The Economic Impact of Casino Gambling in Louisiana

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I. Introduction

"Louisiana's casinos will create jobs and fuel economic growth." This statement was the center of the campaign to legalize casinos and lies at the heart of any summary of the benefits of Louisiana's casinos. The goal of this project is to estimate the economic impact of casino gambling. In particular, we examine the impact of casinos on employment, earnings, and tax receipts in Louisiana.

The geographical units for this study are Louisiana's eight state planning districts. Today, casinos operate in six of Louisiana's eight planning districts. Riverboat casinos operate in the New Orleans, Baton Rouge, Lake Charles and Shreveport areas, while Indian casinos exist in the Houma, Alexandria and Lake Charles areas. Table 1 contains the total employment of each casino, listed by state planning district for the third quarter of 1998.

In New Orleans, which began with six riverboats and plans for the world's largest land-based casino, the industry now consists of three riverboat casinos. In contrast to the relatively weak performance of casinos in New Orleans, the Lake Charles and Shreveport casino industry has thrived. Drawing on the large Texas gambling market, Lake Charles and Shreveport have done so well that these cities have even attracted riverboats from New Orleans to become the state's largest gambling regions.

While the numbers in Table 1 show that the casinos employ a substantial number of workers, these numbers may provide a poor measure of the economic impact of casinos. Some would argue that casinos crowd out other local industries; thus, these employment numbers may overstate the economic impact of casinos. Others would argue that spending by casino employees creates other new jobs and that the employment figures in Table 1 understate the economic impact of casinos. The challenge of this project is to measure as accurately as possible the full impact of casinos on the local economy.

This report begins with a description of the literature. This literature guides our choice of empirical methodology, which is described in section 3. The results are summarized in section 4.

Table 1

Casino:	Employment
New Orleans:	
Boomtown	1,238
Bally's	901
Treasure Chest	1,321
Total	3,460
Baton Rouge:	
Belle of Baton Rouge	749
Casino Rouge	958
Total	1,707
Lake Charles:	
Grand Palais	528
Showboat Star	650
Isle of Capri - L.C.	1,291
Players	1,221
Grand Casino-Cushatta	2,000*
Total	5,690
Shreveport:	
Isle of Capri - Shreveport	1,264
Horseshoe-Bossier City	2,803
Harrah's Red River	1,355
Casino Magic	1,377
Total	6,799
Houma:	
Cypress Bayou	1,200*
Alexandria:	
Grand Casino Avoyelles	1,300*

Riverboat casino employment numbers were obtained from quarterly reports submitted to the Attorney General's office by casinos or directly from the casinos. For Indian casinos, the employment numbers were estimated using previous press reports on employment and the number of games.

* denotes estimated.

2. The Literature

Because casinos only appeared recently in many states, the literature contains few empirical estimates of the economic impact of casinos. However, a number of articles by sociologists, economists and other social scientists do address this issue. In many cases the articles rely on verbal or philosophical arguments rather than formal economic models. While scholars' opinions differ greatly about the economic impact of casinos, the literature does identify several key issues for our impact study.

2.1 The Multiplier Concept

The central idea behind any economic impact study is the *multiplier*. The multiplier comes from the basic tenets of Keynesian theory, where economic activity is driven by the demand for goods and services. If one new dollar is injected to purchase goods in the economy, it has a direct affect of increasing output by one dollar. However, the new dollar also becomes income to the person selling the product, and that individual will also spend a portion, say 75 cents, of the income. Thus the economic impact of the one dollar injection is now $1.75. The 75 cents now becomes income to someone else, who spends a portion, and the chain continues. In the end, the economic impact of a one dollar injection is much larger than a dollar. If the total impact of a one dollar injection is four dollars of additional output, the multiplier is four.

2.2 The "Crowding Out" Thesis

Critics of casino gambling argue that the story above may not hold for casinos. The key point is that dollars spent by local citizens in casinos would otherwise be spent in local businesses such as restaurants. Thus, casinos *crowd out* other businesses. The one exception occurs if the casino patrons come from other areas, bringing new money to the local economy. Grinols' comparison of casinos to restaurants and factories is a good example of this view commonly expressed by casino critics:

> "A factory, when it locates in an area, sells to the rest of the country. Its payroll, materials purchases, and profits spent locally are new money to the area that represents tangible goods produced. On the

> other hand, adding a new restaurant that caters to local population in an area simply takes business from local firms [i.e., industry cannibalization]. The question for a particular region therefore is: Is a casino more like a factory or a restaurant? In Las Vegas, casinos are more like factories because they sell gambling services to the rest of the Nation. In most other parts of the country, gambling is like a restaurant, however, drawing money away from other businesses, creating no economic development, but leaving social costs in its wake (Grinols 1994b, 9; also see Grinols 1995b, 7-9)."

Goodman (1994a, 1994b), Grinols and Omorov (1995), and Edington (1995,1996) express similar concerns, but perhaps the strongest criticism comes from Rose (1995, p. 34):

> "A casino acts like a black hole sucking money out of a local economy. No one cares if you suck money out of tourists, but large-scale casinos that do not bring in more new tourist dollars than they take away from local players and local businesses soon find themselves outlawed."

2.3 The "International Trade" Thesis

These critics argue fervently that casinos will have no positive impact on the local economy if they fail to attract outside gamblers. However, others find their arguments less than compelling. As Evart (1995) notes, professional sports teams and countless other businesses fail to produce a tangible product yet economists typically find a positive economic impact from such industries. Why do casinos differ from other forms of entertainment?

Hoover and Giarrantani (1984) note another flaw in the theory above. If exporting is necessary for growth, how can the world as a whole grow? In the words of Hoover and Giarrantani (1984, p. 319):

> "The argument advanced for the [export base] approach is that a region, like a household or a business firm, must earn its livelihood by producing something that others will pay for. Activities that simply serve the regional market are there *as a result of* whatever level of income and demand the region may have achieved: They are passive participants in growth but not prime movers. A household, a neighborhood, a firm, or a region cannot get richer by simply "taking in its own washing"; it must sell something to others in order to get more income. Consequently, exports are viewed as providing the economic base of a region's growth.
>
> The view of export demand as the prime mover in regional growth raises some interesting questions that indicate the need for a more adequate explanation. Consider, for example, a large area, such as a whole

> country, that comprises several economic regions. Let us assume that these regions trade with one another, but the country as a whole is self-sufficient. We might explain the growth of each of these regions on the basis of its exports to the others and the resulting multiplier effects upon activities serving the internal demand of the region. But if all the regions grow, then the whole country or "superregion" must also be growing, despite the fact that it does not export at all. The world economy has been growing for a long time, though our exports to outer space have just begun and we have yet to locate a paying customer for them. It appears, then, that *internal* trade and demand can generate regional growth: A region really can get richer by taking in its own washing."

2.4 Evidence From the Literature

Scholars can easily disagree on the impact of casinos because there is little empirical evidence on the issue. Walker and Jackson's (1998) results based on state level data suggest that the introduction of casinos does lead to increases in personal income within a state. Impact studies also find benefits from casinos, though casino critics are quick to point out that most of the existing studies were funded by casinos. Hamer (1995) uses an input/output model with multipliers for New Jersey casinos and finds that every job in the casino industry creates an additional 1.09 jobs in all other industries in the state. That is, Hamer (1995) finds a multiplier of 2.09. For Louisiana, Oakland Econometrics (1996) finds a multiplier of 1.81. Both studies appear to use the input-output approach, which may overstate the multiplier for reasons that will be discussed in the methodology section.

The literature provides several bits of key information for our study. First, combining non-empirical and empirical studies suggests a wide range for the multiplier. Critics would assert plausible values near zero while the most optimistic previous industry study suggests a value slightly over two. Second, the literature supplies an idea that casinos that attract outside gamblers will have a larger impact on the local economy. We label this idea as the *export hypothesis*, because it implies a larger multiplier for areas that export their product (gambling). [1] For

[1] The industry studies of Homer (1995) and Oakland Econometrics (1996) appear consistent with the export hypothesis. The estimated multiplier for New Jersey casinos, which attract more out-of-state gamblers than Louisiana, is larger than that for Louisiana.

Louisiana, this implies that casinos in Shreveport and Lake Charles, which attract a large proportion of gamblers from Texas, will have a larger multiplier than other casinos which rely more on local gamblers.

A longer reference list is attached to provide a more detailed description of the literature on casinos.

3. Methodology

Our primary goal is to estimate the total number of jobs and total earnings created by Louisiana casinos. The preferred multipliers are based on a Bayesian regression model consisting of different equations for each of the state planning districts. Before turning to the Bayesian methodology, we describe other approaches to the problem and why we instead prefer the Bayesian approach.

3.1 Input-Output multipliers

Most impact studies facing tasks similar to this one use input-output (I/O) tables to determine multipliers. Input-output tables supply the predicted number of jobs and earnings created by one dollar in new revenue for many industries. For Louisiana, the U.S. Bureau of Economic Analysis (BEA)'s most recent table is based on 1992 data.[2] Casinos fall into a catagory of "other amusements and recreational services," and the table can easily be used to compute the predicted number of jobs created by casinos. In addition, the BEA has calculated the I/O tables for each state planning district which permits separate multipliers for each area. Unfortunately, two key problems serve to question the validity of this measure.

First, the input-output tables are based on 1992 data prior to the existence of casino gambling. Thus, the multipliers are calculated from amusements that may differ substantially

[2] The U.S. Department of Commerce (1992) describes the methodology used the by the Bureau of Economic Analysis (BEA) to generate input-output tables.

from casino gambling and not possess the unique characteristics that lead some to question the economic impact of gambling. Second, the input-output multipliers implicitly assume that the casino creates new revenue. In other words, the input-output multipliers ignore the "crowding out" issue, which the literature suggests may be important. Given these factors, the input-output multipliers should supply an upper bound on true multiplier but should not be used as the sole measure of the multiplier.

Table 2

State Planning District:	Input-Output Multiplier
Lake Charles	2.17
New Orleans	2.72
Shreveport	2.66
Baton Rouge	2.32
Houma	2.22
Alexandria	2.35

Table 2 contains the job multipliers for each state planning district computed from the input-output tables. To understand the multiplier, consider the multiplier of 2.17 for Lake Charles. This number suggests that every casino job leads to 1.17 more jobs elsewhere in the economy. Thus, multiplying total casino employment in Lake Charles (5,755) by 2.17 leads to a total of 12,324 jobs in Lake Charles which may be attributed to casinos.

Overall, these results suggest that each casino job translates into 2.38 total jobs in the economy, or that the existence of casinos led to 48,755 new jobs in 1998. However, these results also show some evidence of the bias mentioned earlier. The multiplier for New Orleans of 2.69 is much larger that the multipliers of Shreveport and Lake Charles. Recall that the export hypothesis implies that the multipliers of Shreveport and Lake Charles should be *larger* than the

other state planning districts. This suggests that the input-output multipliers overstate the true multiplier as expected.

3.2 The Econometric Modeling Approach

The econometric modeling approach consists of specifying regression equations for employment in each of the state planning districts. To allow for joint hypothesis tests, we estimate a system of equations with one equation for each of the eight state planning districts. Because Cypress Bayou casino is located near the boundary of the Houma and Lafayette state planning districts, we also consider models which combine these two districts (leaving a total of seven). The approach consists of specifying key economic factors for each state planning district and estimating a regression model including these factors and casino employment. The coefficient on casino employment supplies the employment multiplier.

Scott, Richardson, and Jamal's (1998) Louisiana Economic Model provided an initial model, but we also considered other variants for each state planning district. Rather than present one set of results, it is useful to denote features common across all specifications. In particular, the results typically estimated multipliers larger than our upper bound (the input-output multipliers) for some state planning districts and quite small multipliers for other districts. The results also typically included large standard errors for many multipliers, which implied t-statistics too small to reject the null hypothesis of a zero multiplier in many cases. However, joint hypothesis tests of zero multipliers were always rejected for any group of state planning districts.

A simple summary of the results is that the basic model clearly showed positive multipliers, but failed to provide precise estimates for the multipliers. Given that the data set contained twenty years of data, but only three years with non-zero casino employment these results are not surprising. Interestingly, the results for our preferred models also fit the data quite

well. Given these results, our options were to estimate a single multiplier for the state[3] or to choose another approach. One approach very well-suited for this problem is Bayesian statistics.

3.3 The Bayesian Methodology

In this section we focus on the intuition behind the Bayesian model. Percy (1992) and Terrell (1995) supply technical details on the methodology and required MATLAB computer programs are available upon request. The central idea behind the Bayesian approach is to combine prior information with the data to obtain a final answer. A key advantage of the technique is that it is more flexible for our application than the frequentist techniques described above.

Table 3

State Planning District:	Economic Drivers	R^2
Lake Charles	Chemicals, Oil, U.S.GDP	.974
New Orleans	Chemicals, U.S. GDP, Oil	.947
Shreveport	U. S. GDP, AT&T	.929
Baton Rouge	Chemicals, U.S. GDP	.974
Lafayette/Houma	Oil, U.S. GDP	.975
Alexandria	Oil, U.S. GDP	.916
Monroe	U.S. GDP	.895

Begin by considering the data. Table 3 contains the key variables for each state planning district which were derived from the work described in 3.2. For each state planning district (the combined Houma-Lafayette district is counted as one), this implies a regression equation. For example, the New Orleans equation is:

[3] This leads to a multiplier of 1.76.

$$spd1_t = b_0 + b_1 cas1_t + b_2 chem_t + b_3 oil_t + b_4 gdp_t + b_5 spd1_{t-1} + e_t$$

where $spd1_t$ is employment in state planning district one,

$cas1_t$ is casino employment in state planning district one,

$chem_t$ is chemical employment,

oil_t is the Louisiana active rig count measuring oil and gas activity,

gdp_t is U.S. real Gross Domestic Product, and

e_t is a random error term.

The lagged employment term accounts for persistence in the series and also eliminates the problem of autocorrelation. The coefficient β_1 is the casino employment multiplier and key focus of this study. A similar equation exists for each state planning district. Likewise, the assumption of normal errors allows us to write the likelihood function for any single equation and also for entire system. This likelihood function summarizes the information in the data, and the results summarized in section 3.2 were obtained by maximizing this likelihood function. The R^2 values in the final column of Table 3 were calculated using maximum likelihood and show that these models provide a good fit in each district.

The Bayesian methodology also requires specifying prior distributions for each parameter. We choose a normal prior for all parameters. For parameters other than the multiplier, we specify normal priors with a mean zero and variance of 10,000. This states that we know little about these parameters. For our multiplier, we choose a prior mean of 1 and variance of .5. This implies that our best guess for the multiplier is one. Clearly some would argue for a multiplier near zero and others would argue for a larger value. However, the assumption that a job created by casinos is one new job seems a reasonable starting point. The variance summarizes our confidence in this estimate. A value of .5 says that we believe there is a 95% chance that each multiplier is in the interval $1 \pm 1.96 * \sqrt{.5}$. In other words our prior states that we

believe there is a 95% chance that the multiplier is between -0.39 and 2.39. Note that we do not restrict the multiplier to be within these bounds.

The essence of Bayesian statistics is to combine the prior with the information from the data summarized by the likelihood. Our final result is a weighted average of the two with the weight determined by the variances. The identical prior for all multipliers serves to shrink the multipliers together and toward a value of one if the data were uninformative. For example, as the standard error on a multiplier in a typical model rises (such as those explored in section 3.2), the prior would dominate and the estimated multiplier would move to one. As the number of observations rises or the standard error falls, the final estimate relies less on the prior and estimates will move closer to the frequentist estimate (the non-Bayesian model in 3.2).

Table 4

State Planning District:	Multiplier
Lake Charles	1.63
New Orleans	1.31
Shreveport	1.75
Baton Rouge	1.23
Lafayette/Houma	1.02
Alexandria	1.38

The final Bayesian results appear in Table 4. The results show multipliers ranging from 1.02 in Lafayette/Houma to 1.75 in Shreveport. The results show all multipliers lie below the Input-Output multipliers in Table 2 as expected. In addition, the results conform to the predictions of the export hypothesis. The multipliers are largest for the casinos in Shreveport and Lake Charles.

4. Results

Table 5 presents the final results on the impact of casinos on employment and earnings. These results were generated using the Bayesian multipliers and earnings from the BEA's input-output tables. Column (2) of Table 5 gives casino employment as number of employees. Beside this number, the number in parenthesis is casino employment as a proportion of total employment. Column (3) presents similar numbers for total employment generated by the casino, both through directly employing workers and through the multiplier. Finally, column (4) contains the estimated increase in earnings (both direct and via the multiplier effect) created by the casino industry in Louisiana.

Table 5

The Economic Impact of Casinos in Louisiana

(1) State Planning District	(2) Direct Casino Employment	(3) Total Jobs Created	(4) Average Annual Earnings of Casino Employees	(5) Total Earnings Created
Lake Charles	5,690 (5.2%)	9,275 (8.5%)	$17,886.36	$175,079,503
New Orleans	3,460 (0.6%)	4,533 (0.8%)	$19,963.96	$ 91,324,915
Shreveport	6,799 (3.1%)	11,898 (5.5%)	$18,229.34	$229,265,702
Baton Rouge	1,707 (0.5%)	2,100 (0.6%)	$19,990.03	$ 42,203,659
Lafayette / Houma	1,200 (1.0%)	1,224 (1.0%)	$19,034.32*	$ 23,331,873
Alexandria	1,300 (0.6%)	1,794 (0.8%)	$19,034.02*	$ 34,776,364
Total	20,156 (1.1%)	30,823 (1.7%)	N/A	$595,982,017

Notes: Total jobs created is calculated as the product of the multipliers in Table 4 and the direct employment numbers in column 1 of this table. The total payroll for each riverboat casinos was obtained from the 1998 third quarter reports submitted by each casino to the Louisiana Attorney General's office. The average annual salary numbers reported in column (4) calculate by multiplying the total earnings of all casinos in the area by four and dividing by the total number of employees reported across the same casinos. Indian casinos do not report the total payroll. For Lake Charles we simply calculate the average wage without including the Grand Cushatta casino. For Lafayette/Houma and Alexandria, we use the average across all other districts as an estimate of annual earnings. Direct earnings are calculated as the product of columns (3) and (4). The wages of indirect jobs created were estimated using I/O tables. Column (5) contains the sum of the direct and indirect earnings created by the casinos in 1998.

Consider first the total impact of casinos in Louisiana. Casinos employed 20,156 workers directly in 1998, which implies that roughly one out of every one hundred Louisiana workers was employed by a casino. **Taking into account the multiplier, Louisiana's casinos accounted for 30,823 jobs and $596 million in earnings**.

The results also show that the impact of casinos is heavily concentrated in two areas. By raw count Shreveport led the state with 6,799 workers employed by casinos. With the multiplier, Shreveport's casinos accounted for 11,898 jobs. By one measure, the impact of casinos on the local economy in Lake Charles is even larger than that in Shreveport. Over 5% of the work force in Lake Charles were employed by casinos (versus 3.1% in Shreveport), and the employment generated by casinos accounted for 8.5% of total employment (versus 5.5% in Shreveport).

Casinos do not play this dominant role in the other state planning districts. While casinos employ over a thousand workers in the four other districts, completely eliminating casinos in one of these areas would not begin to invoke the hardship of the Fruit of the Loom layoffs in Lafayette or AT&T layoffs in Shreveport. Casinos employ less than 1% of total employment in these areas. Even accounting for the multiplier effect, the total employment created does not rise above 1% in these areas.

Our results indicate that casino employees earned $377 million dollars. In addition, jobs created through the multiplier effect accounted for another $219 million in new earnings indirectly created by casinos. **Overall, the results indicate the total impact of casinos on Louisiana earnings is an additional $596 million**. To put this figure in perspective, Louisiana personal income is currently $92.6 billion. **This implies that direct and indirect earnings created by casinos make up 0.64% of the Louisiana economy**.

There is one other important impact which can be estimated from the data generated in Table 5. Economists in the Louisiana Legislative Fiscal Office have estimated that for every new dollar of income generated in the Louisiana economy the State collects approximately 5.5 cents in additional tax revenue. **Thus, the $596 million in additional earnings created by the casino industry should have boosted consumer tax collections to the state treasury by approximately $32.8 million.**

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