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MINNESOTA GAMING
ECONOMIC IMPACT
ON TOURISM

by

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and

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The authors would like to thank the University of Minnesota Center for Urban and Regional Affairs (CURA) for financial support to collect this data. In addition, the authors would like to thank the various agencies of the State of Minnesota for providing the data. Finally, the authors would like to thank the Indian Gaming Commission and Tribal Councils for providing data on casinos. All errors remain the authors.

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ABSTRACT

The results of this study seem consistent with its initial hypothesis that the presence of certain types of gaming activity stimulates traditional tourist spending for the 87 counties of the State of Minnesota. This result seems particularly strong during the height of the summer tourist season.

INTRODUCTION

The introduction of legal gambling activities into a state where gambling had previously been outlawed provides an excellent laboratory to estimate the impact that the purchase of gambling entertainment has on other consumer purchases. To understand this impact, tourist spending theory is reviewed where tourist spending on traditional tourist activities--lodging, eating, and drinking--are influenced by the tourists' preferences, income and purchasing of other goods; i.e., gaming activities. In this study, the tourist who gambles is assumed to be a risk lover, and his or her purchases of gaming services are related to his/her income, and may act as either a substitute or compliment for other economic purchases. The relationship between income and gambling purchases may be such that gambling is a luxury, normal, or inferior good for Minnesota tourists (Houthakker, 1966). Gambling may be either a substitute or compliment to the purchase of many other products or services.

In this study we will attempt to determine whether tourist spending on SIC 58 eating and drinking and SIC 70 lodging are either a substitute or compliment for gambling spending and the magnitude of this spending impact on gambling for these services. This study will use data for 1991; the most recent period of time where a complete set of data is available.

Since the introduction of legal gambling in this state, there has been considerable speculation by the tourist industry that tourists may substitute gambling expenditures for more

traditional tourist spending activities including eating, drinking and lodging. In addition, there is also speculation that tourists may increase their patronage of establishments where gambling is permitted at the expense of establishments without gambling (Marcotty, 1993). This study will investigate the impact that gambling activity has on spending for traditional tourist industry activities. This study will use regression analysis of cross sectional data for four quarters of 1991 and the eighty-seven counties of Minnesota.

MODEL

With the reemergence of legalized gaming activities in Minnesota, the tourist industry may have significantly changed over the last decade. As of 1991, the Minnesota gaming industry included charitable gambling, a state run lottery, horse racing with on track betting and casino type gambling. These gambling activities attract both resident and tourist consumers. Consumer theory would suggest that consumer demand for tourist activities, eating, drinking, and lodging is influenced by various gambling activities in relationship to price, utility and income.

In a cross sectional analysis prices for gambling services are presumed to be constant across counties statewide. This assumption for the state run lottery means that the prices of individual games were constant across all counties within the state during each quarter investigated. However, this assumption may be violated since the lottery did offer a variety of

different games at various price ranges in 1991. To avoid a potential problem with this assumption, it is assumed that the percentage of each priced lottery activity was constant across the 87 counties of the state. Charitable gambling also offered a range of gaming activities at different prices. The casinos, in addition, offered differing priced games and payoffs as well as incentive packages designed to attract tourists and reduce the price of the overall entertainment package. Moreover, casinos were available in only 12 of the 87 counties of the state.

Finally, the prices of all other goods are assumed to be constant over each quarter. This assumption is not entirely correct since inflation during 1991 was about 4 percent per year or 1 percent per quarter.

The tourist demand model (Houthakker, 1966) for various traditional tourist products eating, drinking, and lodging, Q , introduces six assumed independent variables including income, Y , SIC 58 eating and drinking, E , or SIC 70 lodging, L , and three variables measuring gaming activities, $G_{1,2,3}$.

$$1. Q_{E \text{ or } L} = F(Y, E \text{ or } L, G_{1,2,3})$$

The tourist demand for these traditional tourist activities suggested that consumer spending on a specific tourist good may be directly related to income, directly related to either eating and drinking, or lodging, and either directly or inversely related to gaming activities. Thus 2:

2. $\delta Q / \delta Y > 0$;
 $\delta Q / \delta E > 0$; or
 $\delta Q / \delta L > 0$;
 $\delta Q / \delta G < 0$.

While the tourist is expected to eat and drink during his/her visit, the tourist may either reduce or increase their expenditures on eating and drinking depending on whether gambling is a substitute or compliment for tourists expenditures for food and drink. For example, a consumer may partake of the casino's buffet rather than a more expensive and more remote sit-down restaurant. On the other hand, certain gaming activities such as charitable gambling may encourage consumers to consume more food and drink while they are gambling since these activities often occur in bars and certain type of restaurants. Charitable gaming, however, seems to appeal to local rather than tourist customers. If the gaming activity appeals to the tourist, i.e., casino, horse racing and to some extent the lottery, then as gaming expenditures increase, it is expected that tourist spending on local lodging, eating, and drinking will also increase.

DATA

The data for this study has been compiled from several sources including Minnesota Department of Revenue, Minnesota Job Services, Minnesota State Lottery, Minnesota Indian Gaming Commission and the sixteen Indian Gaming Casinos. The data was

collected by quarter for a period of time from 1985-1991 for the 87 counties of the State of Minnesota.

The data collected for the state lottery were provided in gross monthly revenues for on-line and instant sales in each of the 87 counties. In addition, the Minnesota State Lottery Commission provided the number of retail outlets and retail commissions paid out by month and county. The data on Indian Casinos was provided by each of the casinos by their management for the year 1991 and then adjusted to a quarterly basis using an employee ratio technique. The data for charitable gaming was provided by the Minnesota Charitable Gambling Commission on a quarterly basis. Data on wages paid by county and quarter were provided by the Statistical Office of the Minnesota Department of Economic Security. Minnesota Department of Revenue provided data on quarterly sales for SIC 58 Eating and Drinking and SIC 70 Lodging expenditures by county.

The analysis in this paper is a cross sectional regression analysis of the data for the four quarters of 1991. The data was collected for nine variables including: the county, a dummy for casino counties, SIC 58 eating and drinking, gross wages, casino receipts, lottery receipts, horse racing receipts, charitable gaming receipts, SIC 70 lodging receipts. The mean values and standard errors for each of these variables are shown by quarter in Table 1.

In 1991, gaming accounted for \$2.16 billion in gross spending in Minnesota (see Table 1). This gaming activity was

carried out by both residents and non-residents with little current evidence as to the percentage of gaming activity that non-resident tourists provided (Pinney, 1993). By way of comparison, the narrowly defined tourist industry generated \$3.548 billion in spending for SIC 58 eating and drinking and SIC 70 hotel and motel activities. The gross state product in Minnesota for 1991 was \$105.029 billion thus gambling represents about two percent of the total economic activity of the state. In relationship to personal income, gaming represents a transfer of about 2.5 percent of the total personal income of \$87.3 billion. These transfers occur from the gambler, who loses and may or may not be a state resident, to a group of winning institutions and individuals including gamblers, owners of gambling services and workers in the gaming industry, many of whom may also not be residents of the state.

Each quarter has 87 observations with 9 variables and thus 76 degrees of freedom. All dollar values are in current dollars and not adjusted for inflation; however, the annual inflation for this period of time was about 4 percent per year or 1 percent per quarter. Nevertheless, the results obtained here were checked by adjusting the data for price level changes and running the regression analysis again. The results of this run were not appreciably different than the results reported here and are available on request.

All data were reduced to per capita data by dividing the aggregate data set by the 1990 census for each county. It should

be pointed out that it is assumed that average per capita county wages assumes that tourist wage pattern is reflected by county wage patterns. Wealthy tourists, by in large, stay in wealthy counties. It should also be explained that eating and drinking out is done by both tourist and local citizens; it is assumed that an unknown but constant percentage is done by the tourist. Finally, it is assumed that all lodging expenditures are made by tourists when, in fact an unknown percentage is made by the local community. While local residents do provide a portion of the lodging receipts, it is assumed that local spending on lodging activities is small relative to tourist spending.

RESULTS

The initial regression results of this study are shown by quarter in Table 2 through 5 and in general seem to confirm the hypothesis that tourist spending is directly influenced by gaming activities. These results show that both lodging and eating and drinking are, either or both, directly related to income and may be either complimentary or substitutes for certain type of gaming activities.

In particular, the tourist industry seems to be least affected by gaming activities in the first and fourth quarters of 1991 which is normally the off season for tourism in Minnesota. During the traditional summer tourist season, tourist spending on eating, drinking, and lodging appears to be related directly to one or more of the gaming activities. As might be expected, lodging and eating are shown to be complimentary goods and

directly influenced by income. These tourist activities also appear at times to be directly influenced by casino, lottery and charitable gaming activity. The remainder of this report will review the statistical results displayed in Tables 2-5 by quarter.

This report estimates that of the \$2.160 billion wagered legally in Minnesota during 1991; of this amount, for example, \$569 million was wagered in the second quarter of that year (see Table 1). For this quarter, the total gaming activities are divided such that charitable gambling accounted for \$328 million, casino gambling \$139 million, the lottery \$73 million and racing \$29 million. The initial hypothesis of this study is that wagering \$569 million would affect tourist spending. In order to test these hypotheses, the study set up a number of regression estimates to determine if there was a significant relationship between tourist spending and gambling.

In Tables 2-5, the results of two regression equations are reported for four quarters of 1991. Table 2 provides the regression results for Quarter 2 of 1991. This time period represents the beginning of the traditional tourist season in Minnesota. The regression results shown in the upper part of Table 2, Quarter 2, 1991, report the determinants of tourist demand for lodging SIC 70. The T test reported in the second column of this table shows only two significant independent variables in this equation: SIC 58 eating and drinking and casino activity. These two variables are significant to the 5

percent level or higher; a T value of 2.00 or better is required for this test to be significant at the 5 percent level with 87 observations and 79 degrees of freedom. The positive sign for both these variables correspond to accepted tourist spending theory as outlined by our model. In particular, lodging spending in the second quarter of 1991 for various counties in the State of Minnesota was directly influenced by casino gambling in or near those counties. It should be noted, however, that for this quarter the R squared value is only .5569 suggesting that the equation explains only slightly more than half of the variation in lodging expenditures for the 87 counties. In addition, the Durbin Watson test of 1.73 lies in the indeterminate range indicating that regression may be plagued by autocorrelation in the residuals with the estimates of the parameters correspondingly biased.

The regression results in the lower portion of Table 2 provide estimates for the tourist demand for eating and drinking SIC 58. Statistically, the results for this regression appear to be significantly better than for lodging. Eating and drinking is influenced by three significant variables including SIC 70 lodging, income, and the state lottery. All three of these variables have significant T tests respectively, 3.37, 7.24, and 2.76. It should be noted that lodging and eating and drinking are highly correlated probably indicating that there is bilateral causation between these activities. Tourist demand theory would suggest that tourist spending on eating and drinking would be

directly related to tourist spending on lodging; however, the reverse of this observation may not be the case. If bilateral causation does exist between these two traditional tourist activities, then it may suggest that both lodging and eating and drinking are affected positively by two gaming activities of casinos and the lottery. The R squared for this equation is .977 indicating that 98 percent of the variation on tourist spending on eating and drinking has been explained by variation in the significant independent variables. Furthermore, the Durbin Watson test of 2.27 is indeterminate and autocorrelation in the residuals may be present.

In Table 3, quarter 3 of 1991 represents the height of the traditional tourist season in Minnesota. The regression results shown in the upper part of Table 3 Quarter 3, 1991, report the estimates of the determinations of tourist demand for lodging SIC 70, and the lower part of the table report the results for SIC 58. From the upper part of the table, tourist spending on lodging was influenced by five significant independent variables as shown by the T test for this equation. These variables include casino, charitable gambling, the lottery, racing, and wages. The T values for these variables range from a low of 2.75 to a high of 14.5 with 2.00 required for significance at the 5 percent level with 87 observations and 79 degrees of freedom. The positive sign for two of the gambling variables suggest that tourist spending on lodging is directly impacted by casino and charitable gaming activity. However, lodging expenditures were

negatively influenced by two other types of gambling activity, the lottery and racing. The explanation for the inverse relationship between lodging and the lottery may be that during the mid summer months many of the Minnesotan residents leave their home areas to vacation elsewhere in the state or out of the state thus reducing their expenditures on the lottery. In other words, this result might be a seasonal factor that is difficult to account for in a cross sectional regression model. The result for racing may be found in the fact that racing is available in only one county in 87 and, therefore, may not reflect racing's impact on lodging for that county. From the other statistical results, it should be noted that for this quarter the R squared value increased to .95 suggesting that the equation explains about 95 percent of the variation in lodging expenditures for the 87 counties. In addition, the Durbin Watson test of 2.10 indicating that regression is not plagued by autocorrelation in the residuals in this quarter.

The regression results in the lower portion of Table 3 provide estimates for the tourist demand for eating and drinking SIC 58. Statistically, the results for this regression appear to be about the same as they were for quarter 2 with one exception. Tourist eating and drinking expenditures is influenced by only two significant independent variables including wages, and the state lottery. Both of these variables have significant T tests respectively, 3.02 and 2.26. The exception is that in quarter 3 SIC 58 eating and drinking is not influenced by lodging

expenditures. It should be noted that while lodging and eating and drinking were highly correlated in quarter 2, this linkage appears to have evaporated in quarter 3. The R squared for this equation is .99 indicating that 99 percent of the variation in tourist spending on eating and drinking has been explained by variation in the significant independent variables. The Durbin Watson test of 2.45 is in the indeterminate high range suggesting autocorrelation in the residuals may be present.

In Table 4, quarter 4 of 1991 represents the shoulder of the traditional tourist season in Minnesota moving from late fall to early winter. The regression results shown in the upper part of Table 4 quarter 3, 1991, report the estimates of the determinations of tourist demand for lodging SIC 70, and the lower part of the table report the results for SIC 58 during this quarter. As might be expected, travel in Minnesota changed from vacation oriented tourism to the more business oriented activity during the last quarter of the year. Therefore, tourist spending is anticipated to also change. From the upper part of the table, tourist spending on lodging was influenced by only two significant independent variables, casino and eating and drinking, as shown by the T test for this equation. Both variables have positive signs which continues to suggest that tourist spending on lodging is directly impacted by these activities. From the other statistical results, it should be noted that for this quarter the R squared value fell to .60 suggesting that the equation explains only about 60 percent of

the variation in lodging expenditures for the 87 counties; but the Durbin Watson test of 1.93 shows that the results are not plagued by autocorrelation in the residuals.

The regression results in the lower portion of this table for quarter 4 provide estimates for the tourist demand for eating and drinking SIC 58 for the late fall and early winter months. Statistically, the results for this regression appears to be somewhat weaker than they were for quarter 3. However, tourist eating and drinking expenditures are now influenced by three significant variables as compared to only two in quarter 3. The significant variables include the lottery, SIC 70 lodging and wages with significant T tests which are respectively 3.26, 3.73, 4.91. It should be noted that while lodging and eating and drinking were highly correlated in quarter 2, this linkage appeared to have evaporated in quarter 3, but reappeared in quarter 4.

From Table 5, quarter 1 of 1991, during this winter season, tourism in Minnesota is primarily made up of business travel with some personal travel for skiing and snowmobiling. It is anticipated that the statistical result for this quarter may be significantly different than for the summer time tourist. From the upper part of the table, tourist spending on lodging was directly influenced by only one significant independent variable, eating and drinking, as revealed by the T test and its positive sign. Based on the R squared and Durbin Watson test, the model is misspecified for this quarter, and further research into its

specification is required. The lower portion of Table 5 confirms the results of previous analysis that tourist eating and drinking expenditures are influenced by three significant independent variables including SIC 58, wages, and the state lottery. These variables have significant T tests respectively of 3.13, 7.03, and 2.00; all significant to the 5 percent level. It should be noted that lodging and eating and drinking are again highly correlated as was true in quarter 2. This linkage appears to be important during the off tourist season for quarters 1, 2, and 4, but evaporates at the height of the traditional tourist season as indicated by the results provided in quarter 3. The R squared for quarter 1 remains relatively high at 0.97. Furthermore, the Durbin Watson test of 2.16 suggests that autocorrelation in the residuals is not present.

SUMMARY AND CONCLUSIONS

While this study may be plagued, at times, with some statistical problems such as a periodic reoccurrence of autocorrelation in the residuals, the results seem consistent with the initial hypothesis that the presence of certain types of gaming activity stimulates traditional tourist spending for the 87 counties of the State of Minnesota. This result seems particularly strong in the third quarter of 1991 when it appears that lodging was stimulated by casino and charitable gaming activities while at the same time discouraged by the lottery and racing. These somewhat dichotomous results may be explained in part by the fact that certain gaming activities may be

substitutes for one another. For example, the lottery may be a substitute for charitable gaming so that patrons choose between the two gaming activities based on preferences and the size of the prize offered by the lottery in relationship to charitable gaming. These results are carried through both shoulders of the Minnesota tourist season. However, the results are weaker in that Casino gaming is the only significant gambling variable to be correlated with tourist lodging expenditures in these quarters. Tourist and consumer spending on eating and drinking is correlated with gambling activity primarily the lottery in all four quarters of 1991. In addition, consumer and tourist spending on eating and drinking may be correlated indirectly with casino activity because the strong correlation between SIC 58 and lodging and the correlation between lodging and casino activity. Thus, traditional tourist spending on lodging and eating and drinking appear to be directly related to casino and lottery activity.

However, estimates using the elasticity of lodging expenditures to casino gaming activity show that a one percent increase in casino activity in the third quarter of 1991 will lead to only a .0459 percent change in lodging activity. Translating this to dollars, if casino gaming increases by \$14,000,000 then tourist lodging activity statewide will increase by about \$111,000 for this quarter, if this study is accurate and the results continue to prevail. It should be remembered that casinos are available in only 12 of the 87 counties in the state;

therefore, if casinos have an impact on lodging within the state these twelve counties are most likely the ones affected. Tourist lodging expenditures would appear to be very inelastic in relation to casino gaming. Continuing this line of reasoning to eating and drinking, a one percent increase in the state lottery will lead to a 0.5276 percent increase in eating and drinking, or a \$746,000 increase in lottery expenditures will be reflected as a \$4,013,000 increase in eating and drinking expenditures. While it would appear that lottery activity has a significant impact on eating and drinking activity within the state, it must be remembered that residents spending has not been separated from tourist spending for this industry. Thus the impact of tourist spending, eating, and drinking directly linked to the lottery might be significantly weaker.

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**TABLE 1
GAMBLING REVENUE
1991
IN 000**

TYPE	QTR 1	QTR 2	QTR 3	QTR 4	TOTAL 1991
CHARITIBLE	\$329,459	\$328,297	\$305,989	\$298,367	\$1,262,112
CASINO	\$99,999	\$138,743	\$139,836	\$140,895	\$519,472
RACING	\$20,814	\$29,160	\$29,160	\$7,875	\$87,010
LOTTERY	\$75,193	\$72,756	\$74,621	\$69,068	\$291,638
TOTAL	\$525,465	\$568,956	\$549,606	\$516,205	\$2,160,232
SIC 58	\$631,098	\$750,288	\$760,641	\$650,064	\$2,792,091
SIC 70	\$160,702	\$191,052	\$240,642	\$163,560	\$755,956
TOTAL TOURIST	\$791,800	\$941,340	\$1,001,283	\$813,624	\$3,548,047

GROSS STATE PRODUCT EST \$105,029,000

PERSONAL INCOME EST \$87,262,000

SOURCE: 1992 ECON REPORT OF GOV T24; MN DEPT OF REVENUE; MN CHARITABLE GAMING COM;
MN STATE LOTTERY COMMISSION; INDIAN GAMING COM. & VARIOUS TRIBAL GOV.

NOTE LOTTERY ARE NET RECEIPTS WHILE CHARITIBLE GAMBLING IS GROSS

**TABLE 2
REGRESSION RESULTS
QTR 2 1991**

	BETA	T TEST	R^2
DEP* SIC 70		1.00	
INDEP			
V9 SIC 58	0.7517	3.37	
V7 RACING	-0.4445	-0.66	
V1 COUNTY	-16528.7146	-1.82	
V2 DUMMY	13.3390	0.38	
V5 CASINO	0.1375	2.18	
V8 CHART GAM	-0.1235	-0.55	
V4 WAGES	-0.0205	-1.48	
V6 LOTTERY	-0.75	-0.34	
CONSTANT	-4.45	-0.35	0.5569
DW			1.72687

	B	T TEST	R^2
DEP* SIC 58	1.00		
INDEP			
V9 SIC 70	0.1670	3.37	
V5 CASINO	0.0024	0.08	
V1 COUNTY	5976.5091	0.76	
V2 DUMMY	-3.0078	-0.18	
V8 CHART GAM	0.1462	1.38	
V7 RACING	0.0266	0.08	
V4 WAGES	0.0372	7.24	
V6 LOTTERY	2.7350	2.76	
CONSTANT	7.14	1.89	0.97726
DW			2.17102

TABLE 3
REGRESSION RESULTS
QTR 3 1991

	B	T TEST	R^2
DEP HOTEL MOTEL	1.00		
INDEP			
CASINO	0.0798	2.75	
CHARITG	1.4407	14.50	
DUMMY	107880.9014	0.58	
LOTTERY	-6.3334	-8.42	
RACING	-0.1535	-4.09	
SIC 58	0.0086	0.18	
WAGES	0.0139	6.03	
CONSTANT	-83177.55	-1.31	0.94957
DW			2.10298
	B	T TEST	R^2
DEP SIC 58	1.00		
INDEP			
CASINO	0.0013	0.02	
CHARITG	0.4769	1.07	
DUMMY	-236321.5400	-0.54	
LOTTERY	5.3813	2.26	
RACING	0.0556	0.57	
SIC 70	0.0487	0.18	
WAGES	0.0189	3.02	
CONSTANT	-67085.62	-0.44	0.99019
DW			2.45802

**TABLE 4
REGRESSION RESULTS
QTR 4 1991**

DEP		B	T TEST	R^2
HOTEL MOTEL		1.00		
INDEP				
CASINO		0.1091	2.54	
CHARITG		0.0189	0.12	
DUMMY		6.8845	0.23	
LOTTERY		-2.4201	-1.47	
RACING		-0.5841	-0.73	
SIC 58		0.4921	3.73	
WAGES		0.0000	0.02	
CONSTANT		5.55	0.49	0.60034
DW				1.92952
DEP		B	T TEST	R^2
SIC 58		1.00		
INDEP				
CASINO		-0.0253	-0.72	
CHARITG		-0.0051	-0.04	
DUMMY		-0.4003	-0.02	
LOTTERY		4.3901	3.62	
RACING		0.1385	0.22	
SIC 70		0.3037	3.73	
WAGES		0.0275	4.91	
CONSTANT		-5.07	-0.57	0.96261
DW				2.17031

TABLE 5
REGRESSION RESULTS
QTR 1 1991

	B	T TEST	R^2
DEP* HOTEL MOTEL	1.00		
INDEP			
V9 EATING&DRINK	0.6452	3.13	
V7 RACING	0.0000	0.00	
V1 COUNTY	-4839.3515	-0.75	
V2 DUMMY	7.4937	0.25	
V5 CASINO	0.0935	1.74	
V8 CHART GAM	-0.1122	-0.56	
V4 WAGES	-0.0075	-0.57	
V6 LOTTERY	-1.41	-0.74	
CONSTANT	0.39	0.04	0.43123
DW			1.75346
	B	T TEST	R^2
DEP* SIC 58	1.00		
INDEP			
V9 SIC 70	0.1694	3.13	
V5 CASINO	0.0182	0.65	
V1 COUNTY	0.0000	0.00	
V2 DUMMY	-5.1290	-0.34	
V8 CHART GAM	0.0870	0.85	
V7 RACING	0.0000	0.00	
V4 WAGES	0.0376	7.03	
V6 LOTTERY	1.9040	2.00	
CONSTANT	2.21	0.45	0.96942
DW			2.16595