ECONOMIC IMPACT ESTIMATION USING BOOTSTRAP SAMPLES OBTAINED FROM INTERNET AND INTERCEPT SURVEY DATA

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Abstract

One of the challenges in estimating economic impacts of recreational activity and natural resource use is collecting survey data when the underlying population is not perfectly known. We combine bootstrapping techniques with input output analysis to estimate impacts from recreational activity at a barrier island in Louisiana. Per capita expenditure point estimates are bootstrapped and the 1,000 bootstrapped samples are shocked into an input output model to develop confidence intervals of economic impacts between the two surveys. Results show that for many sectors of the economy, confidence intervals do not overlap between survey modes. These results suggest that researchers using multiple survey modes should think carefully about how both the mode and potential underlying differences in population may affect economic impact results.

Introduction

The importance of tourism to Louisiana has been magnified by the lost economic activity to New Orleans and the greater South Louisiana region in this sector as a result Hurricane Katrina. Given this reality, state and regional policymakers are interested in better understanding the economic impacts of tourism-focused recreational activity in the state in order to provide support to maintain and revitalize this sector of the economy. The purpose of this research is to estimate the economic impact from recreational activity that a recently closed barrier island, Elmer's island, has on the regional economy of South Louisiana. More specifically, we attempt to provide numerical value to the economic impacts which accommodates direct indirect and induced effects of recreational expenditure.

We combine a bootstrapping technique with an input output model to estimate recreational spending activity from a combination of online and onsite (intercept) samples. Using such samples, we calculate economic impact estimates using an input output model with confidence intervals. This makes our study slightly different than previous studies in the same

area of research. This study adds to the strategies for combining survey data from alternative data collection strategies and when the combination may or may not be appropriate.

Elmer's Island

Elmer's Island is one of only three accessible beaches on the Louisiana coast. The island has historically served as one of the most popular coastal recreational destinations in the state of Louisiana. The area has been a popular destination not only to instate visitors but also to out-of-state tourists attracting approximately 40,000 visitors each year (Caffey *et al.* 2003). This privately owned island became available for sale upon the death of the owner in 2001. The state of Louisiana showed an interest to purchase the property and make it available for public recreation. However, the state-offered price was condemned for failing to capture the prices reflective of environmental and non-use options for coastal recreation. It was also argued that positive direct and indirect economic impacts of recreational spending on the local economy had not been accounted for when the state appraised the purchase price. This impasse between the state and heirs lead to the closure of the island to all public access for recreation.

The main obstacle to completion of this study originated from the data gathering challenge. The closed island imposed a restriction on obtaining data from a traditional onsite interview. As a result, we conducted face-to-face interviews on two proxy sites (the two alternative beaches in the state). However, the overall number of responses was low. An internet based survey was used to obtain additional expenditure data from the same survey. Using alternative survey modes with potentially different populations imposed a problem in combining the datasets. A bootstrapping technique was therefore used to create a distribution of final demand expenditure vectors to estimate a distribution of economic impacts using input-output model.

The remainder of the paper begins with a literature review on estimating economic impacts of recreational activity on regional economies. The bootstrapping technique and creation of confidence intervals are then discussed. Finally, the economic impact results from the survey data are presented and comparison of the confidence intervals between the two techniques is analyzed.

Literature Review

A considerable number of studies have been conducted on water based recreation that estimates the economic impact from spending of recreational visitors. Many of these studies use input output models in estimating regional impacts of tourism and outdoor recreation on an overall regional economy (Bergstrom and Cordell (1990a), Cordell and Bergstrom (1991), Cordell *et al*. (1990), Heng and Low (1990), English (2000), Weiler (2004), Wiersma *et al*. (2004)). These studies provide multipliers for changes in level of economic activity on such variables as output, income and employment based on survey samples. However a lesser number of studies have focused on dealing with the problem of the unknown sampling distribution of their survey population and how an online survey method might be used to estimate the regional economic impacts of recreation.

Bergstrom *et al.* (1990b) examined local economic effects of recreational expenditures in selected rural areas using a regional input-output model. The study used data from the Public Area Recreation Visitor Study using onsite and follow-up sampling techniques. The respondents were asked to provide information regarding trip related expenditures on the mail survey. Given such sampling techniques, special care was taken in order to correct the bias incurred through disproportionate representation of respondents belonging to different sets of recreational interests. Post sampling weights were used before estimating the impact multipliers. Their study

showed that the recreational spending contributes significantly to major macro economic sectors and therefore suggested outdoor recreation as a viable development strategy for a rural economy.

Similarly, English and Bowker (1996) estimated multipliers associated with the economic impact of whitewater rafting. Their study employed samples obtained from mail surveys. Per person, per trip expenditures were treated as final demand for goods purchased in the impacted region. The expenditure information was allocated to IMPLAN (Minnesota IMPLAN Group 2000) sectors to obtain multipliers for economic impact on selected states.

Hamel *et al.* (2002) estimated regional economic impacts of recreational activities allowing the demand for recreation to vary due to individual decision making criteria. The study combined a recreation demand model with a regional impact model to allow a direct evaluation of economic impact of change in individual or trip characteristics. Since the IMPLAN model did not have detailed recreational sectors studied in the research, a disaggregated set of IMPLAN sectors were identified to create an expenditure profile of recreation-based activities outside the IMPLAN model.

Similarly, Criddle *et al.* (2003) used a binary choice model to model the individual decision to participate in recreational fishing. The study used mail survey data from randomly selected anglers holding fishing licenses. To obtain more informative impact estimates, the study first calculated the probability of taking a recreational trip using a probit model. The estimates were then used to obtain regional economic impacts. The integrated model explained the change on regional impact associated with change on trip cost and amount of catch. The study also provided potential effects of an increase or decrease on expected catch on the regional economy.

Most of the existing studies have paid much attention on finding point estimates for the impacts on major economic sectors of the regional economy. Estimating a value to measure of

economic impacts of recreational visits is one of the most difficult tasks. As a result, recent researchers have paid considerable attention to evaluating regional impact of recreational tourism spending and provide some degrees of confidence to their estimates.

One of the few studies addressing the confidence issue was conducted by English (2000). He estimated the impact of recreational visitation on a local economy and calculated confidence intervals for the estimates. He calculated one thousand bootstrapped final demand vectors to calculate a confidence interval for the economic impact estimates.

This research follows a similar approach. We present a detailed methodology on the bootstrap sampling technique and calculation of the confidence interval. A discussion of the data collection followed by survey results and impact analysis are then presented.

Bootstrap Sampling Technique

Complete information about the recreational visitors (the population) is obtained through the population distribution function *F (.)*. Given the online and onsite sampling procedures, there is no other information available regarding the visitors (the population) except for the information incurred in sample. Under such conditions, the unknown population distribution is estimated in a nonparametric framework using the empirical distribution function that is expressed as $\hat{F}(x) = \frac{1}{n}\sum_{i=1}^{n} I_{(-\infty,x)}(x_i)$. The original sample of size n is used to obtain a large number of samples containing n number of observations. The estimators are then calculated for each bootstrapped sample. The resulting distribution of estimator value will give rise to the estimated distribution function ($\hat{F}$).

In this study, random samples ($\mathbf{x^*} = (x_1^*, x_2^*, .., x_n^*)$) of recreation related expenditure are obtained from the estimated distribution ($\hat{F}$) instead of population distribution (*F)* (Efron,

1979). We draw one thousand of such samples each consisting of n (the original sample size) data values from original onsite and online samples with replacement. In the case of online survey, n represents 1851 observations, and for the onsite survey, 201 observations. For each of bootstrapped samples, we estimate the mean value of individual recreational expenditure. These mean values of expenditure are later bridged to the IMPLAN sectors to calculate economic impact.

Bootstrap Confidence Interval

Providing a confidence interval for the estimation is important since the distribution of impact estimates are not known. It is also important because the sample size from the onsite survey is relatively small. In this paper we employ two methods of estimation for the confidence interval: normal based and percentile.

Normal approximation of the confidence interval makes use of standard errors obtained form bootstrapped samples. With the given level of confidence level a and standard normal distribution z, the interval can be expressed as $q \in \hat{q} \pm \hat{s}\ z^{(a)}$. Where, $z^{(a)}$ is the $100*a$ percentile point of standard distribution; $\hat{s}$ is the bootstrap standard error and $\hat{q}$ is an estimate of variable of interest.

Percentile approach makes use of the parametric bootstrap cdf of $\hat{q}*$, where $\hat{q}*$ represents the estimated parameter using bootstrap samples. The confidence interval using this approach is just the interval between [100 Xa] and [100 X (1- a)] percentiles of bootstrap distribution of estimated parameter $\hat{q}$ (Efron and Tibshirani, 1986). Efron and Tibshirani suggest that the bias corrected approach is equalizes the error probability at the end points and thus provide better estimates of the interval. The a level end point of the bias corrected confidence

interval is expressed as $\hat{G}^{-1}(\Phi[2z_0 + z^a])$ where, $z_0 = \Phi^{-1}\{\hat{G}(\hat{q})\}; \hat{G}_{(s)} = prob(\hat{q}^* < s)$, the probability based on bootstrap distribution of $\hat{q}$; where Φ is the standard normal cdf (Efron and Tibshirani).

Expenditure Data

Estimation of direct, indirect, and induced effects of tourism in the regional economy requires detailed information on out of pocket expenditure of each individuals. The expenditure data for individuals traveling to coastal Louisiana was collected using intercept and internet surveys with a preset questionnaire. The intercept survey was conducted in Grand Isle, LA and Holley Beach, LA, where randomly selected individuals were asked to fill out the questionnaire. The online survey was conducted by posting the questionnaire on the university's website.

Among the many sections of the questionnaire, an individual expenditure section of the questionnaire is used to analyze economic impact in this study. The section provided the expenditure information by individual for recreational and non-recreational activities during a recreational trip. The section contained the expenditures related to 1) trip related supply and equipment expenditures, 2) expenditures during the recreational activities on the site and, 3) dollars spent on commuting costs to the island such as fuel.

Intercept surveys at proxy sites raises the concern of whether the sample drawn from the population visiting these beaches represents the true population that would be visiting Elmer's Island in the future were it to re-open. Furthermore, the samples obtained by face-to-face interviews onsite impose an extremely high cost. We therefore employed an additional online survey to collect information on spending patterns of individuals who would visit the island if it re-opened.

In summary, we use an internet survey where respondents were self selective and an intercept survey where the respondents were randomly chosen as two independent samples from the same (assumed) underlying population of visitors who would recreate at Elmer's island upon reopening. Treating the intercept and internet data separately for impact analysis, we check the influence of survey modes on impact estimates.

Most of the observations (92%) in our study were obtained from online survey posted on the university's website. The Department of Agricultural Economics and Agribusiness at LSU provided web space for the research questionnaire. The survey remained on the web for 77 days starting from May 15th to July 31st, 2003. Online survey responses were formatted in such a way that responses were recorded in a Microsoft Excel spreadsheet automatically once submitted. Duplicate responses were identified and deleted for any submissions with the same internet protocol address. Solicitation for the responses to the internet survey was announced through twenty eight media outlets including direct mails, radio programs, newspapers, magazines, websites and newsletters.

A total of 2,691 responses were gathered using both survey methods. The onsite survey mode generated 201 observations whereas the online survey generated 2,465 observations. Some of the observations with incomplete information were dropped from the data set. The expenditure variables included for analysis from the completed surveys included cost of lodging, food, fuel, parking and launching, groceries, supplies, and equipment.

Effects of expenditure

Coastal recreation functions as an exporting industry which sells its natural resources to consumptive and non-consumptive users. This brings a considerable amount of money into the surrounding region of Elmer's Island. Earnings from visitors' expenditures are considered a

source of changes in final demand for goods and services in the nearby localities (Bergstrom *et al.*). The region's economic growth is stimulated by such changes in nonresident visitors' final demand for goods and services. These increased final demands for locally produced goods and services generate direct, indirect and induced effects on local economy.

Direct effects of recreational spending refer to the new economic activities generated by spending such as purchases of inputs to meet the increased demand for good and services due to incoming visitors. These direct expenditures are amplified throughout the local region by additional spending generating indirect and induced effects. Recreational trip expenditures are examined with respect to an impact region, defined in a number of ways. In our study, an impact region represents multiple parishes (counties) within which recreational spending occurs. The economic impact is a stimulated effect in the region's economy due to additional recreational expenditure within the area.

Analysis, Result and Discussion

We selected IMPLAN Professional software for our input-output model. IMPLAN is secondary data-based input output model designed to analyze regional economic impacts. The IMPLAN model derives a regional version of the input output model by using county level data where available and assuming state and national level percentages when local data are not available. For the purposes of our analysis, the geographic region (accounting stance) from which the impacts are defined is the two parish region of Jefferson and Lafourche parishes.

IMPLAN doesn't define a specific sector as "tourism" within its default set of 509 economic sectors. To address this issue, we use the recently developed MI-REC spreadsheet which consists of a set of utilities and customized procedures for estimating the economic impact of recreational and tourism spending. MI-REC transforms survey-based recreational expenditure

categories into 11 IMPLAN sectors which can be used to shock in the IMPLAN model for the regional economy.

Results

We obtained total output effects of the trip-related expenditures on the local economy using STATA in combination with the IMPLAN software package[1]. Recreational spending pattern averages for both the onsite (intercept) and internet (online) surveys are presented in Table 1. The estimated output effects based on original samples and bootstrapped samples are presented in Tables 2-4.

Table 2 provides economic impact of recreational visitation based upon original internet and intercept surveys. Mean recreational expenditure is combined with the IMPLAN MI-REC bridge table to calculate estimated impacts on the local economy. MI-REC contains 11 sectors of recreation related expenditure which is bridged to 509 IMPLAN sectors. Once the observed categories of expenditure were multiplied with IMPLAN sector matrixes, it provided the final estimates of economic impact associated with the visitor spending.

The main results showed that there were measurable and significant differences between total output impacts between survey modes. Overall, total economic impacts were much larger from the onsite survey ($289 - Table 3) compared to the online survey ($216 - Table 4). This differential also resulted in a slightly larger simple output multiplier of 1.18 for recreational spending from the onsite survey as compared to a 1.11 simple output multiplier from the online survey instrument.

[1] IMPLAN's software interface only allows for the construction of one final demand vector at a time to be applied to IMPLAN Leontief Inverse. To speed the calculation of impacts, the 509x509 Leontief Inverse matrix was exported from IMPLAN into STATA. The 509x1000 final demand matrix of bootstrap final demand samples was then multiplied by the Leontief Inverse matrix to generate a 509x1000 matrix of output effects. Each column of the matrix represented one bootstrap sample's output effects. Averaging across the rows of the matrix resulted in the calculation of the mean output effect for each IMPLAN sector of the regional economy.

If we further look at the bootstrap confidence intervals for specific sectors of the regional economy in Tables 3 and 4, we see further significant differences. For Hotels and Accommodation, the onsite interval ranged from $66.35 - $66.95 (Table 3) as compared to $43.42 - $43.55 for the online survey (Table 4). Similarly, the Arts, Entertainment, and Recreation sector had a similar dichotomy where confidence intervals between the two survey instruments did not overlap. The onsite survey generated an output effect confidence interval for Arts of $63.46 - $64.39 and the online survey of $43.33 - $43.56. In fact, none of the confidence intervals from any of the economic sectors in Tables 3 and 4 overlapped (using Normal Based Bootstrap approach estimates). Such significant differences would suggest that either the underlying populations from which the samples were drawn were significantly different, or that the differences in the survey instrument or the environment from which the instrument was given was significantly different. In either case, the results would suggest that it would be unwise to combine these datasets to generate a single point estimate or confidence interval for measuring economic impacts to the region from the reopening of Elmer's Island.

Conclusion

This study addresses the issue of estimating economic impacts of recreational spending when it is both difficult to identify the true population from which to sample as well as when multiple survey modes are used to collect data. On-site and internet-based surveys were conducted to elicit individual recreational spending patterns of potential visitors to Elmer's Island, Louisiana, if the island were to reopen. Individual point estimates of recreational expenditure were first estimated from both the onsite and online survey data. Bootstrapping techniques were then used to create one thousand bootstrap samples of both onsite and online

survey data. These one thousand recreational expenditure vectors were applied to an input output model to estimate simple output effects from recreational activity if the island reopened.

Results indicated that the overall output effects on the two parish economy from recreational spending if Elmer's island reopened would range from $216 to $289 based on survey mode. Such large differences in output effects were seen at both the individual economic sector level as well as in the aggregate total effects. These results have major implications for economists performing economic impact assessments. Researchers should be careful in combining datasets from alternative survey modes. Tests for differences both in mean aggregate expenditure as well as in detailed output effects should be evaluated before attempting to combine data. Researchers should think carefully about the underlying population when considering alternative survey modes so that one does not create an artifactual dichotomy in results. Finally, researchers should consider how differences in the nature of the survey instrument and the environment in which it is completed may impact survey results. Individuals may be more or less aware of their spending patterns when they are either busy participating in recreational activities or removed from them.

References

Andrew, B.P. "Tourism and the Economic Development of Corn Wall. *Annals of Tourism Research* 24 (1997):721-735.

Bergstrom, John C. and H. Ken Cordell. "Economic Impacts of Recreational Spending on Rural Areas: A Case Study. *Economic Development Quarterly, 4 (*1990a*): 29-39.*

Bergstrom, John, C., H. Ken Cordell, Allan E. Wateson, and Gregory A. Ashley. "Economic Impacts of State Parks on State Economics in the South". *Southern Journal of Agricultural Economics* (1990b): 69-77.

Bergstrom, John, C., R. Jeff Teasley, H. Ken Cordell, Raymond A. Souter, and Donald B. K. English. "Effect of Reservoir Aquatic Plant Management on Recreational Expenditure and Regional Economic Activity." *Journal of Agricultural and Applied Economics*. 28 (1996): 409-422.

Caffey, R. H., Paudel, K. Hall Larry, 2003. "Elmer's Island Coastal Preference Survey". Center for Natural Resource Economics and Policy Department of Agricultural Economics and Agribusiness. Louisiana State University.

Chang, W.H. (2000). "Variations in Economic Multipliers for Tourism, Parks, and Recreation," Doctoral dissertation, Michigan State University.

Cordell, H. Ken, John, C. Bergstrom, Gregory A. Ashley, and John Karish.. "Economic Effects of River Recreation on Local Economies. *Water Resource Bulletin* 26 (1990): 53-60.

Cordell, Ken & John C. Bergstrom. "The Effects of Outdoor Recreation activities on State and Local Economies." *Enhancing Rural Economies through Amenity Resources (*1991): 57-78.

Criddle K.R., Mark Herrmann, S Todd Lee & Charles Hamel. "Participation Decisions, Angler Welfare, and the Regional Economic Impact of Sport-fishing". *Marine Resource Economics*, 18 (2003):291-312.

Dillman, Don A. Mail and Interne Surveys: The Tailored Design Method. 2nd Ed. NewYork: John Wiley Co.

Efron, B. "Bootstrap Method: Another Look at the Jackknife." *The Annals of Statistics*, 7(1) (1979): 1-26.

English, Donald B.K., John C. Bergstrom. "The Conceptual Links Between Recreation Site Development and Regional Economic Impacts." *Journal of Regional Science* 34 (1994): 599-611.

English, Donald B.K.. "Calculating Confidence Interval for Regional Economic Impacts of Recreation by Bootstrapping visitor Expenditure." *Journal of Regional Science* 40 (2000): 523-539.

Hamel, Charles, Mark Herrmann, S. Todd Lee, Keith R. Criddle, Hans T. Geier."Linking Sport Fishing trip Attributes, Participation Decisions, and Regional Economic Impacts in Lower and Central Cook Inlet, Alaska". Annals of Regional Science, 36 (2002): 247-264.

Heng, T.M. and Low, L. "The Economic Impact of Tourism in Singapore." *Annals of Tourism Research* 17 (1990): 535-553.

Henry, E.W. and Deane, B. . "The Contribution of Tourism to the Economy of Ireland in 1990 and 1995." *Tourism Management* 18 (1997): 535-553.

Lee, K and Choi, S. "An Economic Impact Analysis of Regional Tourism Industry the Case Story of Gangwon and Jeju regions" *Proceedings of the New Zealand Tourism and Hospitality Research Conference* (2004): 199-210.

Minnesota IMPLAN Group. *IMPLAN Professional User's Guide*. Version 2. Stillwater, MN. (2000).

National Marine Fisheries Service. "A Review of Regional Economic Models for Alaska Fisheries." AFSC Processed Report January, 2005.

Tyrell T.J. "Rhode Island Tourism Multipliers. Kingston, RI: Dept. of Environmental and Natural Resource Economics, University of Rhode Island (1999).

Weiler, Stephan and John Loomis. "Driving Regional Economic Models with a Statistical Model: Hypothesis Testing for Economic Impact Analysis." *Review of Regional Studies,* 32 (2003): 97-100.

Weiler, Stephan and Andrew Seidl. "What's in a Name? Extracting Econometric Drivers to Assess the Impact of National Park Designation". *Journal of Regional Science* 44 (2004): 145-262.

West, G. R. "Economic Significance of Tourism in Queensland". *Annals of Tourism Research* 20 (1993): 490-504.

Wiersma, Joshua, Doug Morris & Robert Robertson. "Variations in Economic Multipliers of the Tourism Sector in New Hampshire." Proceedings of the 2004 Northeastern Recreation Research Symposium. GTR-NE-326 (2004).

Table 1: Coastal Recreation Expenditure Pattern (mean expenditure $/person/trip)

Spending Categories	Online Survey	Onsite Survey
Lodging	44.155	65.17
Fuel	43.278	35.14
Food and Beverages	41.803	64.19
Equipments	23.365	44.23
Supplies	22.170	18.69
Parking and Launching	11.237	11.27
Others	8.469	6.86
Total	194.477	245.572

T statistics for difference on mean expenditure because of sampling mode is 2.20 (p value = 0.029)

Table 2: Impact Estimates (output effects) (mean expenditure $/person/trip)

NAICS Sector Categories	Onsite	Online
Agricultural, Forestry, Fishing and Hunt	0.398	0.423
Mining	12.786	17.694
Utilities	1.993	1.858
Construction	1.660	1.401
Manufacturing	40.800	53.826
Wholesale Trade	17.904	18.982
Transportation and Warehousing	6.144	6.389
Retail Trade	37.108	34.722
Information	3.881	3.981
Finance and Insurance	2.878	2.651
Real Estate, Rental and Leasing	10.287	9.774
Professional, Scientific and Technical services	7.372	7.085
Management of Companies	0.256	0.234
Administrative Services	3.469	3.155
Educational Services	0.241	0.227
Healthcare and Social Assistance	0.195	0.150
Arts Entertainment and Recreation	63.962	49.914
Hotels and Accommodation	66.594	50.054
Restaurants	0.035	0.033
Other	11.813	11.537
Total	289.777	274.089

Note: Impacts based on simple Type I multipliers for Jefferson and Lafourche parish region.

Table 3: Mean Impact Estimates and Bootstrapped Confidence Interval for Onsite Data ($/person/trip)

NAICS Sector Category	Mean	95% Confidence Interval			
		Normal Based approach		Percentile Approach	
Agricultural, Forestry, Fishing and Hunt	0.40	0.40	0.40	0.40	0.40
Mining	12.77	12.71	12.84	12.71	12.84
Utilities	1.99	1.98	2.00	1.98	2.00
Construction	1.66	1.65	1.67	1.65	1.67
Manufacturing	40.74	40.57	40.90	40.58	40.91
Wholesale Trade	17.86	17.76	17.97	17.76	17.97
Transportation and Warehousing	6.14	6.12	6.16	17.76	17.97
Retail Trade	36.99	36.65	37.34	36.64	37.34
Information	3.87	3.85	3.90	3.85	3.90
Finance and Insurance	2.88	2.86	2.89	2.86	2.89
Real Estate, Rental and Leasing	10.28	10.24	10.31	10.24	10.31
Professional, Scientific and Technical services	7.36	7.33	7.39	7.33	7.39
Management of Companies	0.26	0.25	0.26	0.25	0.26
Administrative Services	3.46	3.45	3.48	3.45	3.48
Educational Services	0.24	0.24	0.24	0.24	0.24
Healthcare and Social Assistance	0.20	0.19	0.20	0.19	0.20
Arts Entertainment and Recreation	63.92	63.46	64.39	63.46	64.38
Hotels and Accommodation	66.65	66.35	66.95	66.35	66.97
Restaurants	0.04	0.03	0.04	0.03	0.04
Others	11.83	11.77	11.89	11.77	11.89
Total	289.53				

Note: Impacts based on simple Type I multipliers for Jefferson and Lafourche parish region.

Table 4: Mean Impact Estimates and Bootstrapped Confidence Interval for Online Data ($/person/trip)

NAICS Sector Category	Mean	95% Confidence Interval			
		Normal Based approach		Percentile Approach	
Agricultural, Forestry, Fishing and Hunt	0.14	0.14	0.14	0.14	0.14
Mining	15.30	15.27	15.34	15.27	15.34
Utilities	1.51	1.50	1.51	1.50	1.51
Construction	1.15	1.15	1.15	1.15	1.15
Manufacturing	36.58	36.51	36.64	36.51	36.65
Wholesale Trade	13.05	13.03	13.06	13.03	13.07
Transportation and Warehouse	4.76	4.76	4.77	4.76	4.77
Retail Trade	25.23	25.18	25.27	25.19	25.27
Information	3.28	3.27	3.29	3.27	3.29
Finance and Insurance	2.05	2.04	2.05	2.04	2.05
Real Estate, Rental and Leasing	7.76	7.75	7.77	7.75	7.77
Professional, Scientific and Technical services	5.39	5.39	5.40	5.39	5.40
Management of Companies	0.18	0.18	0.18	0.18	0.18
Administrative Services	2.47	2.46	2.47	2.46	2.47
Educational Services	0.17	0.17	0.17	0.17	0.17
Healthcare and Social Assistance	0.13	0.13	0.13	0.13	0.13
Arts Entertainment and Recreation	43.45	43.33	43.56	43.32	43.56
Hotels and Accommodation	43.49	43.42	43.55	43.42	43.56
Restaurants	0.02	0.02	0.02	0.02	0.02
Others	10.82	10.80	10.85	10.80	10.85
Total	216.93	216.52	217.33	216.52	217.33

Note: Impacts based on simple Type I multipliers for Jefferson and Lafourche parish region.