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**Examining the Impact of Casinos on Economic Development:
*A Spatial Analysis of the Counties in the Mid-Atlantic Region***

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Abstract

Few have formally evaluated the economic impact of casinos, and yet most agree that it is crucial in estimating the net benefit to society. A new casino investment should stimulate economic activity in the immediate region, but its operations could potentially reduce employment and incomes within the industry. Grinols outlines the factors that could lead to positive or negative growth from the investment, but what is critical to the empirical validation of the investment is the definition of region. Since data is geographically limited to political boundaries, it is necessary to employ a spatial methodology that captures the impact beyond the political boundary. The Spatial Durbin Model (SDM) is outlined. The SDM captures both the local impacts and spillovers in the region and it can also identify if the casino competes or complements within their sectors. Income per capita and employment measurements for the county and the retail sector were examined. The evidence indicates that casinos raise per capita income in urban areas, but lower per capita income in rural areas, while employment has significant gains in private employment, total employment, and retail employment. The gains in both income and employment erode overtime.

Although casinos in the Mid-Atlantic region have been around since 1978, with the first to enter in Atlantic City, New Jersey, it was only after the enactment of the Indian Gaming Regulatory Act of 1988 that the flood gates opened. Three years later, in 1991, the first tribal casino opened in New York and in 1994 West Virginia opened three commercial casinos at racetracks within the state.¹ In the former case, the rationale for opening a casino was two-fold. First, it was a part of the self-determination of the legal status of the tribe. The second was to help develop their struggling economies. In West Virginia, it was an extension of the Lottery Commission's responsibilities where revenues raised were to support education, senior citizens, and tourism in the state. Thus, the twin motivating forces of economic development and support of social programs came into play in arguing for the legalization of casinos across the region.

These rationales are still used today. During the summer of 2013 New York enacted the Upstate NY Gaming Economic Development Act. The underlying argument is captured by the most recently passed legislation in New York:

"This new law will bring the state one step closer to establishing world-class destination gaming resorts that will attract tourists to Upstate New York and support thousands of good paying jobs as well as new revenue for local businesses," Cuomo continued. "For too many years, gaming revenue has left New York for our neighboring states. Today, we are putting New York State in a position to have those dollars spent here in our communities, which will benefit our local economies and tourism industries, as well as support education and property tax relief." (Cuomo, N.Y., 7-30-2013)

¹ The law allowed the racetrack to "slot-machine style video lottery terminals at racetracks, pending voter approval in the tracks' respective counties." These machines are known as video lottery terminals and are under the supervision of the lottery commission.

Although the economic development rationales are still being used, there is conflicting evidence that economic development does take place. Part of this conflict depends heavily on how one defines the region that is being developed. If new investment enters upstate NY, one would expect there to be some net increase in spending upstate, but is this net increase at the expense of neighboring areas? And if there is a net increase in spending in New York, can it be at the expense other areas of spending? And if neighboring states respond by legalizing casinos, does the economic benefit continue to last? Unlike other research where the focus is on the impact on a specific locality, this research will take a unique approach where we examine the net economic benefits of casinos entry on a broader region. In this study the *Mid-Atlantic Region* will be examined using spatial regression modeling. This modeling will allow us to examine feedback effects among the counties, and to assess the net economic development potential of casinos beyond the geographical borders.

This paper will proceed as follows. In the next section, a review of the economic development literature related to casino investments will be presented; a brief discussion of theory and evidence will be given. Section three of the paper will discuss the methodology used in evaluating the impact of casinos. Theory in the previous section suggests that the economic impacts from casino investment depend on the definition of region. Unique to the literature a discussion of spatial modeling will be presented. Spatial modeling captures both nearby and regional changes from the casino investment. Thus, the analysis will show how wide spread is the impact of the investment, and if casino investment competes with or compliments other economic activity.

A Casino's Impact on Economic Development: Theory and Evidence

The economic development potential of casinos is unique for several reasons. First, the service that a casino provides is not only new to the market, but the service may also have innovations that may make it more productive than other competing services. Consumers who were unable to purchase these services now have an expanded consumption set, and can increase their overall utility.² Second, it is a service that has external costs. Although everyone agrees that casinos can produce external costs, the quantifying of the costs has been debated. Third as Grinol's (2004, 79) points out, the evaluation of the economic development potential depends on the definition of "locality". A local geographical market may receive benefits from the increase in spending in its markets, but surrounding areas may face decreases in spending. If the defined geographical area is broadened, the net value to society may be somewhat less, and if the analysis includes social costs, the net benefit to the limited geographical region may be an overestimate of the true benefits to the market.

Casinos as Investment Spending

Casinos as an investment will result in an immediate impact on the "local" community and will have ripple effects as these spending dollars transmit through the "local" economy and surrounding areas.³ As

² Grinols (2003) and Walker and Barnett (1999) have highlighted that economic development should not be limited to output measurements but to include measurements of societal welfare.

³ It is assumed that the casino spending is in addition to local investment spending regardless of the casino investment; that is, it does not crowd out investment spending in the area.

in normal multiplier modeling, the degree of leakages will determine the level of impact on the locality. In the short-run, the initial spending will have positive economic gains. Once the casino is operating, the economic impacts are less obvious since the provision of casino services are competing with other services. Grinols (2004, 82) outlines the flow of "local" income as comprising both positive and negative flows (See Table 1).⁴

Table 1.
"Local" Income Flows

Positive Income Flows to the Casino	Negative Income Flows away from Local Economy
Recapturing of previous gambling spending outside the region	Cannibalization of local spending by locals Cannibalization of non-casino export spending
New local spending	Direct taxes paid to the state
Spending from non-locals (Exporting services)	Casino Spending outside of locality

Negative outflows can be grouped into two categories: Leakages and transfers. The leakages, such as spending by casinos outside of the locality can be smaller the broader the locality is defined. The example given by Grinols' outline assumes that the flows have a one to one corresponding impact on net income and hence economic welfare. The transfers, represented by the cannibalization of spending from a firm to the casino in the locality, does not necessarily have a one to one corresponding impact on overall economic welfare. This will depend on the productive of the resources released relative to the productivity of the resources acquired. If the resources are more productive in producing casino entertainment than the alternative, then in the long run economic development should be positive. If, however, the resources are less productive when used by casinos, then when used for other types of production, then in the long run economic development would be negative.

Sen (2007) has estimated the productivity of casinos in a global market, and although he does not benchmark them with other competing sectors, he shows that they are adding value beyond the transfer of money between patrons. If there are efficiency gains by the entry of casinos into the market, holding local market demand constant, in the short run the labor demand in the sector would have a net decline as the losses in competing areas would exceed the gains in the casino sector. If the casino attracts patrons from outside the local market, there could be some synergies and lead to net increases in labor demand.

The net income flow multiplied by the local spending multiplier would yield the net economic benefit to the area. However, societal wealth may not yield growth. Grinols argues that in order to find the societal welfare from the legalization of casinos the net benefits must be offset by the social costs from problem and pathological gamblers.

⁴ The table does not include transfers payments such as infrastructure improvements which come about from taxes leaked from casino revenues, and returning as payments for infrastructure services. This assumes that the dollar transfer will have the same multiplier effect on the economy.

Casino's External Costs and Economic Development

The addictive nature of gambling is well documented, but when researcher attempt to quantify the external or social costs of addictive gamblers, there is some debate. Grinols and Mustard (2001) lists the research on the social costs associated with gambling: crime and associated costs, employment costs, bankruptcy, suicide, illness, social services, regulatory costs, and family costs. Walker (2007) rightly critiques some of the social costs on the list. In some cases social costs are a transfer of resources from one person to another. As Walker notes "Simply because the government spends money on something does *not* necessarily represent a social cost (i.e., a decrease in social wealth) though it *may*" (p.618). The hiring of additional police and social service workers may be a result of pathological or problem gamblers, but from an economic development standpoint these hires are only transfer of income from the casinos to the government and from the government to other individuals.⁵ If these transactions are a pure transfer, the net impact of casinos on the societal wealth is zero. However, if the transfers result in a loss of productivity the net impact could be negative. Given that the resource transfers are from the private sector to the public sector, it is likely that the net impact would be negative. (See Afonso, Schuknecht, and Tanzi, 2003.) Thus, if casinos increase the number of problem and pathological gamblers, at least the presences of casinos will likely be a drag on economic growth.⁶

Evidence

The evidence for a casino's impact on economic development has taken two directions: direct and indirect. Garrett (2004), Morse and Gross (2007), Cotti (2008), Hunter (2010), and Walker and Jackson (1998, 2007) have directly tested the impact of casinos on economic measurements such as income per capita and employment. Garrett found, in general, employment rose more than forecast in six counties that introduced casinos with rural counties receiving the greatest benefits. Morse and Grosse examined county level economic measurements over time for almost all counties in the U.S., but did not include the potential spillover effects on surrounding counties. They found that casinos cause an increase in economic measurements, but the impact declines over time. Cotti's evidence of all counties over a seven year period indicates that there were positive impacts on the county's and competing sector's employment and earnings. He also examines the impact on neighboring counties and different county population sizes. He found no evidence that casino's impacted neighboring counties nor highly populated counties.⁷ Hunter compares the county level economic measurements at two different periods of time, and estimates the impact on the county of where the casino is located as well as on surrounding counties. His findings indicate that there are positive impacts for the county where a casino enters, but there are also negative impacts to neighboring counties. The net economic impact within the region of casino and bordering

⁵ The tax is a way to internalize the social/external cost in the production of services, and therefore produce an outcome consistent with total costs of the production of the services.

⁶ Economopoulos (2011) has shown that the legalization of the lottery in a state will on average raise the participation rate by 10% from those who do not gamble base on the legality of the activity.

⁷ Cotti's model that assessed the impact on neighboring counties was tested on a subsample of counties. He only included bordering counties and non-bordering counties in the model. The omission of casino counties creates a selection bias in the estimates. The bias will depend on the relationship between the casino counties and the border counties.

counties was small. Walker and Jackson (2007, 2014) examined state level data and showed that in the early stages of casino development that casino revenues granger caused economic growth between 1991 and 1996. When they extended the period to 2005 they found no Granger causal relationship. Their approach of broadening the region and examining the final measure of economic output, allows them to assess the net impact after markets adjust, including adjustment in productivity of resources.

Others, such as Grinols (2004) and Economopoulos (2013) have examined the economic development question indirectly. Grinols calculates the expected economic benefits and costs using estimates from other studies that focused on particular aspects of the benefits and costs. On a per capita basis, Grinols estimates a net loss to society. Economopoulos shows that as new casinos entered the market, consumer surplus rose within the market via lower prices. Although he did not examine the social costs and disutility from the costs, it suggest that overall welfare rose.

Spatial Analysis of the Mid-Atlantic Evidence

Most studies examining the economic impact of casinos on county economic measures use a methodology that does not account for the spatial dependency of regions. If spatial autocorrelation is present, OLS estimation leads to inconsistent and inefficient estimators.⁸ In the presence of the regional interaction, a spatial model can be employed to account for the relationship. Cliff and Ord (1981) and Anselin (1988) were the first to model the spatial dependence of the dependent variable. Since any significant investment in a county could have economic spillovers in neighboring counties, the spatial model would be able to capture the interregional relationship if one exists. In the gambling literature only three studies have employed this methodology. Garrett and March (2002) examined revenue impacts of cross-border lottery shopping, and more recently Walker and Nesbit (2013), Economopoulos (2013) examine the impact of casino competition on casino revenues. The comprehensive general form of the spatial model is the Spatial Durbin Model:

$$Y = \lambda WY + X\beta + WX\theta + \mu \quad (1)$$

where Y is a $n \times 1$ vector of outcomes, λ is a spatial autoregressive coefficient, W is a $n \times n$ "weighting" matrix in which the row weights of j neighboring counties sums to one and zeros are on the diagonal, X is a $n \times K$ matrix of control variables, and β and θ are a $K \times 1$ vectors.⁹ λWY_j is call the *global* spatially lagged dependent variable and $WX\theta$ is the *local* spatially weighted control variables. Thus, the Spatial Durbin Model will capture the impact of a change of X on three regions: the change in X within the county, the

⁸ Spatial dependence implies that one county's economic factor is jointly determined with neighboring counties. Thus, the inclusion of the spatial lag (see below) requires a simultaneous system of equations to avoid bias in the coefficients.

⁹ See Le Sage and Pace (2009) for a detailed description of the spatial autoregressive model. It should be noted that there several ways to define neighbor in terms of developing the weighting structure. It should also be noted that the general model could be extended if there was spatial error dependence.

impact of the neighboring county (local), and the impact on the neighbors' neighbors (global).¹⁰ These effects can be understood by examining the prediction from the model:

$$E(Y) = W^m(X\beta + X\theta), \quad (2)$$

where $W^m = (I - \lambda W)^{-1}$ and is commonly called the multiplier matrix. For a non-zero λ , the impact of a change in X is no longer β_x , but is much more complicated. The change in X of a particular county will have direct impact on the county's economic outcome that is generated within the county, but it also includes feedback effects from the changes occurring in neighboring counties. The data generating process for the K variables, n counties(s) in a given period for a given change in X_r is decomposed below:

$$\begin{bmatrix} Y1 \\ Y2 \\ \vdots \\ Yn \end{bmatrix} = \sum_{r=1}^k \begin{bmatrix} Wm11 & \cdots & Wm1n \\ \vdots & \ddots & \vdots \\ Wmn1 & \cdots & Wmnn \end{bmatrix} \begin{bmatrix} Xr1 \\ Xr2 \\ \vdots \\ Xrn \end{bmatrix} (\beta_r + W\theta_r) \quad (3)$$

where $(\beta_r + W\theta_r) Wm_{ii}$ is the direct impact from a change in X_r in county i . The direct impact can be viewed as the change in a county's Y from a change that occurs in a county's X_r where the X_r also includes residual changes from the spatial relationship of ALL neighboring counties. The residual change is generated by local neighbors ($W\theta_r$) as well as the global region $((I - \lambda W)^{-1})$. $(\beta_r + W\theta_r) W_{ij}$ are the indirect impacts on a county's Y from changes in the neighboring j counties' X_r .¹¹ Finally, the coefficient λ is a scalar parameter that determines the average strength of association among the counties, and is known as the spatial autoregressive coefficient, which is expected to have a value between -1 and +1. Similar to the autocorrelation coefficient in a time series model, the closer the (absolute) value is to 1, the greater the feedback and persistence among the counties in the region.

Statistical test of λ would indicate the presence of spatial correlation and that the influence is global. A negative sign would indicate that counties are substitutes and compete with one another. A positive sign would indicate that the counties are compliments, and cooperate or support one another in their development. A $\lambda=0$ would indicate that there is no global spatial dependence. If $\lambda=0$, a likelihood ratio test is used to determine if θ is equal to zero. If $\theta=0$, then there is no local spatial effects. If $\theta \neq 0$, it suggests that the interdependence is local and only neighboring counties have an impact on a counties economic activity.

¹⁰ "The impacts of Wm can be expanded as a linear combination of powers of the matrix W Using the infinite expansion of $(I - \lambda W)^{-1}$. The partial derivative of $X_r \approx \delta Y_i / \delta X_{ir} = (I_n + \rho W + \rho^2 W^2 + \rho^3 W^3 + \dots)(\beta_r + W\theta_r)$. The powers correspond to observation where zero is approximately the direct impact, the indirect impacts shown by the immediate neighbors (first-order) and neighbors of neighbors (second order) and so on." (Le Sage and Pace 2009, p 40)

¹¹ The value of W^m_{ii} does not necessarily have a value of 1. A change in an X within the state could have regional effects that would have second-order impacts coming from within the state. "Any change to an explanatory variable in a single region (observations) can affect the dependent variable in other regions (observations). This is of course the logical consequence of our simultaneous spatial dependence model. A change in the characteristics of neighboring regions can set in motion changes in the dependent variable that will impact the dependent variable in neighboring regions. These impacts will continue to diffuse through the system of regions." (L&P, p369)

Data

The Mid-Atlantic county level data that was used to examine the impact of casinos on economic activity came from the U.S. Census. County Business Patterns for 2011 was used to compute county and sector level per capita income, and private employment. Quarterly Census on Wages and Employment was used for total employment. Census data on county demographics, per capita income and workforce attributes was also used in the analysis.¹² Casino information came from the state regulatory agency reports. Thirty-one counties out of 232 counties had a casino operating in 2011. Some had been in operation since 1978, while others had only been operating for about a year. Casino size was collected from the Casino City website in 2013, and the 2011 size was assumed to be the approximately the same.

Four measures of economic development (EA) were examined on the county level: Per Capita Income, Average Private Annual Income, Total Private Employment, and Total Employment.¹³ To assess the sectorial economic impact of casinos, the retail sector was also included.¹⁴ The explanatory variables can be divided into Casino (C) based and Resource (R) based variables, and State dummy variables (S). Table 3 provides the county averages for the whole sample as well as casino and non-casino counties.

Table 3.
County Averages of Key Variables for Year 2011

	Casino Cnty	Non Casino Cnty	All Counties
Private Income per Employee	39,293	38,069	38,232
Per Capita Income	27,693	25,602	25,881
Total Employment	163,978	96,185	105,244
Total Private Employment	152,917	86,827	95,658
Retail Income per Employee	23,729	23,087	23,173
Retail Employment	16,855	9,244	10,261
% Labor Force Private Employ	67%	56%	58%
Private Employment Per Establish	14.9	13.4	13.6
Population Density	1,204	1,263	1,255
% Population BA or above	25.7%	21.7%	22.2%
Casino Square Footage	166,185	na	na
Age of Casinos	8.4	na	na
Sample	31	201	232

Although the average incomes per capita between casino and non-casino counties is relatively small, casino counties have 3% to 8% higher incomes than non-casino counties, the employment size of casino counties is much greater. This suggests that policymakers either placed casinos in economically more vibrant areas or that the casinos increased employment in the region. Casinos were located in counties with similar

¹² In some cases the demographic variables were from various time periods.

¹³ The private income and employment measures include self-employed and sole proprietors.

¹⁴ The retail sector was the only sector that had complete information on Pay per Employee and Employment in each county.

population densities, and firm size as non-casino counties, but had a higher education level and a higher percentage of private employment than non-casino counties.

Given the nature of the data spatial relationships could possibly be present in the data. The Spatial Durbin model is used for the income and employment variables to determine if both global and local effects are present in the data¹⁵:

$$EA_i = \lambda W(EA_j) + C_i\beta + R_i\alpha + S_i\psi + W(C_i\beta + R_i\alpha + S_i\psi) + \mu_i$$

where EA_i is the economic activity measure for county i . Per capita income is total income divided by total population of the county. To measure the impact of casinos on the business community, Average Private Annual income was calculated as the total income from private establishments divided by the total employment of the establishments. Likewise, to measure the impact of casinos on private employment, only employment by business establishments was used.

Six casino-based explanatory variables (C_i) were included in the model. A dummy variable was used to identify a casino county. It is expected that if the Casino was to have an economic benefit to the county, the expected sign would be positive. A dummy variable was also included for casinos that were for tribal casinos (Tribal). To capture the sized of the casino the square footage (Sq Ft) of the casino was included. A larger investment in the county from the casinos is expected to have a bigger impact on the county. To account for Atlantic City's unique model of having multiple casinos in one location an interaction variable was created to identify the county and the square footage. The Years was used to assess the lasting impact of the casino investment on the county. It is expected that the impact of the initial investment would dissipate over time. Finally, two interaction variables were created using the casino dummy. One variable is the casino variable times the population density variable. Previous studies found that casinos in rural areas are likely to have greater benefits than urban areas. If this is true, the interaction coefficient should be negative. A second interaction variable was created with the casino dummy and the spatial lag variable.¹⁶ This interaction variable will capture the impact of the relationship between the casino county and the neighboring counties, relative to the relationship between counties that do not have a casino and its neighbors. If casinos are unique in developing regional economic activity as Governor Como argues, we would expect this coefficient to be positive and significant.

Several variables were included in the model to reflect the resource base of the county (R_i) Employees per establishment, population density, private labor as a share of the labor force, and the percent of the population with a bachelor's degree or higher. Employee per establishment was included to reflect the operating size of the average establishment in the market place. Population density was included to denote market size of the county, the share of the labor force that is private reflects, the degree of productivity of the labor force, and the percent of those having a higher education reflects the quality of

¹⁵ The weighted model is based on contiguous counties. Each county is given a one and they are row normalized to sum to a value of one.

¹⁶ The rook contiguity weighted model was used in the analysis.

the labor force.¹⁷ Finally, state dummy variables (S_i) were included to account for idiosyncratic differences among the states.

The results from the models are divided into two economic activities: income per capita and employment. For each county total, private, and retail sector income per capita and employment are modeled. Within each area of economic activity, the statistical significance of the spatial coefficients will be used to determine the level of regional interdependence. Once the level of regional interdependence is identified, an analysis of the coefficients will follow.

Income Results

The testing of the Spatial Durbin Model suggests that there are no systematic global or local spatial impacts for any of the per capita income variables in general. Thus, O.L.S estimations are appropriate. *However, there is evidence that there are some specific neighboring impacts on county per capita income where casinos are located, but this neighboring impact does not extend to the retail sector.* (See Table 3.) It appears that there are both positive and negative economic influences working in the casino locality. One of the variables had a positive statistically significant impact on county incomes: neighboring counties' income. Neighboring counties' per capita income appears to have a positive impact on the casino county's income in both models and the impact had a greater impact on private per capita income (.71) than total per capita income (.40). This suggests that the casino may have drawn in patrons from connected counties and the higher the surrounding incomes the greater the level of income in the casino county.

Three of the casino variables, however, had a negative impact on private per employee incomes - Casino Dummy, Population Density, and Age – while only two had an impact on total per per capita income. On average the per capita incomes were much lower in casino counties than non-casino counties, holding all else constant. Tribal casino counties were no different than regular casino counties. Furthermore, casinos had a greater negative impact in urban areas. While, in general, highly populated centers lead to higher per capita income, the positive coefficient on Pop Den, this does not hold in casino counties population density where the coefficient is negative. This supports the contention that the casinos do “benefit” the income of individuals in more rural locations; in this case a smaller negative impact. Finally, older casinos lead to lower per capita incomes. If external costs grow the longer a casino is operating, and resources are diverted to less productive uses, the casino counties could lose economic ground to their neighbors. Surprisingly, the size of the casino had no significant impact on private or total per capita income.

¹⁷ Some studies have included race and gender in their models. Both were included in the model and they were statistically insignificant without any material change.

Table 3.
Impact of Casinos on Mid-Atlantic Income

	Private Income Per Cap	t-stat		Income Per Captia	t-stat		Retail Pay Per Cap	t-stat
CONSTANT	19678.25	13.85	*	14368.31	19.25	*	19.66	33.98 *
States								
DE	2995.31	0.94		-611.39	-0.35		1.83	1.40
MD	-1616.29	-1.15		3482.05	4.72	*	0.73	1.27
NJ	7518.90	4.83	*	4256.11	5.21	*	2.99	4.71 *
NY	-2028.70	-1.86	**	-57.08	-0.10		0.53	1.20
PA	-1501.72	-1.53		542.48	1.05		-0.13	-0.33
Casino Base								
CASINO	-23238.29	-2.72	*	-9997.44	-2.59	*	-5.70	-0.96
TRIBAL	953.27	0.34		243.78	0.17		-0.36	-0.33
AGE	-399.03	-2.14	**	42.48	0.43		-0.03	-0.38
Atlantic City Sq Ft	0.00	0.38		0.00	-0.48		0.00	-0.21
Sq Ft	-0.01	-0.60		0.00	-0.05		0.00	0.17
C x Neighbor Inc	0.71	3.17	*	0.40	2.84	*	0.26	1.03
C x Pop Density	-0.93	-2.24	**	-0.38	-1.99	**	0.00	-0.31
Resource Base								
PRLF7	4766.53	1.57		9102.57	5.65	*	3.11	2.51 **
BA	374.14	7.06	*	510.73	18.24	*	0.13	5.87 *
PEEMP	555.27	4.27	*	-445.10	-6.52	*	-0.13	-2.38 **
POPDEN	0.43	6.61	*	0.04	1.20		0.00	3.09 *
Adjusted R²	0.68			0.87			0.56	
λ	-0.090 (-0.82)			0.015 (0.29)			-0.079 (-0.92)	
LR	1.22			1.09			0.71	
White's Chi	72.79			72.26			72.70	
Sample	232			232			232	

() Asymptotic t-stat. *, **, *** Significance at the 1%, 5%, and 10%.

The net impact of an average casino county's income for an urban and rural county is illustrated in Table 4.¹⁸

¹⁸ Population density used for the 25th and 75th percentiles (881, 168). Neighboring counties average total and private per capita income was for the counties above the 25th percentile (\$45,353 and \$31,157) and below the 75th percentile (\$34,308 and \$23,480). Average age was 8.4 years respectively. .

Table 4.
Point Estimate of Net Impact of a Casino on an Average County's Income

	Private Per Employ Income		Total Per Capita Income	
	Urban	Rural	Urban	Rural
Casino	-23,238	-23,238	-9,997	-9,997
Neighbor	32,201	24,359	12,463	9,392
Pop Density	-441	-84	-255	-64
Age	-3,352	-3,352		
Net	5,171	-2,314	2,211	-668

In urban locations it appears that a county's total and private per employee net income are positive for the average casino after seven and a half years of operation. The strong export of casinos to neighboring counties was more than sufficient to offset the negative impacts. Age only impacts private per employee income. A casino would have had to been in operations for 18 years for the casino region to return to its original level of private per capita income. For both income levels rural communities faced negative impacts from the casinos in the eighth year. Newer rural casinos would have shown some improvement but by year three most of the gains were lost.

County Employment Results

The Spatial Durbin Model for employment suggested that there was no systematic global spatial impact in the region, but there are, in general, local impacts; employment activity happening in a county is related to the neighboring counties, but it does not go beyond your neighbors. Thus, O.L.S. is appropriate even when spatially weighted neighbors are included in the model.¹⁹ However, the local relationships in employment in the casino county is not any different from the any other county.

It also appears that casino counties did have significant impact on the retail sector employment, and had both positive and negative impacts on county level employment. (See Table 5.) In general, the employment levels in casino counties or tribal casino counties were no different than non-casino counties, holding all other factors constant. However, the size of the casino had a positive impact on employment at the county level and at the sector level while the age of the casino appears to reduce employment at the county level and at the sector level. This suggests the casino may have generated sufficient impact to increase employment from the investment, but over time competition may have led to a loss of employment.

¹⁹ White's chi square on the O.L.S model with neighbors indicate there is no hetercedasticity.

Table 5.
Impact of Casinos on Mid-Atlantic Employment

	PRIVATE	t-stat		Total	t-stat		Retail	t-stat
CONSTANT	-250266.58	-4.03 *		-251948.45	-3.67 *		-25677.89	-3.65 *
STATES								
DE	57221.55	1.05		58524.69	0.98		9179.24	1.48
MD	-25803.37	-1.07		-24633.49	-0.93		-1957.24	-0.71
NJ	-22788.05	-0.76		-27632.06	-0.84		-16.37	0.00
NY	-10019.07	-0.49		-10261.25	-0.45		72.75	0.03
PA	403.12	0.02		-4493.79	-0.23		955.51	0.47
Casino Base								
CASINO	8225.05	0.18		17073.28	0.33		7372.13	1.43
TRIBAL	59457.95	1.31		64092.92	0.29		1563.39	0.28
AGE	-6312.32	-1.89 ***		-6476.19	-1.77 ***		-647.97	-1.69 ***
Atlantic Sqft	-0.52	-2.60 *		-0.47	-2.14 **		-0.05	-2.20 **
SQFT	0.69	3.63 *		0.66	3.12 *		0.07	3.17 *
C x Neigh Emp	-0.33	-1.27		-0.36	-1.30		-0.25	-0.89
C x Popden	13.72	1.05		15.40	1.02		0.66	0.59
Resource Base								
LF Part Rate	85018.09	1.55		103873.49	1.72 ***		5738.98	0.92
Pop w/BA	6223.55	6.65 *		6532.47	6.34 *		692.79	6.51 *
Emp per Etab	1723.46	0.74		1684.36	0.66		192.08	0.73
Pop Density	26.83	18.71 *		30.21	19.15 *		1.65	10.12 *
Neighbor								
WBA	5430.93	2.35 **		5734.41	2.26 **		611.89	2.32 **
WPEEMP	9819.36	1.80 ***		10206.28	1.70 ***		983.86	1.59
WPOPDEN	-13.93	-5.55 *		-15.98	-5.78 *		-0.88	-3.08 *
Adj R²	83.30%			83.30%			69.10%	
λ	-0.090 (-0.82)			-0.87 (-0.79)			-0.019 (-0.18)	
LR	3.18*			3.43*			1.65**	
Sample	232.00			232.00			232.00	

() Asymptotic t-stat. *, **, *** Significance at the 1%, 5%, and 10%. Only significant weighted control variables are presented in table. λ is from the Spatial Durbin Model. Likelihood Ratio indicate the weighted neighbors should be included in the model.

For the typical county that contained a single casino for every 10,000 square feet of casino space resulted in approximately 7,000 new private employees in the county. Since the neighboring counties employment was not impacted by the casino's employment, it appears that this employment increase is a pure gain. However, these gains in the county are offset by the age of the casino suggesting that over time the benefits of the investment are wearing off.

The net impact on employment in an average casino county is presented in Table 6.

Table 6

**Point Estimates of Net Economic Impact on Employment in the Casino County
(At Sample Averages)²⁰**

	Private Employment	Total Employment	Retail
Square Footage	80,909	77,392	8,208
Age	-47,340	-48,570	-4,860
Net	33,569	28,822	3,348

The net impact on private employment in casino counties was significantly higher than total employment. In the average size casino showed a significant increase in both private and total employment, and after seven and a half years county private employment increased by 33,569. The gains, however, are wiped out after twelve years of operations.

Conclusion

One of the key arguments for the legalization of casinos has been economic development. As with any new entry into a market that is desired by consumers, and could be more productive than competitors, the new investment should lead to positive gains in economic measures. Researchers have generally showed positive gains in employment and income, but only one has employed a spatial approach to the estimation. If casinos compete with other markets, there could be substitution among resources. If they complement other markets, there could be growth in other markets and resources. The economic development spatial model indicates that the economic impact of casinos does not go beyond neighboring counties. In terms of income, the casinos investment appears to be a net gain in urban areas, a net loss in rural areas, and no impact in the retail sectors. Neighboring counties income did help enhance the casino counties income. However, the results also show that these gains erode over time. Thus, it would not appear that a casino improves a "region" – that is beyond its borders - as suggested by the Governor of New York, it did not "compete for wages" with the retail sector as some have speculated, and it may have deleterious impact over time as some have argued. The employment impact of casinos appears to be isolated to the county itself. Within the county, there are significant employment gains in general and in the retail sector. The initial investment improves employment and the larger the size of the investment the greater impact. Like the income model, the impact erodes over time.

The evidence confirms what many have naturally believed that new and large investment into a county will lead to positive economic benefits. Yet the data appears clear also that over time there is an erosion. Future work is needed to better understand the factors that may be causing the loss in these counties. A focus on the shift in resources and their productivity would be helpful.

²⁰ The average casino excluding Atlantic City was 117,260 while the average age was 7.5 years.

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