

The Effect of Casino Gambling on Crime in New Casino Jurisdictions

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ABSTRACT

Crime was analyzed in seven new casino jurisdictions (Sioux City, IA; Biloxi, MS; Alton and Peoria, IL; St. Louis City, St. Louis County, and Alton, IL) to determine if crime rates increased after casino gambling was legalized. To be included in the study, local law enforcement agencies had to make available data for Part I and Part II crimes dating back at least four years before casinos opened in the community. Crime-specific rates were calculated using both community population and population at risk, which adjusts the community population to include the annualized tourist population. Results indicate a lack of consistency in the general crime trends and in the crime specific analyses. Using the crime rates based upon the population at risk, three communities had many more crimes that significantly increased than decreased, three other communities had many more crimes that significantly decreased than increased, and one community had few significant changes in either direction. When the Wilcoxon Signed Rank Test for Paired Differences was calculated for crimes in all seven jurisdictions, few significant differences were found comparing pre- and post-casino crime. Although the conclusions are necessarily tentative, it appears that the effect of casino gambling on jurisdictions is variable and may be dependent on local conditions not easily generalizable from community to community.

Part of the national debate surrounding casino gambling is whether crime increases as a result of the presence of casinos in a community. Casino supporters argue that casinos bring economic benefits to an area and point to Las Vegas, the world mecca of casino gambling, as the prime example. Since 1980, Las Vegas has grown faster than any other city in America (Bureau of the Census, 1998: 42), yet for many of those years Las Vegas ranked as one of America's safest cities (Margolis, 1996). The critics of casino gambling point to Atlantic City, its failed promise of economic rejuvenation, and its crime rate which increased dramatically after casinos began operating there in 1978 (Harshbarger, 1996).

Part of the difficulty in trying to understand the debate over the benefits and the problems associated with gambling is that each side has enough ammunition to make credible arguments. An explanation for this is that gambling is a term that covers a variety of activities and operates in a wide variety of venues. Even a good analysis comparing casino gambling's effect on crime in two locales may be flawed. Some casinos are large, others are small; some are land based, others are riverboats; some appeal primarily to locals, others appeal almost exclusively to tourists; some are located in urban areas, others are distant from any population center; some have been in operation for many years allowing the development of a casino culture that allows the community to efficiently deal with the problems casinos may present, others are new to an area and treated as novelties without any understanding of the potential problems that casinos may bring to a community. Finally, the communities themselves may be quite different in population size, demographics, and economy. Simple comparisons often overlook the complexity of the problem.

Another difficulty surrounding the research studying the effect of casinos on crime is the operationalization of the dependent variable, that is, what crimes are being studied and how is the crime rate being measured? The UCR index offenses are the most frequently analyzed data since the figures for most cities are readily available, having been collected and published annually by the FBI since 1931. The index offenses are seen as appropriate to analyze because these eight offenses are taken as a proxy for the level of "serious crime" found in a jurisdiction. However, many of the crimes included in the index have little logical connection to casinos. Casino related crime is most likely of an instrumental nature, being a means used by problem gamblers to obtain money to enable them to "chase" or recoup their losses (Lesieur, 1976).

Although it is possible to come up with scenarios where violent crime may be gambling related, it is evident that the UCR property crime and some offenses not included in the UCR (forgery, credit card fraud) are more reasonably connected to casinos than are murder and rape.

After a determination is made of what crimes are to be studied, a valid measure of the crime must be utilized. If research analyzes changes in the numbers of crimes committed in a community without taking into account population, the analysis is clearly flawed and the conclusions that can be drawn from the study are clearly limited. If crime rate is the dependent variable, a more controversial question is whether the denominator utilized in calculating the crime rate is the resident population of the community or the population at risk, which takes into account both the residents and the tourists who are in a community during a given period of time.

In this paper, a review of the literature of tourism and crime will be presented. Then, the literature on casinos and crime will be briefly reviewed with the focus on how casinos affect the crime rate in a community. Next, crime data will be presented for seven jurisdictions looking first at crime rates based on the resident population before and after casinos enter the community and then examining the modified crime rates taking into account the total population at risk (which includes tourists).

REVIEW OF THE LITERATURE

In 1966, the FBI began listing in the UCR "crime factors" which "affect the amount and type of crime that occurs from place to place" (1966: viii). Among the factors listed in 1966 (and which continue to be listed) are the "stability of population with respect to residents' mobility, commuting patterns, and transient factors." Users of the UCR data are cautioned against comparing the crime data of reporting units "solely on the basis of their population..." (1994: v). Despite this warning, few criminologists have included tourism figures into crime rate calculations. In fact, as Miller and Schwartz have noted recently, research on the relationship of tourism to crime is quite limited (1998:127).

One of the first analyses of tourism and crime was done by Chesney-Lind and Lind (1986). They examined crime rates and tourism in two Hawaii counties, noting that Hawaii has

one of the highest “tourist densities” in the nation with one million residents of Hawaii but four million tourists annually (1986:182). The researchers found that tourists were disproportionately victims of crime as compared to the residents of the area. The violent crime victimization rate was 27% higher and the property victimization rate was 29% higher for tourists than for residents. The greatest differential between tourists and residents was for robbery victimization, with the robbery rate of tourists over 60% higher than for the resident population. Tourists were also more likely than residents to be victims of burglary, larceny, and rape, but less likely to be victims of murder, assault, and auto theft (Chesney-Lind & Lind, 1986).

Other research studying the relationship of tourism to crime has similarly found that the number of strangers in an area affects the amount and type of crime (Jarrell & Howsen, 1986; Garcia & Nichols, 1990). The relationship, however, is complex with Jarrell and Howsen (1990) and Pelfrey (1998) concluding that number of tourists alone does not adequately explain crime rate variations.

The first analysis of tourism and crime in casino communities was done by Albanese (1985) in response to a series of reports analyzing the crime rate in Atlantic City, New Jersey. Albanese reviewed reports on the effects of legalized gambling in Atlantic City, which legalized casinos in 1978, by New York’s Attorney General (1981) and by the Twentieth Century Fund (1983). Both reports concluded that crime had greatly increased in Atlantic City as a result of the legalization of casino gambling. However, Albanese noted several methodological flaws in those studies. The most serious problem was that the increase in crime is somewhat misleading since the studies did not calculate the crime rates based on “population at risk” (Albanese, 1985). Albanese conducted a more sophisticated analysis by taking into account such variables as number of tourists (by including tourists in the population at risk), increase in the number of motel and hotel rooms, and changes in police manpower. Albanese then compared the trend for the index crime rates in Atlantic City from 1978 to 1982 with the trends for the rest of the state. Albanese stated that although a simple analysis would conclude that the crime rate was greater in Atlantic City after casino gambling was legalized, if the tourists were included in the population at risk, the actual crime rate was less after legalization of casino gambling than before.

The most comprehensive analysis of the relationship of casino gambling to crime in

Atlantic City was conducted by Curran and Scarpitti (1991). They noted that although Atlantic City's index crime rate in 1978 was 133.6 and increased to 311.2 in 1980, these numbers taken out of context are misleading. Consequently, Curran and Scarpitti analyzed the long term crime trends in Atlantic City as a percentage of total New Jersey state index offenses over time. They found that Atlantic City's total index crime rate and the trends for murder, rape, aggravated assault, and motor vehicle theft were declining as a percent of the state total and these trends were undisturbed by the introduction of casino gambling. However, burglary, robbery, and larceny for Atlantic City, which were steadily declining as a percentage of the state totals from 1968 to 1977, increased in the post-casino years of 1978 to 1989.

By analyzing crimes committed in and around casinos, Curran and Scarpitti were better able to define the risk of crime to Atlantic City residents. Their analysis of crime reports taken by the Casino/Hotel Investigations Unit of the Atlantic City Police Department revealed that most crime in and around the casinos victimized noncommunity residents. They calculated that casino based crime accounted for 63.7% of all index offenses reported by Atlantic City in the five year period following legalization and that over 90% of the casino crimes were larceny thefts. Curran and Scarpitti concluded when casino based crime is extracted from the total number of crimes for the population at risk or when tourists visiting Atlantic City are added to the denominator in calculating the crime rate, Atlantic City's crime rate is comparable to other cities (Curran & Scarpitti, 1991: 448).

The analyses by Albanese (1985) and Curran and Scarpitti (1991) suggest that casino gambling in Atlantic City did not lead to increased risk of victimization of Atlantic City residents. However, questions remain concerning the impact of casino gambling on crime in the differing locales.

Giacopassi and Stitt (1993) compared changes in reported crime in a small Mississippi city (Biloxi) for one year before and one year after casino gambling was legalized. They found that legalization of gambling did not significantly increase any violent index offense, but did significantly increase larceny-theft and motor vehicle theft. When other (non-index) offenses were analyzed, none was found to have increased significantly after casino gaming was legalized. Chang (1996) studied Biloxi's crime rate after two years of casino operation and reached a

similar conclusion to that of Giacompassi and Stitt: there was no general increase in crime in Biloxi after casinos were introduced for either Part I or Part II offenses.

Neither of the Biloxi studies that examined the impact of casinos on crime calculated the crime rate by including the population at risk. However, Giacompassi and Stitt note although a daily census of tourist numbers was not available, tourism had increased dramatically as a result of the casinos and traffic on the main road in Biloxi had increased by 240%. They further noted that crime trends for a few offenses clearly had shifted upward. Nevertheless, they expected that when the population at risk could be included in the modified crime rate calculation, a finding similar to that of Atlantic City would manifest itself. Given the large number of tourists visiting Biloxi annually and the relatively modest increases in a few crimes, the modified crime rate would show no increase risk of victimization for community residents.

Ochrym (1990) conducted a study comparing the crime rates for five cities in New Jersey. He concluded that tourist destinations generally have higher crime rates than do non-tourist locales, and it does not appear to matter whether the tourism is casino based or related to other types of tourist attractions. Ochrym did add a caution by noting that his analysis of crime rates did not include tourists in the population and crime rate calculations. If this had been done, the findings would have been significantly different since Atlantic City's resident population in 1986 was 37,140; if tourists were included, an additional 82,000 individuals would have had to be added to the daily population of Atlantic City (Ochrym, 1990:137).

A recent article by Miller and Schwartz (1998) reviews the literature between street crime, tourism, and casino gambling. Their analysis of the research leads them to conclude that tourism is associated with higher rates of crime, but there is scant evidence that casinos are different from other tourist attractions in this regard. They believe the research demonstrates that anything that attracts a large number of tourists, be it an amusement park or a casino, will lead to a higher crime rate. They state that despite the domain assumption of most research that casinos are somehow different from other entertainment attractions (1998:126), they find no evidence that casinos lead to more crime than other tourist attractions. Miller and Schwartz also note that for criminologists to ignore the role tourism plays in communities that attract large numbers of tourists is an affront to common sense and a growing body of research and places criminological

analyses behind the sophistication of even the popular press, which has run many articles on the subject of tourism and crime (Nickerson, 1994). However, Miller and Schwartz note that “the story of the relationship between legalized casino gambling and street crime is far from written” (Miller & Schwartz, 1998:133). They note that the greatest need in gambling research is for studies that have greater specificity in defining the types of crime that are being studied and for studies that do not engage in “data dredging” which analyzes all crime in an area and attributes any differences to the presence or absence of casinos.

Taking account of the literature review and the criticism leveled at much of the gambling and crime research, the present study will involve an analysis of crime in seven jurisdictions that are new casino jurisdictions. The research will calculate crime on the basis of both the permanent resident population and also utilizing a modified crime rate which will take into account tourists in the population at risk. The crimes analyzed will include all of the index offenses, but will also include other crimes that are arguably more likely to be influenced by the presence of a casino than some (such as homicide) in the index offenses.

A Theoretical Framework

Most of the research on gambling and crime provides no theoretical framework on which to base the research and no context to consider the results. Yet, several criminological theories seem appropriate to explain the hypothesized relationship between casinos and crime. Among these are routine activity theory (Cohen & Felson, 1979) and the concept of “hot spots” (Sherman, Gartin, & Buerger, 1987; Roncek & Maier, 1991).

Routine activity theory posits that for predatory events to occur there must be motivated offenders, suitable targets, and an absence of capable guardians. Often, the most notable change brought about by the introduction of casino gambling into a community is the number of tourists that they attract. These tourists become suitable targets for crime, given the fact that they often possess substantial sums of money brought for the purpose of gambling. It is reasonable to assume that the increased opportunities for crime, given the increased number of tourists visiting the casinos and the large sums of money they carry, would result in a substantial number of new

offenders who would be attracted to the target-rich environment, or at least an increase in the motivation and opportunity to offend for those so inclined who are members of the community. At the same time, unless law enforcement and casino security are increased significantly, the ratio of capable guardians to both motivated offenders and suitable targets will diminish (Cohen & Felson, 1979).

Routine activity theory would seem to suggest that the introduction of casinos into a community will lead to and increase in crime. As Cohen and Felson point out, the convergence in time and space of suitable targets and the absence of capable guardians may even lead to large increases in crime rates without any increase in the structural conditions that motivate individuals to engage in crime. They also point out that were the proportion of motivated offenders or suitable targets in a community to remain stable, changes in routine activities could alter the probability of their convergence in time and space thus creating more opportunities for crime to occur (Cohen & Felson, 1979).

The nature of the casino clientele (large numbers of individuals, many of whom may be strangers in the community, possessing large sums of money) would suggest, consistent with routine activities theory, an increase in crime. In addition, a good deal of the research literature suggests that the nature of the casino environment itself is criminogenic. The most significant factor in the criminogenic equation may be the availability of alcohol and the role it may play in transforming casinos into "hot spots" (Roncek & Maier, 1991) and thereby generating crime.

The role that alcohol plays in facilitating crime is widely acknowledged (Blum, 1967; Collins, 1981, Dull & Giacopassi, 1987; Stitt & Giacopassi, 1992). The connection of alcohol consumption and availability was clearly related to "hot spots" in the study done by Roncek and Maier (1991). Examining the relation of crime to the locations of tavern and lounges in Cleveland, they concluded that the amount of crime of every type was significantly higher on residential blocks where taverns or lounges were present (1991:747). Relating their findings to routine activities, they highlight the role of alcohol as a disinhibitor of personal behavior and the important role of anonymity in hindering social control by interfering with the ability of the guardians of social behavior to manage large numbers of people in a "hot spot" environment (Cohen & Felson, 1991).

METHOD

As part of a larger study to determine the effect of casino gambling on crime and the quality of life in new casino jurisdictions, crime data were collected from seven new casino jurisdictions. For communities to be eligible for inclusion in the study, the police departments had to agree to make available Part I and Part II crime data for their communities dating back at least four years prior to casinos opening in their community. Part II crime data, which is not available anywhere other than directly from the agency that collects it, was critical since logic dictates that crimes such as fraud, embezzlement, bad checks, and public disorder crimes, to mention a few, are more likely related to gambling effects than are aggravated assaults, armed robberies, or rapes. All the communities selected for the study initiated casino gambling in the 1990s and have had casino gambling for a minimum of four years. This time frame allows comparisons to be made before and after the casinos were in operation. A number of communities that agreed to cooperate could not be included in the study due to incomplete, inaccessible, or nonexistent data. For example, in some cases data were collected, but the information was not computerized. One community was originally included in the study accompanied by a letter of intent to cooperate from the Chief of Police, only to be eliminated later when it was reported by the Lieutenant in charge of records that the data from an old computer system could not be retrieved. Native American casinos were excluded from consideration because of the likely inaccessibility of crime and other data needed and because of the rural location of most of the Indian casinos.

The communities which were ultimately included in the study are Biloxi, MS; St. Louis (city), St. Louis County, and St. Joseph, MO; Alton and Peoria, IL; and Sioux City, IA. The cities range in population from 32,905 for Alton, IL, to 396,685 for St. Louis. All the cities lost population from 1980 to 1990 (Bureau of the Census, 1992). Of the seven cities, only Peoria does not have a casino at this time. Peoria had a riverboat in 1991, but for regulatory reasons, it was moved to East Peoria, directly across the Illinois River and easily accessible from Peoria, in 1993. However, Peoria shares in the tax revenue from the riverboat with East Peoria, and many

citizens of Peoria work in and are customers of the casino. Peoria, therefore, presents a unique case for study. Each of the other cities has one riverboat casino, except for Biloxi, which has nine casinos located on a bay or on the Gulf Coast on stationary barges. These barge casinos tend to be larger than the riverboat casinos, and their number and concentration have resulted in the casinos and the tourists they draw playing a much larger role in Biloxi than in the other communities studied. The other extreme is St. Louis, a relatively large city with a single riverboat casino within the city limits, but with several other casino riverboats nearby (in East St. Louis, St. Charles, Maryland Heights, and Alton). St. Louis presents an interesting situation in that, unbeknownst to the researchers, the city of St. Louis has boundaries fixed by charter which does not allow annexation. As a result, the population of St. Louis County, which surrounds St. Louis on the Missouri side of the Mississippi River, has grown tremendously and is now composed of 95 incorporated areas with a population of approximately 1.25 million. During the course of a site visit the researchers contacted the office of the St. Louis County Police Department and serendipitously discovered quarterly crime data inclusive of all of the county for the time period in question. It should be noted that the city of St. Louis and St. Louis County are separate jurisdictions and the county crime statistics do not include the city data. The county contains two additional riverboat casinos in addition to the casino located in the city of St. Louis. As a result, the entire metropolitan St. Louis area is the largest of the research sites. In comparison to the other communities in the study, the St. Louis riverboat has relatively little impact on tourism and on the overall economy of the city and county.

With the exception of the crime data from St. Louis County, all data are taken from monthly reports. For St. Joseph, Missouri, there are only data available for nine months after casinos were brought to the city because of incomplete data entry by city personnel.

Population at Risk

To calculate the population at risk, the tourist or visitor population is added to the resident population. Unfortunately, data on the exact number of visitors is unavailable for the entire sample period. However, it is possible to estimate the number of visitors to a community

from studies that examine the economic impact of tourism on states and counties. This involves dividing total direct tourism expenditures by the average expenditure per visitor per trip, thereby obtaining an estimate of the number of person trips.

Travel and Tourism offices were contacted in each state in order to obtain information on the total direct expenditures by tourists in the state and for each county. These data ranged from being fairly complete in Iowa, which had total direct expenditure estimates for 1988-1996, to relatively incomplete in Biloxi, which only had total direct expenditure estimates for 1995-1997.

Average expenditure per trip is the state average and was obtained from the *American Travel Survey, 1995* (ATS). The Department of Transportation conducted a study in 1995 which estimated the number of visitors to (and from) all states and various metropolitan areas. The average expenditure per visitor is calculated using the total direct tourist expenditures in 1995 from the economic impact of tourism studies and the number of visitors to the state in 1995 from the ATS survey. The average expenditure for years later and earlier than 1995 is adjusted upward and downward based on changes in the Consumer Price Index (CPI).

As noted above, information on total direct tourist expenditures is not available for all years. Consequently, data for missing years were estimated from existing data assuming a constant growth trend. Once total direct tourism expenditures and average expenditure per visitor were estimated, the number of yearly visitors was obtained by dividing total direct tourism expenditures by the average expenditure. Yearly figures were then converted to monthly (or quarterly) figures by taking a weighted average, using the percentage of visitors to the casinos during each month as the weight. Visitation to casinos is cyclical, with high visitation occurring in the warmer summer months, and should approximate tourist visitation cycles.

Finally, population figures were obtained from the USA Counties 1996 CD-ROM. This contains yearly population estimates for all counties through the year 1994. Later years were estimated assuming a constant growth rate, and all yearly figures were converted to monthly figures assuming a constant growth rate. City population figures (Alton, Peoria, St. Joseph, and Biloxi) for all years are weighted averages of the county population using the proportion of the county population accounted for by the city in the 1990 Census. Adding the monthly population estimates with the monthly tourist estimates gives us the population at risk.

Results

The results of the analyses of the effects of casino gambling on crime in the designated research site cities appear in Tables 1-4. The tables present the average crime rate per 1,000 population, per time period, before and after the introduction of gambling into these communities standardized on a per capita basis, as well as on the basis of the population at risk when tourists are taken into account. For all jurisdictions with the exception of St. Louis County, the time periods were months. In the case of St. Louis County, the crime data were only available quarterly. The exact crime offenses presented for each city differ due to the categorizations of data made available by the respective police departments.

Looking first at Table 1, the results for Sioux City indicate that a substantial number of offense categories increased significantly after the introduction of casino gambling. Of the twenty-two offense categories for which data were available, twelve registered statistically significant increases. Those categories were homicide, robbery, aggravated assault, burglary, motor vehicle theft, forgery, credit card fraud, prostitution, sex offenses, drug violations, family offenses and liquor law violations. At the same time four offenses decreased significantly. Those were fraud, check fraud, embezzlement, and public drunkenness. All of the increases or decreases were statistically significant regardless of whether or not tourists were added and true population at risk was considered.

The results for Biloxi also appear in Table 1. Biloxi is unique because it has the most casinos and also the casinos provide free drinks to patrons which could directly or indirectly affect the crime situation. Of all of the cities examined, Biloxi has the most crimes that have significantly increased since the advent of casinos, whose increases might be directly attributable to the advent of casino gambling. Using the per capita measure, crimes increase for fifteen out of twenty-two offense categories comparing rates before and after the introduction of casinos. When the population at risk measure is used this number decreases to ten. Interestingly, the offenses that increased significantly were robbery, simple assault, forgery, fraud, credit card fraud, embezzlement, prostitution, drug violations, DUI, and disorderly conduct. Many of these

offenses are ones whose increases are suggested by both logic and criminological theory.

When comparisons are made between percent differences before and after the advent of casinos using the per capita versus population at risk figures, there are two offenses where the relationship changes from positive significant differences to negative non-significant ones, aggravated assault and liquor violations. There are four offenses that showed a significant increase after casinos using the per capita measure that remained positive but lost their significance. These were larceny, sex offenses, family offenses, and public drunkenness. One offense, sexual assault, showed a decrease after casinos opened when both per capita and population at risk measures were used. However, the decrease became statistically significant when the population at risk was used as the population base.

An examination of the results of the comparisons for offense categories before and after the inception of casino gambling for St. Louis City (see Table 2) again reveals mixed results. Here, of twenty-two offense categories, eight increased at a statistically significant magnitude for both per capita and population at risk calculations. These offenses were larceny, arson, simple assault, sex offenses, drug violations, family offenses, and liquor law violations. By contrast, ten offense categories decreased significantly. These were sexual assault, aggravated assault, burglary, motor vehicle theft, forgery, fraud, check fraud, credit card fraud, prostitution, and public drunkenness. Only one offense, disorderly conduct, significantly decreased when the at risk measure was used to calculate the before and after measure as opposed to the per capita measure. This leaves robbery, DUI, and embezzlement as offenses that did not change statistically in either direction for either the per capita or the at risk measure.

The results for St. Louis County, which were available only on a quarterly basis and represent nineteen offense categories also appear in Table 2. Of those nineteen offense categories, six increased significantly between the time periods before and after casino gambling came to the area for both per capita and population at risk calculations. Those were larceny, simple assault, embezzlement, drug violations, family offenses and disorderly conduct. Eight offenses decreased significantly for both calculations. Those were sexual assault, aggravated assault, burglary, arson, forgery, prostitution, sex offenses, and liquor law violations. Three offense categories, robbery, motor vehicle theft and fraud, decreased significantly for only the

population at risk calculation. Homicide and DUI did not change significantly, but DUI changed from an increase to a decrease when population at risk was used as the denominator.

Table 3, presenting the results for both Alton and Peoria, Illinois, appears next. For Alton there were statistically significant increases for per capita and per population at risk rates only for credit card fraud and drug violations. There were corresponding statistically significant decreases for robbery, burglary, larceny, simple assault, and fraud. Comparing per capita versus population at risk results revealed a difference for eight offense categories. For aggravated assault, arson, prostitution, sex offenses and family offenses, there were statistically significant decreases in before and after rates when population at risk was taken into account, but not for the per capita measure. For forgery, the difference decreased below significance when population at risk was used rather than merely the per capita measure, though in both situations there was an increase in the before to after rate. For two offenses the sign of the relationship actually changed direction, going from positive to negative for homicide and aggravated assault, with only the population at risk difference for aggravated assault being statistically significant. For sexual assault, the relationship changes to no difference in before and after casino rates for the population at risk measure from a non-statistically significant increase when the per capita population was used to calculate the rate.

For Peoria, the community for which there is the least number of offense category data available, the results resemble those of Sioux City and Biloxi (see Table 1). Here nine of the twelve offense categories for which there are data show rate increases from before to after casinos appeared for both per capita and population at risk calculations. Those nine offenses are sexual assault, robbery, aggravated assault, larceny, motor vehicle theft, arson, simple assault, prostitution and drug violations. Burglary and deceptive practices (a composite measure of forgery, various forms of fraud, and embezzlement) decreased significantly for both per capita and population at risk measures from before to after casinos came to the community. One offense, homicide, increased using both measures of population but it did not achieve statistical significance.

The last city to be considered is St. Joseph, Missouri (see Table 4). Unfortunately, data were only available for nine months after the introduction of casino gambling into this

community, so the results should be considered tentative at best. For this reason statistical significance was not as easily achieved as in the other communities where more degrees of freedom apply to the significance calculation. The results reveal that for four offenses, aggravated assault, fraud, sex offenses, and drug violations, increases in before/after rates were positive and achieved statistical significance for both per capita and population at risk calculations. For one offense, larceny, increases were significant when per capita population was the basis for standardization, but not when population at risk was utilized. There were no rate decreases that were significant when both population measures were used, but burglary and motor vehicle theft decreases were statistically significant when population at risk was considered. Three offense categories, homicide, arson and check fraud, did not occur after the advent of casino gambling, but given the short span of comparison for after effects their decrease is viewed as likely unrelated to the issue at question. No other offenses appearing in Table 4 had changes that achieved statistical significance.

Turning next to an examination of results by offense category across all jurisdictions, the following consistencies and inconsistencies are revealed. The only offense category that increased from before to after casinos in all jurisdictions was drug violations. It should be noted that in all situations the increases were statistically significant and occurred regardless of which population measure was used for standardization. It is possible that this increase could have occurred without the introduction of casinos into the communities. If one were to ask which offenses increased most frequently, the answer can be ascertained by looking across all before/after comparisons. Offenses that increased in prevalence to the point of achieving statistical significance for a majority of the comparisons when the population at risk measure was used (the most conservative to gauge a possible casino effect) were simple assault (66% -four of six comparisons) and credit card fraud (75% -three of four comparisons) Whether these instances of increase are due to casino effects at this point would be a matter of conjecture. Of the Part II offenses that might be related to casinos and problems related to losing and/or problem gambling, none with the exception of credit card fraud seem to increase dramatically.

Overall, using the population at risk and comparing the number of crimes that significantly increased or decreased in each city after casinos were introduced, we find the

following:

	Significant Increase	Significant Decrease	No Change	Number of Crimes
Sioux City	12 (54.5%)	4 (18.2%)	6 (27.3%)	22
Biloxi	10 (45.5%)	5 (22.7%)	7 (31.8%)	22
St. Louis (City)	6 (27.3%)	11 (50.0%)	5 (22.7%)	22
St. Louis (County)	6 (31.6%)	11 (57.9%)	2 (10.5%)	19
Alton	2 (12.5%)	10 (62.5%)	4 (25.0%)	16
Peoria	9 (75.0%)	2 (16.7%)	1 (6.3%)	12
St. Joseph	4 (23.5%)	2 (11.8%)	11 (64.7%)	17

From these data, we see that there is little consistency in the before and after casino comparisons for changes in crime. In three communities (Sioux City, Peoria and Biloxi) there were many more crimes that significantly increased than decreased. In three other jurisdictions (Alton, St. Louis (city) and St. Louis County) there were many more crimes that significantly decreased than increased. In one jurisdiction (St. Joseph), twice as many increased than decreased, but a vast majority (11 of 17) showed no change.

Despite the inconsistency of the results across jurisdictions, we can estimate which offenses had an overall significant change using the Wilcoxon Signed Rank Test for Paired Differences (WSRT), a nonparametric test used to compare two probability distributions. To calculate the statistic, the ranks of the absolute values of the differences in before and after offense rates are computed. So, for example, the difference in homicide rates before and after the introduction of casinos are computed for all seven jurisdictions, and the absolute value of this difference is then ranked. After the absolute values are ranked, the sum of the ranks of the positive differences (increases in the offense), T_+ , and the sum of the negative differences (decrease in the offense), T_- , are computed. The WSRT test statistic, T , is the smaller of T_+ and T_- . The smaller the value of T , the greater is the evidence that the two probability distributions, in this case offense rates before and after the introduction of casino gambling, are different, i.e.,

there has been a significant change in crime following the introduction of casinos. Critical values of T are provided in most statistics books.

As might be expected from the results, there are very few instances where the results from the WSRT are able to reject the null that the probability distributions for per capita or per population at risk offenses are identical, i.e., that there was no significant change in the offense category between pre and post casino periods. Nevertheless, when examining the per capita offenses for those offenses for which data were available from five or more communities, there were statistically significant changes in burglary ($T_- = 25, T_+ = 3$), larceny ($T_- = 3, T_+ = 25$), drug violations ($T_- = 0, T_+ = 28$), and family offenses ($T_- = 1, T_+ = 20$). The results for burglary and larceny are significant at the 10% level and would suggest that there was a decline in burglary and an increase in larceny. Results for drug violations and family offenses are significant at the 5% level and are consistent with increases in these offenses. When examining offenses normalized by the population at risk, only burglary ($T_- = 27, T_+ = 1$) and drug violations ($T_- = 0, T_+ = 28$) appear significant.

With regard to what might be expected from relevant theory such as routine activity theory and the corollary notion of “hot spots,” the expectation that crime rates would rise as a result of the advent of casino gambling in the communities under study was not born out. In fact only two communities, Peoria and Sioux City, showed an overall increase in crimes across all categories and for three communities, Alton, St. Louis City and St. Louis County, significant decreases in crimes were more prevalent than either incidents of no change or significant increases. Ultimately, there is no way of knowing what the crime rates would have been had casino gambling not been introduced into these communities. Also, relative to routine activity theory there is really no way to factor in an empirical equivalent for “capable guardians.” However, casinos are “hot spots,” but in themselves they are also environments where security is maximized by means of security cameras and visible security forces.

Conclusions

The analysis indicates that there are few consistencies between communities when

comparing the before and after crime rates for new casino jurisdictions. Although the present analysis is inconclusive regarding the impact of casinos on crime, the absence of clear-cut findings is itself important. It is possible that the numbers (both crime and tourism statistics) are so imprecise as to result in these inconsistencies. However, it is equally plausible that the effects of casinos on a community are quite varied, depending on a multitude of variables that are just beginning to be studied. The effects of a casino on a community may truly be dependent on local conditions (economy, population, demographics, location of the casino, police preparedness, casino regulations, whether casino clientele is mostly local, etc.) not easily generalizable or replicable from community to community. Perhaps a good illustration of this is the case of Biloxi. When Biloxi is compared to the other communities studied here it is evident that casinos have had the most profound impact in terms of economic impact, tourism and impacts on the community's daily life. It may be that in Biloxi casinos have reached some critical mass where effects that are witnessed are more in line with what might be expected in a community where casinos play a major role. Clearly, the crimes that have increased significantly could easily be related to the life-style and impacts that a casino might be expected to have. Here the crimes that increased were robbery, simple assault, forgery, fraud, credit card fraud, embezzlement, prostitution, drug violations, DUI, and disorderly conduct. However, more studies of the current type are needed to verify such a conclusion.

Some might suggest that there might be a lag in terms of the amount it might take for any casino effects to appear. As a part of the present analysis changes in crimes were examined one, two, and three years out and little change was noted. In a few instances relationships lost their level of statistical significance, but this seems due to a reduced number of degrees of freedom. Thus, given the present data there seemed little reason to report these findings.

It should be pointed out that by looking at the impact of casinos on crime rates based on the local population and also based on the population at risk, both the conventional and a more conservative measure of the impact of a casino on a community are provided. It was found that, at least for four out of seven communities in this study, the population at risk figures were not greatly different from the usual crime rate measure based on a community's population. For three communities, Alton, Biloxi and St. Louis County the use of population at risk measures for

standardization resulted in seven changes in statistical significance of relationships for both Alton and Biloxi and three in the case of St. Louis County. These changes were either increases in rates that went from significance to non-significance or increases that became significant decreases or decreases that were not statistically significant that became statistically significant when the population at risk measure was used. This suggests that taking tourism into account does provide a more accurate measure of offense prevalence. At the same time, with the exception of Biloxi, these communities are not Las Vegas, Reno, or Atlantic City that attract millions of tourists annually to the casinos where population at risk (including tourists) is tremendously greater than the resident population. However, the seven jurisdictions studied are much more reflective of the communities that have legalized casinos in the 1990s and the results, therefore, more relevant to the current debate focusing on the consequences of a casino's operation in a community.

Lastly, it should be noted that the present analysis is a simple before/after test which assumes any difference in crime is due to the presence (or previous absence) of the independent variable, casinos. This assumption must be called into question when the results achieved in the communities studied are so varied. Studying any community over a multi-year period introduces a multitude of variables beyond the control of the researchers. For now, all we can conclude is that simple analyses and broad generalizations do not suffice to capture the complexity of what occurs in communities when legalized casino gambling is introduced.

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Table 1

Percent Differences in Offence Rates Before and After Casino Gambling Per 1,000 Population and Population at Risk in Sioux City, Iowa and Biloxi, Mississippi

Sioux City, Iowa							Biloxi, Mississippi		
Offense Category	Per Capita			Per Population at Risk			Per Capita		
	Before Gambling	After Gambling	% Difference	Before Gambling	After Gambling	% Difference	Before Gambling	After Gambling	% Difference
Homicide	.0049	.0101	106.12***	.0035	.0071	102.86***	.0089	.0083	-7.19
Sexual Assault	.0488	.0517	5.94	.0344	.0362	5.23	.0524	.0516	-1.57
Robbery	.0756	.0938	24.07***	.0532	.0662	24.44**	.2231	.3510	57.37***
Agg. Assault	.3604	.7675	112.95***	.2537	.5365	111.47***	.5903	.6284	6.44*
Burglary	1.347	1.507	11.89*	.9453	1.0484	10.91*	2.0965	1.6406	-21.74***
Larceny	3.5245	3.5676	1.22	2.4755	2.4904	.60	5.0422	5.8417	15.86***
Vehicle Theft	.2109	.3130	48.41***	.1476	.2174	47.29***	.6712	.5284	-21.27***
Arson	.0353	.0339	-3.97	.0248	.0232	-6.45	.0318	.0237	-25.29*
Simple Assault	.9377	.9041	-3.58	.6585	.6335	-3.79	.9738	1.6578	70.23***
Forgery	.1666	.2064	23.89***	.1173	.1442	22.93***	.1111	.2115	90.34***
Fraud	.1771	.1253	-29.25***	.1246	.0879	-29.45***	.1467	.2072	41.32***
Check Fraud	.1183	.0775	-34.49***	.0833	.0545	-34.57***	.0069	.0036	-48.35***
C. Card Fraud	.0035	.0211	502.86***	.0025	.0147	488.00***	.0136	.0510	274.02***
Embezzlement	.0083	.0045	-45.78***	.0058	.0032	-44.83***	.2249	.3273	45.48***
Prostitution	.0266	.0370	39.10**	.0186	.0261	40.32*	.0134	.0634	372.36***
Sex Offenses	.1318	.1701	29.06***	.0925	.1190	28.65***	.0530	.0635	19.75*
Drug Violations	.1744	.3810	118.46***	.1228	.2647	115.55***	.4638	.8874	91.35***
Family Offense	.0443	.0881	98.871***	.0312	.0613	96.47***	.1041	.1220	17.19*
DUI	.6647	.6779	1.99	.4683	.4746	1.35	.3974	1.5172	281.81***
Liq. Violations	.0637	.0804	26.22***	.0448	.0560	25.00***	.0424	.0477	12.38***

Sioux City, Iowa							Biloxi, Mississippi		
	Per Capita			Per Population at Risk			Per Capita		
	Before	After	% Diff	Before	After	% Diff	Before	After	% Diff
Public Drunk	.9090	.7306	-19.63***	.6392	.5093	-20.32***	1.0049	1.2351	22.91**
Dis. Conduct	.6471	.6380	-1.41	.4551	.4441	-2.42	.4931	.9133	85.20***

Significance Levels * = p < .05 ** = p < .01 *** = p < .001 Degrees of Freedom for Sioux City df = 67 and for Biloxi df = 74

Table 2

Percent Differences in Offence Rates Before and After Casino Gambling Per 1,000 Population and Population at Risk in St. Louis City and St. Louis County, Missouri

St. Louis City							St. Louis County		
Offense Category	Per Capita			Per Population at Risk			Per Capita		
	Before Gambling	After Gambling	% Difference	Before Gambling	After Gambling	% Difference	Before Gambling	After Gambling	% Difference
Homicide	.0444	.0416	-6.31	.0299	.0272	-9.03	.0111	.0123	10.81
Sexual Assault	.0686	.0594	-13.41**	.0461	.0385	-16.49**	.0547	.0490	-10.42*
Robbery	2.0631	2.0645	0.07	1.390	1.336	-3.898	.2614	.2574	-1.53
Agg. Assault	1.6621	1.473	-11.33***	1.1176	.9555	-14.50***	.6365	.5599	-12.03***
Burglary	5.3226	4.9087	-7.78**	3.5842	3.1798	-11.28***	1.9844	1.4702	-25.91***
Larceny	11.1040	12.8528	15.75***	7.4767	8.3258	11.357***	6.7786	7.7464	14.28***
Vehicle Theft	2.9825	2.8243	-5.30*	2.0086	1.8271	-9.036***	.9881	.9846	-.35
Arson	.1611	.1846	14.59**	.1085	.1191	9.769	.0739	.0636	-13.94**
Simple Assault	2.1855	2.4105	10.30***	1.4717	1.5608	6.054*	1.2250	1.5554	26.97***
Forgery	.0876	.0645	-26.37***	.0593	.0415	-30.017***	.2280	.2044	-10.35*
Fraud	.2901	.2452	-15.48***	.1956	.1583	-19.070***	1.0639	1.0354	-2.68
Check Fraud	.0751	.0523	-30.36***	.0507	.0337	-33.531***	na	na	----
C. Card Fraud	.0310	.0234	-24.52***	.0209	.0151	-27.751***	na	na	----
Embezzlement	.0282	.0308	9.21	0.019	0.020	5.263	.0495	.0610	23.23**

St. Louis City							St. Louis County		
	Per Capita			Per Population at Risk			Per Capita		
Prostitution	.1309	.1001	-23.53***	.0881	.0645	-26.788***	.0134	.0081	-39.55***
Sex Offenses	.1746	.2121	21.48**	.1175	.1367	16.340*	.2096	.1920	-8.40**
Drug Violations	.6812	1.0268	50.73***	.0460	.6640	44.348***	.6689	1.2246	83.08***
Family Offense	.0648	.0852	31.48***	.0436	.0551	26.376***	.1063	.1625	52.87***
DUI	.2053	.1940	-5.50	.1386	.1259	-9.163	.8948	.9506	6.24
Liq. Violations	.2694	.4861	80.44***	.1804	.3107	72.228***	.5921	.3494	-40.99***
Public Drunk	.0044	.0019	-56.82***	.0030	.0012	-60.000***	na	na	---
Dis. Conduct	.6557	.6363	-2.96	.0441	.4122	-6.594*	.9150	1.2129	32.56***

Significance Levels * = p < .05

** = p < .01

*** = p < .001

Degrees of Freedom for St. Louis City df = 51 and
for St. Louis County df = 14

Table 3

Percent Differences in Offence Rates Before and After Casino Gambling Per 1,000 Population and Population at Risk in Alton and Peoria, Illinois

Alton, Illinois							Peoria, Illinois		
Offense Category	Per Capita			Per Population at Risk			Per Capita		
	Before Gambling	After Gambling	% Difference	Before Gambling	After Gambling	% Difference	Before Gambling	After Gambling	% Difference
Homicide	.0161	.0162	0.15	.0102	.0089	-12.36	.0064	.0084	31.25
Sexual Assault	.0755	.0873	15.69	.0478	.0478	0.00	.0992	.1453	46.47***
Robbery	.2253	.1851	-17.86**	.1432	.1025	-28.39***	.2465	.3910	58.62***
Agg. Assault	.3588	.3595	0.18	.2271	.1957	-13.85***	.9065	1.2723	40.35***
Burglary	2.6889	2.5159	-6.43*	1.7118	1.3779	-19.51***	1.8759	1.7426	-7.11**
Larceny	3.3811	2.8266	-16.40***	2.1594	1.5488	-28.28***	4.305	4.7137	9.49***
Vehicle Theft	.3027	.3713	22.65***	.1921	.2003	4.31	.3018	.7022	132.67***
Arson	.0682	.0580	-14.97	.0437	.0313	-28.38***	.0571	.0896	56.92***
Simple Assault	2.4484	1.4728	-39.85***	1.5565	.8115	-47.86***	.2963	.4907	65.61***
Forgery	.0925	.1215	31.36***	.0595	.0671	12.87	na	na	---
Fraud	.2611	.2310	-11.55*	.1683	.1274	-24.26***	na	na	---
C. Card Fraud	.0108	.0214	99.18**	.0069	.0115	67.40*	na	na	---
Deceptive Practices ¹	na	na	---	na	na	---	.2992	.2335	-21.96***
Prostitution	.0311	.0243	-21.74	.0197	.0128	-34.86*	.0824	.1116	35.44***
Sex Offenses	.1085	.1033	-4.81	.0689	.0574	-16.69*	na	na	---
Drug Violations	.1823	.5738	214.79***	.1140	.3072	169.38***	.2093	.6184	185.46***
Family Offense	.2550	.2380	-6.675	.1586	.1304	-17.71*	na	na	---

¹ Deceptive Practices includes forgery, fraud, embezzlement, check fraud and credit card fraud.

Significance Levels * = p < .05 ** = p < .01 *** = p < .001 Degrees of Freedom for Alton for Part I offences

df = 79 and for Part II offences df = 72
Degrees of Freedom for Peoria df = 74

Table 4

Percent Differences in Offence Rates Before and After Casino Gambling Per 1,000 Population and Population at Risk in St. Joseph Missouri

St. Joseph, Missouri						
Offense Category	Per Capita			Per Population at Risk		
	Before Gambling	After Gambling	% Difference	Before Gambling	After Gambling	% Difference
Homicide	.0026	0	-100.00 ^{NA}	.0016	0	-100.00 ^{NA}
Sexual Assault	.0256	.0170	-33.59	.0157	.0087	-44.59
Robbery	.0488	.0480	-1.64	.0306	.0251	-17.97
Agg. Assault	1.2512	1.8425	47.26 ^{***}	.7663	.9688	26.43 ^{**}
Burglary	1.0753	1.0398	-3.30	.6861	.5450	-20.57 ^{**}
Larceny	3.5226	4.2364	20.26 [*]	2.2092	2.2247	.70
Vehicle Theft	.2451	.2138	-12.77	.1537	.1220	-27.13 [*]
Arson	.0030	0	-100.00 ^{NA}	.0022	0	-100.00 ^{NA}
Forgery	.1738	.1782	2.53	.1080	.0952	-11.85
Fraud	.1826	.2852	56.19 ^{**}	.1127	.1504	33.45 [*]
Check Fraud	.0112	0	-100.00 ^{NA}	.0075	0	-100.00 ^{NA}
Embezzlement	.0017	.0015	-11.76	.0011	.0008	-27.27
Sex Offenses	.1211	.1999	65.07 [*]	.0742	.1055	42.18 [*]
Drug Violations	.0372	.1085	191.67 ^{***}	.0224	.0575	156.70 ^{***}
Family Offense	.0153	.0496	224.18	.0089	.0056	60.00
Liq. Violations	.0011	.0093	745.45	.0006	.0049	716.67
Dis. Conduct	.0150	.0372	146.36 [*]	.0092	.0197	114.13

Significance Levels * = p < .05 ** = p < .01 *** = p < .001

Degrees of Freedom for St. Joseph df = 9