accommodation series. Using the same test in first difference led to the rejection of the null hypothesis for all series. To complement the ADF with another test of greater power, KPSS test was also conducted. Under the null hypothesis of stationarity and in levels form, the test led all series to reject the null at either 1%, 5% and/or 10%. The same test was conducted in first difference and which then led to failure to reject the null hypothesis.

Granger Causality Test

In a VAR model, causality is determined if the current and past values of the excluded variable help predict the future value of another variable. In short, causality is detected if we are able to reject the null hypothesis that a given variable process does not Granger cause another variable. Table 2 presents the results of the VAR Granger causality test. The test is meaningful only if variables are stationary and so the test was conducted using a VAR in first difference. Two VAR model specifications were presented namely, the unrestricted VAR and the vector error correction (VECM) model. Although differencing variables makes non-stationary series stationary, it is quite possible that there may be linear combination/s of integrated variables that is stationary or variables are said to be cointegrated. But given the sensitivity of the cointegration test to choice of lag length and options in conducting the test, I've decided to present both test results to provide insights as to how sensitive or robust the causality results to different model specifications.

Based on the empirical results, there is a strong bi-directional and statistically significant causal relationship between visitor arrivals and employment changes in the Accommodation sector. This finding is robust in both model specifications. Bi-directional relationships were also detected between employment behavior in Accommodation and Food & Drink sectors, as well as between Arts, Recreation & Entertainment, and the Accommodation sectors. This finding of feedback between these tourism related sectors maybe reflecting the growing trend of bundling or packaging of tourism characteristic consumption products and services in Hawaii. Surprisingly, no significant relationship was detected between stochastic changes in imported crude oil prices and changes in Accommodation employment sector.

A statistically significant and uni-directional relationship was also detected between visitor arrivals and employment changes at the Food and Drink sector. Unlike the Accommodation sector, Food and Drink sector exhibit significant correlation with stochastic changes in the prime lending rate under the VECM. However, in both model specifications, stochastic changes in imported crude oil prices displayed a uni-directional

effect on the Food and Drink sector. This may suggest the greater sensitivity of operational &/or variables costs in the Food and Drink sector to energy cost relative to other tourism related industries.

Besides the feedback relationships detected between Accommodation and Arts, Entertainment & Recreation as well as between Food & Drink sector and Arts, Entertainment & Recreation, no significant causal relationships were detected with visitor arrivals, prime lending rate and imported crude oil prices and the Arts & recreation sector. The lack of causal relationships in the Arts, entertainment & recreation sector with visitor arrivals was quite puzzling given that tourism has now evolved into different dimensions beyond passive visit to a certain destination, e.g., notions like cultural tourism, edu-tourism, and specialty tourism come to suggest that tourists prefer to "do" something in a place of destination. An alternative hypothesis to this lack of causal relations might be that Arts, entertainment & recreation sector in Hawaii maybe considered a transitioning or transforming industry. Transforming industries are usually older growth base industries that have reached the peak of their competitiveness.

The other interesting uni-directional and highly statistically significant causal relationship was detected in the stochastic changes in prime lending rate to total visitor arrivals. This finding validates the great sensitivity of demand for travel as a discretionary expenditure to financing constraints. In addition, the lack or absence of statistically significant causal relationship between crude oil prices and visitor arrivals may seem puzzling given the dependency of tourism traffic into the Hawaiian island on airlift supply. One may probably argue that the lack of correlation was reflecting the various ingenuous ways employed in the travel industry of bundling airfare, accommodation &/or other activities that can minimize the sensitivity of travelers to changes in the crude oil prices which may eventually affect travel ticket prices.

SUMMARY OF FINDINGS

This study examines the dynamic employment behavior of Hawaii's tourism related industries due to external shocks. A better understanding of how industrial employments differ in response to external shocks may prove to be useful to policymakers and other stakeholders in designing policies or response programs to help mitigate adverse employment impacts in tourism related industries.
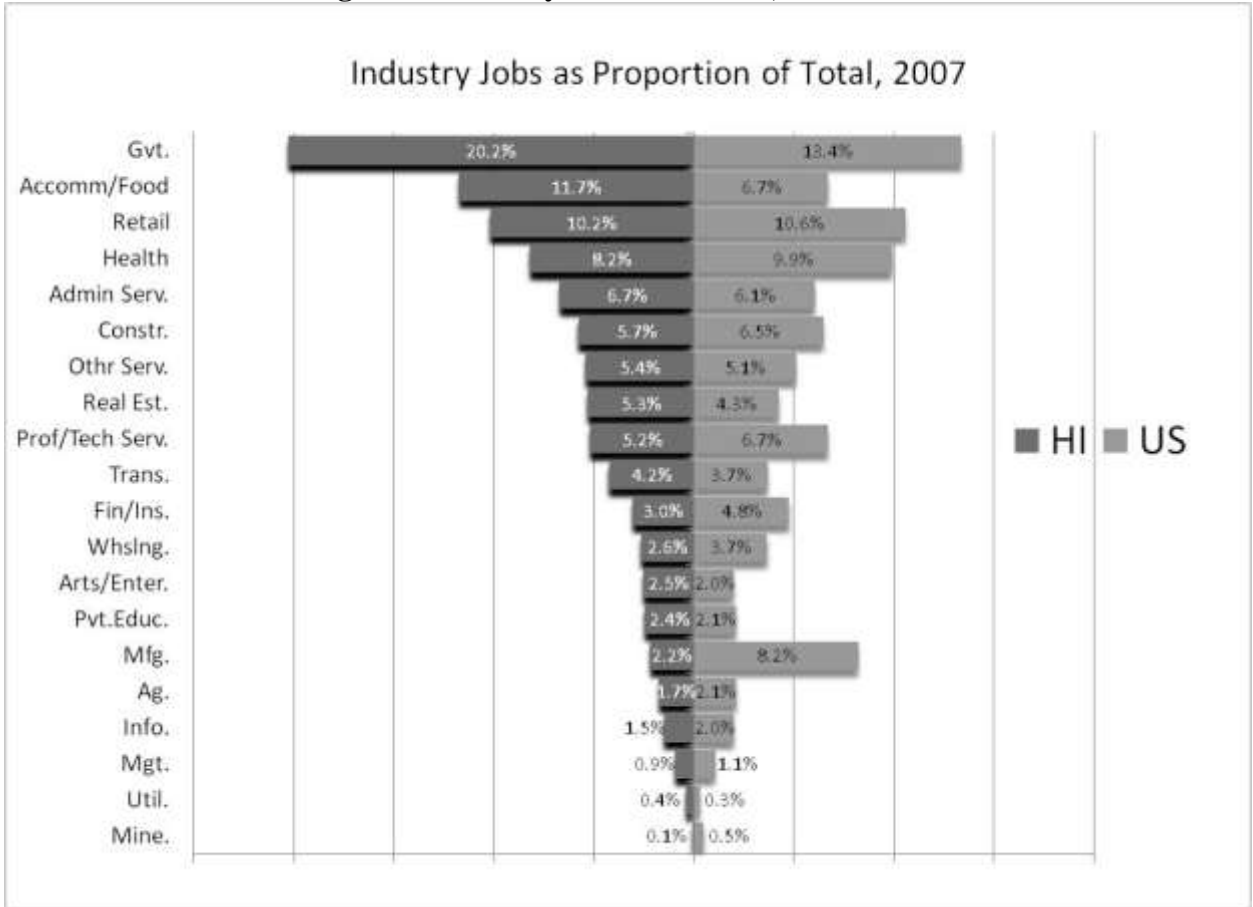
Using VAR analysis and two model specifications, the Granger causality test results suggest that shocks in visitor arrivals and crude oil prices significantly help predict the employment changes in the food and drinks sector. Statistically significant bi-directional relationships exist between visitor arrivals and employment in the accommodation sector. No strong relationship was however detected between shocks in visitors, interest rate changes and crude oil price shocks with the employment behavior in the Arts, entertainment and recreation sector.

Significant feedback relationships were detected between employment dynamics in the Accommodation and Food and Drink service sectors as well as between Arts, entertainment and the Accommodation sectors. This finding of feedback between these tourism related sectors maybe reflecting the growing trend of bundling or packaging of tourism characteristic consumption products and services in Hawaii. A statistically significant causal relationship was also detected in the stochastic changes in interest rate

to total visitor arrivals. This finding validates the great sensitivity of demand for travel, a widely considered discretionary expenditure to financing constraints.

Undoubtedly, the tourism industry in Hawaii has been the principal driver of growth for many decades but given the dynamic and new economic global order; it proved to be vulnerable to external shocks and contributes to unwanted economic instability. Henceforth, the need to diversify Hawaii's economy has taken on more urgency in the state's economic development policy arena. However, proper identification and subsequent nurturing of potential and emerging industry drivers outside of tourism is a challenging undertaking. Although there may be new opportunities in these other industries, it would be useful to examine the transitional costs involved and implications of this economic diversification on deep rooted traditional tourism related industries in Hawaii for future study.

Figure 1: Industry Jobs in Hawaii, 2007

Industry Jobs as Proportion of Total, 2007

Industry	HI	US
Gvt.	20.2%	13.4%
Accomm/Food	11.7%	6.7%
Retail	10.2%	10.6%
Health	8.2%	9.9%
Admin Serv.	6.7%	6.1%
Constr.	5.7%	6.5%
Othr Serv.	5.4%	5.1%
Real Est.	5.3%	4.3%
Prof/Tech Serv.	5.2%	6.7%
Trans.	4.2%	3.7%
Fin/Ins.	3.0%	4.8%
Whslng.	2.6%	3.7%
Arts/Enter.	2.5%	2.0%
Pvt.Educ.	2.4%	2.1%
Mfg.	2.2%	8.2%
Ag.	1.7%	2.1%
Info.	1.5%	2.0%
Mgt.	0.9%	1.1%
Util.	0.4%	0.3%
Mine.	0.1%	0.5%

Table 1: Hawaii's Industry Location Quotients, 2002-2007

Top Industry Location Quotients			
Description	2002 LQ	2007 LQ	% Change LQ
Accommodation and food services	1.78	1.72	(3%)
Government	1.59	1.52	(4%)
Arts, entertainment, and recreation	1.31	1.28	(2%)
Real estate and rental and leasing	1.27	1.25	(2%)
Educational services	1.23	1.14	(7%)
Administrative and waste services	1.08	1.06	(2%)
Transportation and warehousing	1.03	1.12	9%
Other services, except public administration	1.02	1.06	4%
Utilities	0.97	1.13	16%
Retail trade	0.97	0.95	(1%)
Agriculture, forestry, fishing and hunting	0.90	0.80	(11%)
Health care and social assistance	0.84	0.82	(3%)
Management of companies and enterprises	0.81	0.83	2%
Professional and technical services	0.81	0.77	(5%)
Construction	0.76	0.91	21%
Information	0.75	0.73	(3%)
Wholesale trade	0.71	0.71	1%
Finance and insurance	0.65	0.63	(3%)
Manufacturing	0.25	0.27	5%
Mining	0.13	0.13	(5%)

Table 2: VAR Granger Causality/Block Exogeneity Wald Tests

	Unrestricted VAR Model		Vector Error Correction Model	

Dependent variable: D(LVISITOR)

Excluded	Chi-sq	Prob.	Chi-sq	Prob.
D(PRIMELENDINGRATE)	21.01431	0.0502*	19.68859	0.0732*
D(LIMOIL)	9.008301	0.7022	9.060381	0.6978
D(LACCOM)	26.29488	0.0097*	26.13601	0.0103*
D(LFOODDRINK)	14.51993	0.2687	10.62371	0.5614
D(LARTSREC)	5.87548	0.9222	5.518283	0.9384

Dependent variable: D(LACCOM)

Excluded	Chi-sq	Prob.	Chi-sq	Prob.
D(LVISITOR)	57.98597	0.0000*	32.31669	0.0012*
D(PRIMELENDINGRATE)	15.96726	0.1927	15.97825	0.1922
D(LIMOIL)	12.39238	0.4147	10.43079	0.5782
D(LFOODDRINK)	26.25155	0.0099*	22.87921	0.0288*
D(LARTSREC)	26.10863	0.0104*	24.0429	0.0201*

Dependent variable: D(LFOODDRINK)

Excluded	Chi-sq	Prob.	Chi-sq	Prob.
D(LVISITOR)	27.71897	0.0061*	20.94001	0.0513*
D(PRIMELENDINGRATE)	15.76532	0.2022	19.71701	0.0726*
D(LIMOIL)	22.62111	0.0311*	25.11375	0.0143*
D(LACCOM)	17.91915	0.1182	24.8803	0.0154*
D(LARTSREC)	25.08919	0.0144*	31.23555	0.0018*

Dependent variable: D(LARTSREC)

Excluded	Chi-sq	Prob.	Chi-sq	Prob.
D(LVISITOR)	5.311189	0.9468	5.296696	0.9473
D(PRIMELENDINGRATE)	8.259109	0.7646	7.867386	0.7954
D(LIMOIL)	8.002366	0.7849	8.527754	0.7426
D(LACCOM)	20.28039	0.062*	16.50435	0.1692
D(LFOODDRINK)	14.89191	0.2474	14.03145	0.2987

REFERENCES

Bonham, C., C. Edmonds & J.Mak. (2006). The Impact of 9/11 and other terrible global events on tourism in the US and Hawaii. *East-West Center working papers Economic series* no. 87.

Dritsakis, N. (2004). Cointegration analysis of German and British tourism demand for Greece. *Tourism Management*, 25, 111-119.

Enders, Walter. (1995). *Applied Econometric Time Series*. John Wiley & Sons, Inc.

Energy Information Administration's website. http://www.eia.doe.gov/

Federal Reserve Board's website. Economic Research & Data link -- http://www.federalreserve.gov/datadownload/

Hall, C.M. & S.J. Page. (2009). Progress in Tourism Management: From the geography of tourism to geographies of tourism a review, *Tourism Management*, 30, 3-16.

Huan, J.H. & Min, J. (2002). Earthquake devastation and recovery in tourism: the Taiwan case. *Tourism Management*, 23, 145-154.

Lee. C.K. (1995). Importance of secondary impact of foreign tourism receipts on the South Korea economy. *Journal of Travel Research*, 34(2), 50-54.

Lim, C. (1999). A meta-analytic review of international tourism demand. *Journal of Travel Research*, 37(3), 273-284.

Lim, C., & McAleer, M. (2001). Cointegration analysis of quarterly tourism demand by Hong Kong & Singapore for Australia. *Applied Economics*, 33(12), 1599-1619.

Milne,S. & I. Ateljevic. (2001). Tourism, economic development and the global-local nexus: Theory embracing complexity. *Tourism Geographies*, 3(4), 369-393.

Okumus, F., Altinay, M., & Arasli, H. (2005). The Impact of Turkey's economic crisis of February 2001 on tourism industry in Northern Cyprus. *Tourism Management*, 26, 95-104.

Pizam, A., & Fleischer, A. (2002). Severity versus frequency of acts of terrorism: which has a larger impact on tourism demand? *Journal of Travel Research*, 40, 337-339.

United Nations and World Tourism Organization. (2008). *International Recommendations for Tourism Statistics* (IRTS 2008). (New York, Madrid, November 2007).

United Nations Statistics Division (UNSD), the Statistical Office of the European Communities (EUROSTAT), the Organization for Economic Co-operation and Development (OECD) and the World Tourism Organization (UNWTO), *2008 Tourism Satellite Account: Recommended Methodological Framework* (TSA: RMF 2008).

Wang, Y.S. (2009). The impact of crisis events and macroeconomic activity on Taiwan's international inbound tourism demand. *Tourism Management*, 30, 75-82.

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