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People Rush in, Empty Their Pockets, and Scuttle Out: Economic Impacts of Gambling on the Waterways

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Abstract. This paper evaluates county-level economic growth impacts of casinos along waterways in six US states over the years 1995-2002. In a manner consistent with individual state legislation regarding legalized riverboat gambling, the dataset includes those counties in the states of Illinois, Indiana, Iowa, Louisiana, Missouri, and Mississippi adjacent to navigable waterways. Using insights gained from reduced form equations derived via a structural growth model, a system of growth relationships is estimated for each of population, employment, and aggregate county income. Controlling for various local characteristics, there is evidence counties with a casino opening after 1995 experienced slower aggregate county income growth while the effect on employment growth was positive. Casinos did not appear to significantly affect population growth.

1. Introduction

In the aftermath of hurricane Katrina in August 2005, the Mississippi Gulf Coast struggled to cope with damage inflicted to its infrastructure, communication and utility networks, residents physical and mental health and well being, and of course, the gambling industry. The dependence of this region on gaming is particularly evident as demonstrated by the quick response by the Mississippi senate which, in just over a month after Katrina made landfall, voted to allow casinos to be built on dry land but within 800 feet of the water. With a number of counties assessing the role casinos might play in an economic development strategy, there is need for timely and objective research to examine the economic growth effects of casino operations. The argument in favor of such research is further strengthened given the lack of consensus and ongoing debate as regards the costs and merits of legalized gambling.

Academics[1] have long questioned the motivation and rationale behind why people gamble. It is common knowledge that at any point in time the expected payoff to any lottery, slot machine, or card game will favor the gambling establishment[2]. In a 1995 study examining gambling activity in Wisconsin it was found the average loss per casino visit was approximately $50 (Thompson et al. 1995). In a 1994 article, Grinols noted the average collected from adults within a 35 mile radius of Atlantic City and Las Vegas were

[1] While somewhat dated, the following quote from Paul Samuelson largely captures the mindset of many gambling critics: "There… is a substantial economic case to be made against gambling… it involves simply sterile transfers of money or goods between individuals, creating no new money or goods. Although it creates no output, gambling does nevertheless absorb time and resources. When pursued beyond the limits of recreation, where the main purpose after all is to "kill" time, gambling subtracts from the national income" (Samuelson 1970, p 402).

[2] It should be noted certain activities such as counting cards in blackjack can increase an individual's odds so as to actually make money. However, in the case of counting cards, while legal provided no external devices are used, may result in these patrons removed from the establishment and further prevented from engaging in such activity in other establishments through information sharing among other casinos.

$199 and $106 respectively. In playing games of chance, averages and probabilities ensure the casino is, on average, never at a loss. From an owner's perspective a casino might be described as the perfect business where "people swarm in, empty their pockets and scuttle off[3]." If it were not for the fact that in 2003 there were 443 commercial casinos operating in the US with a total revenue of about $27 billion (Survey of Casino Entertainment, 2004) the use of casinos as an economic development tool would likely not get very much attention. Further, the fact that in 2003 these casinos generated about $4.3 billion in direct taxes makes them an enticing economic development alternative to supplement strained government budgets.

Gambling advocates argue casinos simply provide a form of entertainment and should be treated no differently than other industries, others (religious groups, anti-gambling advocates, etc.) contend gambling is fundamentally different from other forms of entertainment and represents a "sin good"[4]. Those opponents of legalized gambling would tend to highlight large social costs and negative externalities associated with gambling activity and includes reduced worker productivity, addiction, family breakdown, increased criminal activity, and increased law enforcement and judicial costs. Whether or not legalized gambling and casinos results in net economic benefit versus cost depends in large part on how the costs, especially social, are computed (Walker and Barnett, 1999). A number of studies have addressed the social cost aspect of gambling (Grinols, 1995; Thompson et al., 1999; Gazel et al., 2001; Walker, 2003). Different interpretations of the associated costs are one reason why some research suggests casinos can provide economic activity that may benefit the local community (Siegel and Anders, 1999; Garrett, 2004), while other research is less optimistic (Grinols, 1994, 1995; Anders et al., 1998). Arguing that most studies define social costs of gambling in an ad hoc manner, Walker and Barnett (1999) specifically address in effect what does and what does not constitute a social cost of gambling. The authors go further and address the less controversial social costs of gambling prohibition as a result of prohibition and political rent seeking. While the debate on the costs of gambling will surely continue, this particular study does not explicitly address the social costs associated with gambling *per se;* rather the objective is to evaluate what effect, if any, gambling establishments have on established indicators of economic growth. In this way we need not be concerned with the political[5] and moral debate that often accompanies legalized gambling and can instead focus on evaluating casinos as a regional economic development tool.

This study examines the impacts of gambling on aggregate county income, employment, and population growth by examining a cross-section of counties from states Midwestern and Southern states. The main contributions of this research are twofold; first, a simple structural growth framework is considered by which a series of derivations reveals important implications for estimation of reduced-form growth relationships; second, with insight gained from the reduced-form model, we estimate a system of growth relationships to evaluate the economic growth impacts of riverboat casinos. Since not all states allow casino gambling in addition to the fact that even among those states where casinos are legal, casinos are not permitted in all counties, the sample of counties considered includes only those counties which could legally host a riverboat casino. These are those counties coinciding with waterways that generally satisfy riverboat gambling legislation in the states of Illinois, Indiana, Iowa, Louisiana, Missouri, and Mississippi. The resulting sample of 145 counties is then used to determine if the presence of a casino has had an impact on any of the economic growth indicators. Since legalized riverboat casinos and other water based gambling are relatively recent phenomena to Midwestern and Southern states, only economic growth over the seven year period 1995-2002 is considered. Findings when controlling for a variety of county specific characteristics indicates casinos established after 1995 had positive impact on employment growth but a negative impact on aggregate county income growth while casinos established before 1995 had little or no enduring effect. Casinos d not appear to have had a significant impact on population growth.

In the next section an overview of some of the key issues regarding legalized gambling are highlighted in the context of economic development. This is followed by a conceptual framework where the implications for estimation of reduced form growth equations are derived. The three remaining sections describe the dataset, empirical findings, and concluding remarks respectively.

[3] This quote is attributed to the business tycoon Mr. Burns on the Simpsons in an episode which parodies the social costs of gambling.
[4] See Gross (1998) – Economic Development Quarterly 12 – 203-213.

[5] To highlight the intensity of the political debate, on the topic of legalized gambling in Chicago a commentator noted that while a new casino would undoubtedly generate new jobs, "… we could create plenty of construction jobs by building brothels and opium dens." (Quinn, 1992).

2. Casinos and Economic Development

The use of casinos and gambling has been promoted as an effective means to bolster local economic activity and otherwise improve struggling economies. Further, casinos may complement local tourism and promote greater growth in service industries. A recent survey found 75% of those responding believed casinos can play an important part in their community's entertainment portfolio (Survey of Casino Entertainment, 2004). This apparent optimism for gambling to stimulate economic growth represents one reason why greater consideration has been given for further casino development. With budgetary conditions worsening for many state and local governments, the sizable potential revenue generated from casinos makes them an attractive option to make up budgetary shortfalls and to supplement local government coffers (Garrett, 2004). The fiscal outlook for local governments may improve considerably as tax revenue collected from gambling revenues can be used to improve local services and infrastructure. Further, since gambling has not been fundamentally altered by technological advancements and by-and-large does not require a high level of skill of its employees, casinos are increasingly being considered in areas with a low-skill workforce that is often a characteristic of depressed economies. In addition, since gambling revenues are generally taxed at a higher rate than other sectors the opportunity to generate additional tax revenue, even while total output may be falling, may create incentives for local governments to tend towards maximizing tax revenue rather than increasing economic output[6].

Job creation is often cited as a benefit to localities establishing casinos and is a major consideration for regions with high unemployment. Garrett (2004) finds employment gains are greater in rural counties which have adopted a casino as a major or predominant industry. For tribal casinos operating on Indian reservations, Evans and Topoleski (2002) find that both employment and population increased in the years shortly following the introduction of a casino. The same study also found there were both positive and negative spillovers to neighboring communities. However, comparing employment levels before and after the introduction of riverboat casinos, Grinols (1994) fails to find an increase in employment levels corresponding to the introduction of casinos.

Tourism is often a key consideration when undertaking an economic development program involving casinos. At the heart of many casino development projects is the reliance on gambling expenditures coming from patrons outside the immediate region. In the case of a proposed casino in Chicago, net employment gains required more gambling dollars come from visitors than residents (Grinols, 1994). The need to draw in a considerable amount of tourism dollars is a major factor in determining whether or not a casino can leave a region better off. However, as the number of casinos in smaller markets increases, it is unclear whether such markets can attain and maintain a sufficient level of out-of-region patronage. Additionally, in regions without a casino an incentive arises to establish casinos to stem the flow of resources out of the region. Indeed, one of the factors contributing to Illinois allowing riverboat gambling was to stem the flow of its residents' gambling expenditures across the Mississippi in Iowa[7] (Dunstan, 1997). In a related example from California, the Fantasy Springs tribal casino located east of Los Angeles and operated by the Cabazon[8] tribe has been faced with financial difficulties in recent years due to reduced patronage as other tribes have located casinos ever closer to Los Angeles. As summarized by Donald Trump "Everybody seems to be eating each others' lunch, and it's only going to get worse" (Sanders and Emshwiller, 2005).

3. Theoretical Growth Model

The empirical model is motivated by the classic Carlino and Mills (1987) growth model examining population and employment growth. In a manner similar to Deller et al. (2001), the Carlino and Mills (1987) framework is extended to include county income growth. As a point of departure from previous models which specify steady-state equilibrium values as a linear function (Deller et al., 2001), here steady-state equilibrium values of key economic variables are expressed in terms of a Cobb-Douglas functional form. Since the objective is to empirically capture the effect, if any, presence of a casino has on those economic growth measures identified, the analysis herein need not be concerned with an intricate structural growth model. However, the reduced form growth equations do provide insight as to which independent variables should and should not be included in the empirical

[6] One way to motivate this notion follows as an extension from the Leviathan hypothesis where politicians have an incentive to allocate some resources from the budget to meet their personal ends as opposed to those of the constituents. Since elected officials' terms in office are limited the motives for establishing a casino may not necessarily be in line with long-term growth objectives. For more on the Leviathan hypothesis see Brennan and Buchanan (1980) and Grossman and Noh (1994).

[7] This issue is also noted in Siegel and Anders (1999).

[8] This is the tribe which won a 1987 Supreme Court case allowing for tribal casinos nationwide.

specification. The basic form of the model in equilibrium takes the following form:

$$I^* = \alpha_I \; P^{*\;\beta_{P,I}} \; E^{*\;\beta_{E,I}} \prod_{a=1}^{nI} \Omega_{I,a}^{\;\gamma_{I,a}} \qquad (1)$$

$$E^* = \alpha_E \; P^{*\;\beta_{P,E}} \; I^{*\;\beta_{P,I}} \prod_{b=1}^{nE} \Omega_{E,b}^{\;\gamma_{E,b}} \qquad (2)$$

$$P^* = \alpha_P \; E^{*\;\beta_{E,P}} \; I^{*\;\beta_{I,P}} \prod_{c=1}^{nP} \Omega_{P,c}^{\;\gamma_{P,c}} \qquad (3)$$

where I, E, and P represent county income, employment, and population levels respectively, and the superscript,*, indicates the steady state equilibrium value. Exogenous variables that impact the steady-state are included in Ω_i, for i=I,E,P. These sets include additional explanatory variables which include presence of a casino, demographic and human capital indicators, select industry characteristics, and state policy effects among others. There are a total of nI, nE, and nP of these exogenous variables for each of income, employment, and population respectively. The $\beta_{j,i}$'s and γ_i's for j=I,E,P and j≠i are structural parameters. Faced with an exogenous shock or disequilibrium in the economic system the adjustment process towards the steady state is formulated in terms of changes in growth rates in a manner resembling Barro and Sala-I-Martin (1991). The adjustment path followed by the growth rate is assumed to respond gradually according to the speed of adjustment parameter represented by λ_i. The relationships describing the dynamic paths of the growth rates to the equilibrium steady-state values are given by:

$$\ln\left(\frac{I_{t+1}}{I_t}\right) = \lambda_I \; \ln I^* - \ln I_t \qquad (4)$$

$$\ln\left(\frac{E_{t+1}}{E_t}\right) = \lambda_E \; \ln E^* - \ln E_t \qquad (5)$$

$$\ln\left(\frac{P_{t+1}}{P_t}\right) = \lambda_P \; \ln P^* - \ln P_t \qquad (6)$$

In each of the growth relationships in equations (4)-(6), the (log of) steady-state value can be re-stated as a function of the speed of adjustment rates, the growth rate, and an initial condition. Without loss of generality, one can take logarithms of equations (1)-(3) and equate these with the equilibrium values obtained from the modified equations (4)-(6). After simplifying, a system of equations can be derived relating growth as a function of initial conditions for the growth variables, other growth rates, and exogenous variables. Unfortunately, the three resulting growth equations cannot be estimated directly as they potentially suffer from a host of statistical problems such as endogeneity. However, since the objective of this study is to examine the impact of casinos on the economic growth indicators, it will be sufficient to examine the reduced form growth equations. Performing these substitutions, and introducing a random error, ε_i, to capture unobservable random effects results in the following set of growth equations:

$$\ln\left(\frac{I_{t+1}}{I_t}\right) = \tilde{\alpha}_I - \lambda_I \ln I_t + \frac{\lambda_I}{\psi}\left[\begin{array}{l} 1-\beta_{E,P}\beta_{P,E} \;\; \sum_{a=1}^{nI} \gamma_{I,a} \ln \Omega_{I,a} + \;\; \beta_{E,I} + \beta_{P,I}\beta_{E,P} \;\; \sum_{b=1}^{nE} \gamma_{E,b} \ln \Omega_{E,b} + \\ \beta_{P,I} + \beta_{E,I}\beta_{E,P} \;\; \sum_{c=1}^{nP} \gamma_{P,c} \ln \Omega_{P,c} \end{array}\right] + \varepsilon_I \qquad (7)$$

$$\ln\left(\frac{E_{t+1}}{E_t}\right) = \tilde{\alpha}_E - \lambda_E \ln E_t + \frac{\lambda_E}{\psi}\left[\begin{array}{l} \beta_{I,E} + \beta_{P,E}\beta_{E,P} \;\; \sum_{a=1}^{nI} \gamma_{I,a} \ln \Omega_{I,a} + \;\; 1-\beta_{E,I}\beta_{E,P} \;\; + \sum_{b=1}^{nE} \gamma_{E,b} \ln \Omega_{E,b} \\ \beta_{P,E} + \beta_{I,E}\beta_{E,I} \;\; \sum_{c=1}^{nP} \gamma_{P,c} \ln \Omega_{P,c} \end{array}\right] + \varepsilon_E \qquad (8)$$

$$\ln\left(\frac{P_{t+1}}{P_t}\right) = \tilde{\alpha}_P - \lambda_P \ln P_t + \frac{\lambda_P}{\psi}\left[\begin{array}{l} \beta_{I,P} - \beta_{E,P}\beta_{E,I} \;\; \sum_{a=1}^{nI} \gamma_{I,a} \ln \Omega_{I,a} + \;\; \beta_{E,P} + \beta_{I,P}\beta_{E,I} \;\; \sum_{b=1}^{nE} \gamma_{E,b} \ln \Omega_{E,b} + \\ 1-\beta_{E,I}\beta_{I,E} \;\; \sum_{c=1}^{nP} \gamma_{P,c} \ln \Omega_{P,c} \end{array}\right] + \varepsilon_P \qquad (9)$$

Where:

$$\tilde{\alpha}_I = \frac{\lambda_I}{\psi}\left(1-\beta_{E,P}\beta_{P,E}\right)\ln\alpha_I + \left(\beta_{P,I}+\beta_{E,I}\beta_{P,E}\right)\ln\alpha_P + \left(\beta_{E,I}+\beta_{P,I}\beta_{E,P}\right)\ln\alpha_E$$

$$\tilde{\alpha}_E = \frac{\lambda_E}{\psi}\left(1-\beta_{P,I}\beta_{I,P}\right)\ln\alpha_E + \left(\beta_{P,E}+\beta_{P,I}\beta_{I,E}\right)\ln\alpha_P + \left(\beta_4+\beta_{P,E}\beta_{I,P}\right)\ln\alpha_I$$

$$\tilde{\alpha}_P = \frac{\lambda_P}{\psi}\left(1-\beta_{E,I}\beta_{I,E}\right)\ln\alpha_P + \left(\beta_1+\beta_{I,P}\beta_{E,I}\right)\ln\alpha_E + \left(\beta_2+\beta_{E,P}\beta_{I,E}\right)\ln\alpha_I$$

$$\psi = 1-\left(\beta_{E,I}\beta_{P,E}\beta_{I,P}+\beta_{P,E}\beta_{E,P}\beta_{I,E}+\beta_{E,P}\beta_{P,E}+\beta_{P,I}\beta_{I,P}+\beta_{E,I}\beta_{I,E}\right)$$

In equations (7)-(9), the $\tilde{\alpha}_i$'s are constants, and λ_i's are speed of adjustment parameters. Allowing for a limited amount of correlation between the errors, the ε_i's, the above system of equations (7)-(9) can be estimated using Zellner's seemingly unrelated regression (SUR) technique.

While the model above does not provide us with enough latitude to recover the structural model parameters, some useful implications for estimation can be drawn. First, these reduced form growth equations are functions only of their own initial values and not those of the other growth variables. Secondly, the speed of adjustment parameter, the λ_i's, appears only in their own respective growth equations. Finally, all the exogenous variables, the Ω_i's, appear in each of the growth equations. Therefore, with the exception of the initial value for each growth variable, all the right-hand side variables should be the same.

4. Data

One reason there has not been more empirical research on the impacts associated with gambling is the lack of data (Walker, 2003). It is partly due to the lack of data and the difficulties involved in collecting a more comprehensive dataset that attention is restricted to riverboat gaming in Midwestern and Southern states. The states of Illinois, Indiana, Iowa, Louisiana, Missouri, and Mississippi each have regulations concerning legalized riverboat gambling. The sample is restricted to counties in these states located in proximity to the following waterways: the Mississippi River (IL, IA, MO, LA, MS), Fox River (IL), Des Plaines river (IL), Missouri River (IA, MO), Red River (LA), Ohio River (IN, IL), Lake Michigan (IN, IL), and the Mississippi Gulf Coast (MS). In addition, riverboat gambling in these states could not commence until the appropriate state legislation legalizing riverboat casinos was passed, this occurred between the years 1991 and 1995. In Iowa and Indiana the first riverboat casinos opened in 1991, followed by Mississippi in 1992, Louisiana in 1993, Missouri in 1994, and Indiana in 1995 (Survey of Casino Entertainment, 2004). Given the relatively recent nature of riverboat gambling, the time frame of this study evaluates 1995-2002 economic growth.

To control for the effect of a casino two casino variables are constructed. A variable equal to one if the county had a riverboat casino present in 1995 or earlier and zero otherwise, and a second dummy variable which is equal to one if the county had a casino which began operations between 1996 and 1999 and zero otherwise. After removing those counties with missing data there were 145 counties that could potentially host a casino. At the start of the reference period a casino was located in 22.8% of these counties and 7.6% were home to casinos established subsequent to 1995 (Table 1). A map of the counties used in this study along with casino status is shown in Figure 1.

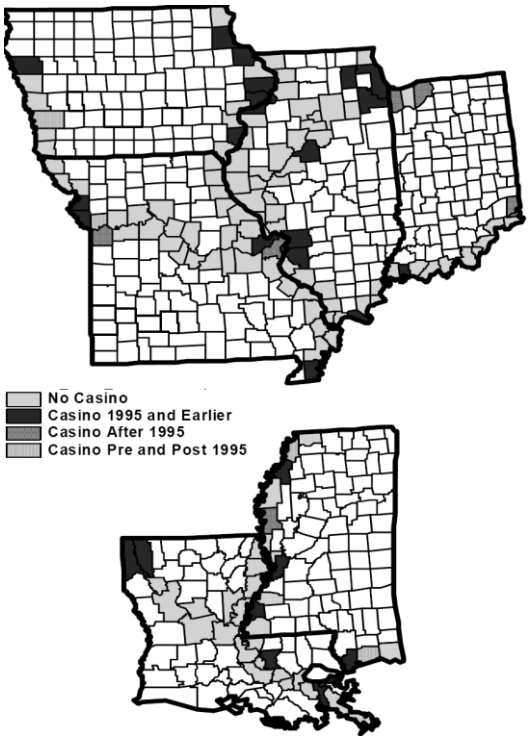

Figure 1. Counties along Major Waterways by Casino (sources: American Gaming Association - *Survey of Casino Entertainment*, casino websites, and Thalheimer and Ali, 2003)

Table 1. Summary Statistics

	Mean	Std. Dev.
Dependent Variables (log growth rates)		
Income Growth 1995-2002	0.302	0.086
Employment Growth 1995-2002	0.066	0.117
Population Growth 1995-2002	0.023	0.072
Explanatory Variables		
Gambling Variables		
Casino Established 1995 or Earlier	0.228	
Casino Established post 1995	0.076	
Dependent Variable Initial Conditions		
Population 1995	116,191	454,633
Employment 1995	66,739	273,499
County income 1995	2,759,526	12,100,000
Other Controls		
Percent with College Degree 1990	0.140	0.059
Transfer Payments Per Capita 1995	3.412	0.716
Per Capita Income 1995	18.575	3.465
Natural Amenity Scale	-0.771	1.067
Services Share of Earnings 1995	0.195	0.084
Number of observations = 145		

County income, population, and employment figures are collected from the Bureau of Economic Analysis (BEA). The average (point-logarithmic) growth for these indicators over the study period was 30.2%, 6.6%, and 2.3% respectively (Table 1). Located along waterways and thus providing greater opportunity for recreational and scenic amenities in general, it is arguable that some of economic growth in these areas might be attributable to economic activity driven by amenities. A natural amenity index is included to control for this and is a composite index including a variety of climatic and topographic variables[9]. During the 1990's and early years of the 21st century, growth in the service industry has been a feature of much of the Midwest and the South. To isolate the effects of a casino from activity in the service industry in general, we include the initial share of service earnings relative to total county earnings using BEA earnings data[10]. The inclusion of this variable allows us to isolate the effect of casinos while controlling for broad service industry impacts. To control for demographic characteristics, included are human capital measured as the percentage of the population 25 years and over with a college degree based on the 1990 Census of Population, per capita income, and an economic dependence variable computed as transfer payments relative to county income using data from the BEA (Table 1). Finally, given the inherent state differences in regulatory environment, resident attitudes, and state industry composition among others, we also control for state effects.

[9] Specifically, the McGranahan (1999) amenity index is used.

[10] Service earnings data was not available from the BEA for six counties and were dropped from the sample: five along the Mississippi river and one along the Ohio river.

5. Results

This section reports the empirical results from four variations on the three-equation system of growth equations estimated using the SUR technique. Model I includes both casino variables, model II includes a single dummy variable if the county had at least one casino at the start of the growth period, model III includes both casino variables but excludes the share of earnings within the county from services, and the final variation model IV, includes a casino variable identifying operations beginning after 1995. The model estimates for these three models are presented in Table 2.

Table 2. Regression Estimates – Growth Equations (1995-2002)

		Model			
		(I)	(II)	(III)	(IV)
County Income Growth	(ln) Initial County Income	0.063	0.038	0.073	0.053
		(0.84)	(0.50)	(0.95)	(0.74)
	(ln) Transfer Payments Per Capita	-1.955***	-1.936***	-1.801***	-1.954***
		(5.91)	(5.77)	(5.53)	(5.90)
	Percent with College Degree	-3.305**	-2.921*	-2.795*	-3.271**
		(2.10)	(1.84)	(1.79)	(2.08)
	(ln) Per Capita Income	0.629	0.627	0.667	0.642
		(1.01)	(1.00)	(1.07)	(1.03)
	Natural Amenity Scale	0.102	0.101	0.110*	0.104
		(1.60)	(1.57)	(1.71)	(1.63)
	Services Share of Earnings	1.693**	1.182		1.578**
		(2.01)	(1.45)		(1.99)
	Casino before 1995 (=1)	**-0.068**	**-0.020**	**0.038**	
		(0.40)	**(0.12)**	**(0.23)**	
	Casino after 1995 (=1)	**-0.473****		**-0.336**	**-0.459****
		(2.00)		**(1.47)**	**(1.96)**
	R-Square	0.418	0.401	0.402	0.417
County Population Growth	(ln) Initial County Population	0.031	0.017	0.035	0.026
		(0.57)	(0.30)	(0.63)	(0.51)
	(ln) Transfer Payments Per Capita	-2.383***	-2.372***	-2.276***	-2.382***
		(9.97)	(9.83)	(9.70)	(9.96)
	Percent with College Degree	-4.891***	-4.668***	-4.525***	-4.876***
		(4.30)	(4.10)	(4.01)	(4.29)
	(ln) Per Capita Income	1.139***	1.124***	1.181***	1.140***
		(2.72)	(2.66)	(2.80)	(2.72)
	Natural Amenity Scale	0.029	0.029	0.035	0.030
		(0.63)	(0.62)	(0.74)	(0.65)
	Services Share of Earnings	1.155*	0.858		1.104*
		(1.90)	(1.47)		(1.93)
	Casino before 1995 (=1)	**-0.030**	**-0.003**	**0.044**	
		(0.25)	**(0.02)**	**(0.37)**	
	Casino after 1995 (=1)	**-0.275**		**-0.181**	**-0.269**
		(1.61)		**(1.10)**	**(1.59)**
	R-Square	0.569	0.560	0.558	0.568

Table 2. (continued)

		Model			
		(I)	(II)	(III)	(IV)
	(ln) Initial County Employment	-0.184*	-0.155	-0.166	-0.153*
		(1.94)	(1.64)	(1.61)	(1.71)
County Employment Growth	(ln) Transfer Payments Per Capita	-3.602***	-3.631***	-3.094***	-3.614***
		(8.45)	(8.42)	(6.86)	(8.45)
	Percent with a College Degree	-4.226**	-4.700**	-2.480	-4.346**
		(2.08)	(2.30)	(1.14)	(2.13)
	(ln) Per Capita Income	0.116	0.140	0.306	0.094
		(0.15)	(0.18)	(0.37)	(0.12)
	Natural Amenity Scale	0.008	0.008	0.035	0.002
		(0.10)	(0.10)	(0.39)	(0.02)
	Services Share of Earnings	5.554***	6.153		5.874***
		(5.16)	(5.91)		(5.74)
	Casino before 1995 (=1)	**0.206**	**0.148**	**0.561****	
		(0.94)	**(0.67)**	**(2.48)**	
	Casino after 1995 (=1)	**0.575***		**1.028*****	**0.535***
		(1.90)		**(3.27)**	**(1.78)**
	R-Square	0.489	0.476	0.395	0.485

Notes: i) Standard errors are in parentheses (***- 1% level of significance, **- 5% level of significance, *- 10% level of significance); ii) All state dummy variables and the constant term have been suppressed in this regression; iii) all estimates derived using the seemingly unrelated regression technique.

The income growth model explains between 40% and 42% of the variation in aggregate county income growth for the years 1995-2002. Specification I results, which includes the service industry share of county earnings, indicate that a county with a casino established after 1995 has had a negative effect on total county income growth (significant at the 5% level) while the effect of a casino in the county prior to 1995 did not have a statistically significant effect. A similar result in terms of parameter magnitude and significance is found in model IV when excluding early casino presence, presence of a casino post 1995 had a negative correlation with county income growth. The estimates in models I, II, and III do not exhibit evidence that total county income growth has been adversely affected by the presence of a casino if the casino was established 1995 and earlier. The estimates from this model also indicate the share of earnings from the service industry has had a positive effect on county income growth. Interestingly, the population growth models, explaining between 56 and 57% of the variation, do not reveal a significant relationship, either benefit or detriment, with casinos. It is interesting to note this result held regardless of the model considered or which casino variable(s) were included.

Lastly, we turn our attention the impact of casinos on employment growth, here the amount of variation explained ranged between 40 and 49%. Unlike income and population growth, the inclusion of service share of earnings variable adds approximately ten percentage points to the coefficient of determination, and indicates the importance of activity within the service industry when explaining employment growth during this period. Not surprisingly, employment growth was positively affected by casinos that began operations post 1995 as indicated by the positive and statistically significant parameter estimates in models I, II, and IV. However, counties with casinos established 1995 and earlier did not appear to have a significant impact on growth except when excluding service share of earnings variable in which case the parameter estimate was significant at the 5% level.

Counties with high levels of transfer payments per capita tended to exhibit slower growth in all three of income, population, and employment growth. As a measure of human capital, the share of the population aged twenty-five years and older with a college degree had a generally negative impact on growth, a result particularly evident with population growth. A somewhat counter-intuitive result, this may be partially explained by observing that much of the sample is

rural and these counties may have been subject to the rural brain-drain effect such as those found by Huang et al., (2002). Finally, per capita income appears to have contributed in a positive and statistically significant manner only to population growth.

6. Conclusions and Discussion

In light of the uncertainty over the role legalized gambling should play in the redevelopment effort along the Mississippi Gulf-Coast following hurricane Katrina and the fact that many communities throughout the US are considering casinos as part of an economic development strategy, this study provides timely analysis on the economic growth implications of casinos. To this end we first develop and a system of reduced form growth equations and use insights gained from this model to conduct empirical analyses. In particular, we evaluate what effect, if any, casinos had on each of aggregate income, population, and employment growth for a sample of counties during the years 1995-2002. The sample included counties in Midwestern and Southern states in which riverboat casinos were legally permitted to operate during the 90's. To extract the marginal effect of casinos two casino variables were created: if the county had a casino which began operations in 1995 or earlier; and if the county had a casino in operation after 1995.

Controlling for various local demographic, industry, and amenity characteristics, estimation reveals that casinos established after 1995 had a positive influence on county employment growth while casinos established before this period generally displayed an insignificant relationship. In general, this is the expected result since employment should respond favorably to any large-scale building project such as a casino. However, such growth may be short-lived and, depending on the industry and the nature of the employment, may mask long-term impacts. With the introduction of a gambling establishment it is conceivable that some full-time jobs in other industries might have been replaced by part-time jobs. If this is the case then employment growth alone may be a misleading indicator of economic well-being. This result would be consistent with Siegel and Anders (1999) whose research found substitution between gambling and other employment sectors. This type of scenario is also supported by the current analysis since there was no evidence of a significant relationship between casinos and population.

One of the more surprising results concerns the relationship between casinos and aggregate county income growth and the implications this may have for future casino development. Counties in which a casino was established after 1995 actually had a negative impact on aggregate income growth while casinos established in the years prior lacked any significant relationship. What may seem to defy conventional wisdom for advocates of casino development, there might be a number of different explanations for this result. First, if substitution is occurring between gambling and other industries it is possible that a share of the revenues generated within the county may flow out if casino shareholders reside outside the county. This may also reduce the associated multiplier effects of those funds had the income remained within the county. This need not represent any lack of inefficiency associated with the nature of gambling itself, but only that the economic proceeds are being distributed outside the county itself. Due to the generally higher tax rates applied to gambling revenues, it is possible an improvement in the fiscal situation might cause local officials to discount signs that the overall economic situation might actually be worsening. The second, and most cynical explanation offered is that held by Samuelson (1970) whereby gambling and the related activity produces a questionable economic good and wastes otherwise productive time. Unfortunately the merits of such an argument are questionable when compared with alternative forms of entertainment. Rather than a visit to a casino, would the money be better spent on attending a sporting event or an evening at the opera?

The final explanation offered relates to the role of tourism and how the gambling landscape has changed in the last decade. In the early 90's there were few legal casinos operating outside cities like Las Vegas and Atlantic City so the early adopters in those Midwestern and Southern counties enjoyed a short-term profit as a result of the relaxing of gambling restrictions in those states. However, with the easing of gambling laws in other states and the construction of ever more casinos, riverboat and tribal, the market has become saturated and competition from casinos in other regions has significantly reduced the income generated by out-of-region residents.

Considering the changes that have taken place in the gambling industry in the past decade, a strong case can be made for further study of the economic implications of gambling and casino development. At any rate, state bureaucrats and local government officials may wish to further consider their options before embarking on an economic development agenda that relies heavily on gambling.

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