A Benefit-Cost Analysis of Indiana's Riverboat Casinos for FY 2005

A Report to the Indiana Legislative Council and the Indiana Gaming Commission

By

Policy LLC

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Forward

This Project was completed by a diverse group of highly qualified individuals employed through Policy Analytics, LLC. Those primarily responsible for the project were the President of Policy Analytics, William Sheldrake, Professor John Spry of St. Thomas University, and Senior Consultant Daniel Clendenning. Additional consulting assistance was provided by Rachel Harter, Vice President of Statistics and Methodology at the National Opinion Research Center, and Rachel Volberg, President of Gemini Research, Ltd. Complete biographical and credentials' information on those involved in this project is provided in Appendix F.

In addition to the research team, Mike Smith, Executive Director of the Indiana Casino Association was instrumental in obtaining data from the riverboat casinos in Indiana. The authors would also like to thank Dr. Jim Landers, Indiana Legislative Services Agency, Dr. Larry DeBoer, Purdue University and Drew Klacik and Laura Littlepage of the Center for Urban Policy and the Environment at Indiana University – Purdue University at Indianapolis for assistance in obtaining relevant data. We would also like to thank Mr. Jerry Long at the Indiana Problem Gambling Hotline for giving us access to hotline call data.

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Executive Summary

The Indiana Legislative Council, in June of 2005, asked the Indiana Gaming Commission to study the impact of gaming on Indiana citizens and communities. To carry out this request the Gaming Commission hired Policy Analytics, LLC to analyze the benefits and costs to Indiana citizens and communities of the current system of riverboat casinos. We utilized a benefit-cost approach, comparing the current Indiana policy to an alternative, hypothetical policy in which Indiana does not have any riverboat casinos for fiscal year 2005. In order to measure the incremental costs and benefits for Indiana under its current policy, we assume that other factors (such as the availability of gaming in other states and the availability of lottery and charitable gaming in Indiana) are held constant.

The Methodology

Policy Analytics, LLC collected and extensively analyzed detailed and comprehensive player data in evaluating the effects of casino gaming in the state of Indiana. Casino gambling is a very "place-based" economic activity. This report addresses the geographically sensitive nature of the social costs of gambling as well as its benefits.

This analysis utilizes a methodology to associate the social costs that resulting from the presence of Indiana's riverboat casinos with the geographic markets into which the Indiana Casinos distribute their product. It is that focus on the appropriate geographies that allows the report to bring forward additional policy implications for elected officials in Indiana.

Table E.1: - Calculation of Net Costs and Benefits to the State of Indiana on the Presence of Casino Gambling in FY 2005 $'s
[Dollars in Millions]

Summary of Costs			Summary of Benefits	
Cost Categories	Grinols Valuation	NORC Valuation	Benefit Categories	Policy Analysis Valuations
Social Costs (excluding bankruptcy/crime)	$41.87	$19.02	Distance Consumer Surplus	$52.62
Bankruptcy	$1.21	$1.21	Tax Benefits	$763.23
Crime	$52.14	$52.14	Net Change in Profits	$0.00
Regulatory Costs	$3.34	$3.34	Change in Transactional Constraints	$0.00
Subtotal Costs and Benefits	$98.56	$75.71		$815.85
Net Benefit	$717.29	$740.14		

Source: Gerstein, et al., *Gambling Behavior and Impact Study* (1999). Grinols, Gambling in America, 2004. Policy Analytics, LLC calculations.

Defining Social Costs

In estimating the social costs, this report developed a range of economic valuation based on two experienced research entities: the National Opinion Research Center [NORC] and Dr. Earl Grinols, Baylor University, Waco, Texas. Policy Analytics also collected data from the Indiana Council on Problem Gaming Helpline and the Indiana Voluntary Exclusion Program.

The social costs examined in this report include:

- Bankruptcy;
- Crime;
- Unemployment and loss of productivity;
- Poor health and mental health problems; and
- Divorce.

The social costs of gambling flow from the diagnoses which psychologists have defined as both problem and pathological gambling. The difference between problem and pathological gamblers lies in the intensity of the behavior. A problem gambler exhibits 3 or 4 of the behavioral characteristics, whereas a pathological gambler exhibits 5 or more. A comprehensive list of the behaviors is found on page 35, however several of them are shown below.

1. Preoccupation: Individual is preoccupied with gambling.
2. Tolerance: Needs to gamble with increasing amounts of money to achieve the desired excitement.
3. Withdrawal: Is restless or irritable when trying to stop or cut down on gambling.
4. Escape: Gambles as a way of escaping from problems.
5. Loss of control: Has repeated and unsuccessful efforts to control, cut back, or stop gambling.

Using regression analysis and the detailed information regarding gambling activity this report demonstrates a significant relationship between proximity to a casino and higher incidences [adjusted for population] of problem or pathological gambling. This confirms other work done nationally.

This study estimates that an additional 6,178 (0.13% of Indiana Adults) problem gamblers and an additional 12,356 (0.26% of Indiana Adults) pathological gamblers can be attributed to the introduction of riverboat casinos. These numbers are relatively small because riverboat casinos in Indiana are located on the edges of the state. As a result, only a relatively small proportion of Indiana's population resides within 50 miles of a casino. Given the proximity of Indiana's casinos to large population centers (such as Chicago, Cincinnati, and Louisville) 66% of total turnstile admissions are from non-Indiana patrons.

Additional Social Cost Findings

Crime: Approximately 8% of crime in counties containing casinos is attributable to the presence of casinos. The tangible cost to Indiana residents from additional crime in fiscal year 2005 is estimated to be $52.14 million.

Bankruptcy: It is estimated that 774 bankruptcies within Indiana can be attributed to the presence of casinos for the fiscal year 2005. This is 1.4% of total bankruptcies in Indiana. These additional bankruptcies result in a measurable cost to Indiana residents approximating $1.21 million for the year.

Other Social Costs: Policy Analytics, LLC uses a range to estimate social costs other than crime and bankruptcy. This range is based upon scholarly literature. The estimated social costs to Indiana for fiscal year 2005 are between $19.02 million and $41.87 million in additional costs relating from job loss, unemployment, health costs, mental health costs, gambling treatment, and divorce.

Regulatory Costs: Indiana spent $3.34 million for casino regulation in fiscal year 2005.

Defining Benefits

Policy Analytics, LLC gathered and analyzed detailed player data in determining the benefits of casino gaming to the state of Indiana. This player data was analyzed in relation to player geography. Many of the results of this benefit-cost analysis seem to be a result of the placement of Indiana's riverboats. The location of Indiana's casinos, across from major population centers in other states, imports benefits in the form of economic activity and taxes into the state.

Analyzing the player data in relation to geography yields a total benefit of $815.85 million for fiscal year 2005. As can be seen in Table E.1, the benefit categories include distance consumer surplus and tax benefits, as well as local incentive payments and transactional constraints. Distance consumer surplus measures how much consumers would be willing to pay to be closer to a location offering a particular good or service. Distance consumer surplus depends on both the starting distance to the nearest casino and the final distance to the nearest casino.

Tax benefits as stated in Table E.1 are the net amounts of admission, wagering, property, and sales taxes, reduced by the displacement of lottery and charitable gaming and other sales taxes. This net change in tax revenue for Indiana is used to reduce other taxes on Indiana citizens and finance state and local government.

Distance Consumer Surplus: The total gain to Indiana citizens from the proximity to the recreation offered at casinos in the state is estimated at $52.62 million for fiscal year 2005.

Tax Benefits: The estimated net increase in Indiana's state and local taxes due to Indiana's regulatory and tax policies for fiscal year 2005 is $763.23 million.

Policy Analytics, LLC findings demonstrate a net result of having in casinos in the state provides a significant net benefit that outweighs the costs associated with local casinos. The net result, as seen in Table E.1, is estimated to be at a minimum $717.29 million.

Findings

1. The benefits to Indiana citizens from Indiana's policy of licensing and regulating riverboat casinos are significantly greater than the costs, providing greater than $700 million in net benefits.
2. Proximity to casinos results in higher rates of problem gambling, bankruptcy, and crime. This has policy implications for provision of problem gambling treatment programs—specifically resources to treat problem gambling should be geographically clustered near casino host communities.
3. Indiana citizens gain from enhanced proximity to the entertainment provided by casinos – a net benefit of $52.6 million.
4. The location of Indiana's casinos at or near the borders of the state serves both to increase the benefits, by importing taxes from out-of-state players; and acts to decrease the social costs by exporting the problems associated with out-of-state gamblers.

Recommendations for Further Study

This report is a summary benefit-cost analysis. While the work contained herein moves the body of analysis forward on Indiana's gambling economy, additional questions need to be addressed. The 1999 Indiana Gambling Impact Study Commission states on page 28, "Indiana should support ongoing research to monitor the fiscal, economic, and social impacts of legal and illegal gaming in the state."

This report would echo that statement and provide the following areas for possible inquiry:

A. Survey research, while costly, would assist in developing a better understanding of the specific geographies and demographics where problem and pathological gambling are most prevalent in Indiana.

B. Tax policy regarding casino gaming is often a creature of governmental emergency and legislative convenience. An exploration of different tax policy regimes should yield a better sense of how the state can provide efficiency to its casinos and maximize revenue yield for state and local governments.

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I. The Issue:

The Impact of Indiana Riverboat Casinos on Indiana Citizens and Communities

Legislative Council Resolution 05-01 charged the Indiana Gaming Research Department with studying the "impact of gaming on Indiana citizens and communities (HB 1342)" and the "effects of gambling on Indiana citizens (per letter from Rep. Welch)."[1] Representative Welch's letter requests that the Gaming Commission "include in its independent study the effects of gambling, specifically the levels of addiction; gambling's role in bankruptcies and real estate foreclosures; and social costs (crime, loss of work productivity, suicide, stress-related illness, divorce, domestic violence, etc.)"[2]

Policy Analytics, LLC was contracted to perform independent analysis for the Indiana Gaming Commission in response to this research request by the Indiana Legislative Council. Specifically, we were asked to study both the benefits and costs to Indiana citizens and communities of Indiana's ten riverboat casinos under the current regulatory and tax regime. This research report compares both the benefits and costs for Indiana's citizens and communities of Indiana's current regime of ten riverboat casinos with a hypothetical situation in which there are no riverboat casinos in Indiana. This comparison allows for estimates of the additional benefits and social costs to Indiana citizens and communities of the legal riverboat casino gambling in Indiana.

We estimate these additional benefits and costs for Indiana citizens and communities over a time frame of one year, fiscal year 2005. Fiscal year 2005 in Indiana started on July 1, 2004 and ended on June 30, 2005. Using this recent data aids in producing a timely and relevant report. Patterns of patronage and travel may have changed due to the introduction of dockside gaming in Indiana on July 1, 2002 and changes in policies in other states. Changes in taxation policy in Indiana and other states, particularly Illinois, may have caused important changes in the casino market. These changes may have changed the benefits and/or costs of Indiana riverboat casinos on the economic well-being of Indiana citizens.

It is important to clearly state the aims and scope of this research report at the outset. We estimate the changes in benefits and costs for Indiana between the current policy regime and an alternative policy regime in which Indiana did not have riverboat casinos, holding other factors constant. One important factor assumed to be unchanged during our analysis is the availability of other forms of legal gambling.

Other forms of legal gambling available within Indiana include the Hoosier lottery, charitable gambling, betting on horse racing at Indiana Downs, Hoosier Park, and five off-track betting facilities.[3] Casinos currently operate in other states including Illinois, Michigan, Nevada, and New Jersey. Each of the states bordering Indiana; Illinois,

[1] This Legislative Council Resolution was adopted on June 16, 2005.
[2] Letter from Representative Welch, May 19, 2005.
[3] Indiana Downs is located in Shelbyville. Hoosier Park is in Anderson. Off-track betting facilities are at Hoosier Park, Clarksville, Fort Wayne, Indianapolis, and Merrillville.

Michigan, Ohio, and Kentucky; operates a state lottery. Our results are not an estimate of the total costs and benefits of all forms of legal gambling in Indiana. We explicitly assume that Indiana policies towards these other forms of non-casino legal gambling are held constant. Finally, these results should not be viewed as the costs and benefits of legal gambling in other states because this study explicitly focuses on Indiana.

II. Benefit-Cost Methodology

Often policymakers need estimates of the real-world positive and negative effects of a government policy on people. Individuals have many roles in society as consumers, employees, business owners, taxpayers, beneficiaries of government services, neighbors, family members, etc. Benefit-cost analysis is used to examine the effects of a policy on the well-being of individual members of society. Policies may produce benefits to some individuals and costs to other individuals depending on their particular roles in society. In some instances a policy could produce net benefits for one group of people, say consumers, and net costs to another group of people, tax payers.

Benefits and costs from a government policy can be measured in terms of their effects on people in their roles as consumers (consumer surplus), producers (profits), taxpayers and beneficiaries of government spending (tax revenue), and people affected by external benefits or costs (positive and/or negative externalities). The general methods used by policy analysis to calculate benefits and costs are described in authoritative references on cost-benefit analysis such as Gramlich (1990) and Nas (1996). Literally thousands of government policies and projects have been analyzed using the tools of benefit-cost analysis.

> There are few things wholly evil or wholly good. Almost every thing, especially of government policy, is an inseparable compound of the two; so that our best judgment of the preponderance between them is continually demanded.
>
> Abraham Lincoln, 1848

A benefit-cost study compares total benefits to people with total costs to people. A listing of benefits and costs for Indiana citizens implicitly places equal weight on a dollar of value regardless of what group of Indiana residents receives that dollar of value. However, by describing what groups of Indiana residents receive a benefit or cost from a policy a benefit-cost study can provide policymakers with additional information on the distributional consequences of the policy. Policymakers can then use the results of a benefit-cost study to make value judgments based on the weights they place of different groups of individuals who receive benefits and costs.

Benefit-cost analysis must be careful to measure benefits that may not have an obvious price in the marketplace. Some benefits such as the amenity value of a recreational facility are somewhat difficult to measure. The willingness of consumers to pay for enhanced access to a recreational facility may be obtained using survey techniques. The amenity value of a recreational facility may be estimated from the travel costs incurred. External benefits and external costs require careful analysis to calculate properly. By their nature as benefits or costs imposed on other individuals outside of a marketplace transaction, externalities are usually not priced in a market. The literature on the external costs resulting from gambling has difficulty in placing dollar values on the social costs of problem and pathological gambling.

Care should be taken in benefit-cost analysis to enumerate all benefits and costs. However, a benefit-cost study must also avoid double-counting either a benefit or a cost. For example, increased tax revenue may properly be counted as benefit to society when it is a result of a policy. However, measuring both an increase in tax revenue and the value of the projects funded with the additional revenue would incorrectly overstate the benefit of a policy. The extra tax revenue or the value of the project should be counted, but not both. Care should be taken to derive the benefits to people and the costs to people of a policy from economic principles.

A Taxonomy of Benefits and Costs for Indiana

Grinols and Mustard (2001) and Grinols (2004) develop an exhaustive and mutually exclusive listing of the benefits and costs of a policy of licensing, regulating, and taxing regional casinos. We apply their methodology to questions of the effect of riverboat casinos on Indiana though a detailed and rigorous development of the benefits and costs of riverboat casinos to Indiana citizens. This rigor avoids confusion about what items are benefits or costs for Indiana. This rigorous methodology also avoids the problem of double-counting a benefit or cost. It also avoids the problem of needlessly omitting a benefit or cost to Indiana. This rigorous methodology also aids in correctly stating how each benefit or cost should be computed. This detailed methodology has been praised in a scholarly book review that was somewhat critical of other parts of Grinols' book. Gerstein writes:

"The book includes roughly 20 pages detailing a comprehensive economic calculus to assess the costs and benefits of casinos, along with a thorough critique of the tunnel-visioned 'economic impact' studies that are produced typically under the sponsorship of prospective casino owners, operators or economic development councils. These focus largely on enumerating the jobs needed to construct and operate the new facilities and the presumptive multiplier effects of those jobs on the local economy. Professor Grinols' calculus and critique comprise the core technical contributions of the book, and they merit discussion and dissemination by economists, sociologists, political scientists and policy analysts interested in gambling and comparable domains."[4]

We compare the sum of social welfare in Indiana between two situations. In scenario 1, ten riverboat casinos operate under the regulatory and tax regime Indiana adopted for fiscal year 2005. In scenario 0, Indiana does not license or permit any riverboat casinos to operate. While drawing on Grinols and Mustard's (2001) theoretical modeling and exposition, we modify their approach in order to focus on benefits and costs for Indiana because this study was directed to examine the "impact of gaming on Indiana citizens and communities." The study does not consider the effects of Indiana policy on individuals outside of Indiana.

Under both of these scenarios other forms of gambling are available to Indiana and non-Indiana citizens. Under both scenario 0 and scenario 1, Indiana and all states bordering

[4] Gerstein, Dean R. "Review of Gambling in America: Costs and Benefits." *Addiction*. Vol. 100. No. 1. 2005. p. 133.

Indiana operate state lotteries, casinos are available in Illinois and Michigan, charitable gambling, such as bingo is legally available, and wagering on horse racing is available in Indiana and other states. Under both scenarios individuals may engage in illegal wagering in person, by phone, or using the internet. This methodology produces a list of the additional benefits and costs summed over Indiana citizens of the ten riverboat casinos in Indiana by comparing scenario 0 with scenario 1.

This detailed economic model is developed in abbreviated form in Chapter II and in detail in Appendix A. Here we describe a summary of the benefits and costs of Indiana of moving from scenario 0 to scenario 1. The benefits and costs to Indiana citizens of Indiana's current regulatory and taxation policies of licensing ten riverboat casinos are listed below:

1. Net change in profits accruing to all Indiana residents measured across all businesses owned by Hoosiers.
2. Net increase in tax revenue measured across all Indiana tax revenue sources.
3. The gain for Indiana consumers from increased proximity to entertainment at a casino.
4. Capital gains for Indian citizens induced by new economic activity such as increased housing prices.
5. Consumer gains from relaxing transactional constraints on consumer choices.
6. The gain to Indiana consumers from changes in prices.
7. Net change in the cost of externalities on individuals in terms of real resources.

We describe each of these benefits and costs below. Some of the items in this list could theoretically be benefits or costs for Indiana citizens. For example, a net increase in tax revenue in Indiana would be a benefit of a policy. However, if there was a net reduction in tax revenue measured across all Indiana tax revenue sources; this would be a cost of the policy. Based on the later analysis in this report, items 1-4 will be net benefits for Indiana citizens. Items 5 and 6 are estimated to have zero effect on Indiana citizens. Item 7 represents increased costs to Indiana citizens. Section IV estimates benefits for Indiana in dollars from items 1-4 on this list and discusses why items 5 and 6 have no net effect on Indiana citizens. Section V describes social costs associated with gambling and estimate the dollar value of the net change in the costs of externalities.

There is an additional caveat when considering the costs and benefits. Many economic analyses utilize economic models of a region's economy to find the entire response to a particular investment or change in policy. In these studies, a model will estimate not only the initial change but all of the "spin-offs" that are associated with that change – at least until an equilibrium is reached. This analysis is focused on the "current year net benefits and costs" and not on the final or total economic impact. We believe that a complete economic impact modeling analysis would be beyond the scope of this project and would un-necessarily muddy the attempt undertaken here to connect both benefits and costs geographically.

1. Net change in profits accruing to all Indiana residents measured across all businesses owed by Hoosiers

The net change in profits accruing to all Indiana residents summed over all business sectors should be calculated. The reason that higher net profits accruing to Indiana citizens is a benefit is because these higher net profits allow Indiana citizens to purchase additional goods and services. This benefit is different than the profits of only the riverboat casino sector of the Indiana economy because we much sum the change in profits across all parts of the Indiana economy and because some of the profits from Indiana riverboat casinos accrue to non-Indiana residents. The introduction of riverboat casinos in Indiana causes profits of the riverboat casinos to change from zero under scenario 0 to over $170,000 million in equity cash flow to equity holders. For the most recent fiscal year available, FY 2003, total cash flow to equity holders was $172,787,000.[5]

2. Net increase in tax revenue measured across all Indiana tax revenue sources

This is the change in Indiana tax revenue from all sources. Higher net Indiana tax revenue allows Indiana citizens to benefit from lower taxes on other things and/or higher levels of public goods. Wagering taxes paid by the casinos are a measure of the gross tax revenue paid by the riverboat casino industry. The net change in all Indiana state and local government revenue sources will be lower than this gross amount. Section IV will calculate this net gain in Indiana tax revenue.

3. The gain for Indiana consumers from increased proximity to entertainment at a casino

One benefit to Indiana citizens of the current regime of riverboat casinos is a result of increased proximity to the entertainment available at casinos. This benefit may be less visible than the net change in profits and tax revenue, but it measures a direct benefit to Indiana consumers. All Indiana counties are within 250 miles of a casino under scenario 0, without Indiana riverboat casinos. In scenario 1, many Indiana residents are closer to the entertainment amenity of riverboat casinos. Distance consumer surplus is the amount of money Indiana citizens would be willing to pay to be closer to the entertainment offered at riverboat casinos. It is a measure of the value of increased consumption possibilities for Indiana consumers. Calculating this consumption value involves comparing the distance when the nearest casino in scenario 1 is closer compared to when the nearest casino is farther away in scenario 0, while remaining no worse off. This net benefit to Indiana citizens is the sum over all Indiana citizens of distance consumer surplus.

4. Capital gains for Indian citizens induced by new economic activity such as increased housing prices

[5] 2004 Annual Report of the Indiana Department of Gaming Research. Indiana Department of Gaming Research. p. 22.

This benefit is the increased value of things owned by Indiana citizens between scenarios. It is summed over the change in value for all Indiana citizens. For example if scenario 1 generates additional economic activity which increases the demand for housing and other real estate in Indiana, this capital gain is a net benefit for Indiana.

5. Consumer gains from relaxing non-price constraints on consumer choices

This is calculated as the change in utility of from relaxing non-price, transactional constraints summed over all Indiana citizens. The most important transactional constraints might be in labor markets. If individuals are willing to work for a reservation wage, but cannot find a job at that wage because of transactional barriers, they may suffer from involuntary unemployment. If there is a change in the sum over all Indiana citizens of transactional constraints in moving from scenario 0 to scenario 1, this change would be a benefit to Indiana citizens. In Section IV, this study examine the effects of the introduction of riverboat casinos on unemployment and whether there is any evidence on this possible benefit to Indiana citizens.

6. The gain for Indiana consumers from changes in prices

If the introduction of riverboat casinos in Indiana favorably changes the odds for Indiana residents this would be a reduction in prices. Lower prices increase the economic well-being of consumers. This is called consumer surplus. If Indiana riverboats are similar to other regional casinos in the odds of the games, then this term will be zero. In this case, all of the increases in the economic well-being of Indiana citizens as consumers will be in the form of distance consumer surplus discussed in item 3 above.

7. Net change in the cost of externalities on individuals in terms of real resources

If a scenario results in larger externalities so that more resources are used dealing with those externalities, then the cost of these resources are a net cost to Indiana. Social costs that would be incurred in scenario 1 but not in scenario 0 enter the calculus through this equation. It should be noted this cost is the net change in resources to deal with externalities generated by moving from scenario 0 to scenario 1 for Indiana. This cost to Indiana citizens is not the total costs of all real resources using in dealing with any gambling problem. It is only the real resources used to deal with gambling problems due to the riverboat casinos.

III. Background: Indiana's Ten Riverboat Casinos

Indiana legalized casino gaming on riverboat casinos with the passage of the Riverboat Gambling Act in 1993. The Act also established the Indiana Gaming Commission, vesting the commission with the authority to issue not more than eleven riverboat licenses in specified areas of the state and to regulate the operation of these riverboats. Casino Aztar, the first riverboat casino in Indiana, located in Evansville, opened at the end of 1995. There are currently a total of 10 riverboat casinos operating in Indiana. In addition, there could be an 11th license issued for casino operation in Orange County in the future.

Each of the riverboat casinos, the date on which gaming commenced and the location of the casino are listed in Table 3.1. The number of electronic gaming devices and table games for each casino are also displayed.

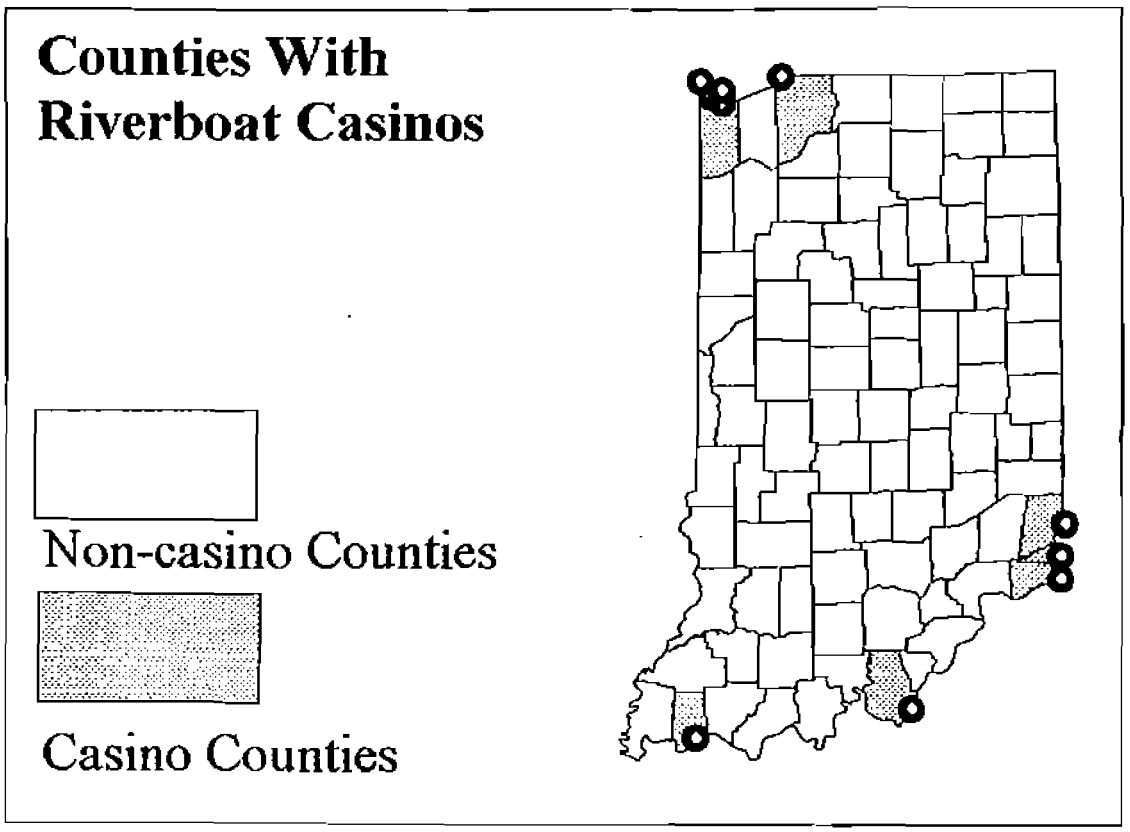
Table 3.1 - The 10 Riverboat Casinos in Indiana

Casino	City	County	Opening Date	Number of Electronic Gaming Devices	Number of Table Games	Restaurants	Hotel Rooms
Argosy	Lawrenceburg	Dearborn	12/30/92	2,396	87	5	300
Belterra	Belterra	Switzerland	10/26/96	1,607	56	7	608
Blue Chip	Michigan City	LaPorte	8/18/93	1,719	47	3	184
Caesars	Elizabeth	Harrison	11/19/94	2,349	141	8	503
Casino Aztar	Evansville	Vanderburgh	12/17/91	1,378	49	5	250
Grand Victoria	Rising Sun	Ohio	10/3/92	1,489	42	5	201
Horseshoe	Hammond	Lake	6/28/92	2,000	48	5	0
Majestic Star	Gary	Lake	6/10/92	1,615	48	3	0
Resorts	East Chicago	Lake	4/13/93	1,965	67	5	293
Trump	Gary	Lake	6/10/92	1,388	60	2	300

Source: 2005 Annual Report, Indiana Gaming Commission

The location of Indiana riverboat casinos are on the northern and southern edges of the state. The Horseshoe, Majestic Star, Resorts, and Trump Casinos in Lake County are very close to Chicago, Illinois. The Blue Chip Casino in Michigan City, LaPorte County is near the Indiana-Michigan border. Argosy Casino in Dearborn County, Grand Victoria in Ohio County, and Belterra Casino in Switzerland County are close to the Cincinnati, Ohio metropolitan area which spills over into Northern Kentucky. Caesars Casino in Harrison County is across the Ohio River from the Louisville, Kentucky metropolitan area. Casino Aztar in Vanderburgh County is across the Ohio River from Kentucky.

Figure 1: Counties with Riverboat Casinos



These locations of riverboat casinos in Indiana have important consequences for both the benefits and costs of casinos for Indiana. Regulations resulting in riverboat casinos locating along the Indiana state border across from major population centers in other states increase the likelihood that the patrons of these riverboat casinos will be from outside of Indiana. This increases the ability of Indiana to export a significant share of the tax burden from casino taxes to casino patrons from outside of Indiana.

While the locations of riverboat casinos in Indiana are close to major population centers outside of Indiana, Indiana riverboat casinos are more distant from the major Indiana population centers of Indianapolis and Fort Wayne. Locating riverboat casinos on the edges of Indiana may hold down patronage of casinos by Indiana citizens. This may result in relatively smaller consumption benefits for Indiana citizens from the consumption amenity of enhanced proximity to the entertainment offered at riverboat casinos. It may also hold down the social costs of riverboat casinos to Indiana by maximizing the distance between some major Indiana population centers and casinos.

Indiana's ten riverboat casinos generated total adjusted gross revenue (AGR) of $2.407 billion dollars in fiscal year 2005. AGR is the amount bet by casino patrons less the amount paid out in winnings to casino patrons. There were a total of 26,697,045 admissions to riverboat casinos in Indiana in fiscal year 2005. Table 3.2 adjusted gross revenue, admissions, and AGR per admission for each riverboat in FY 2005.

Table 3.2 - Adjusted Gross Revenue, Admissions, and AGR per Admissions for Indiana Riverboat Casinos, FY2005

Casino	AGR	Admissions	AGR per Admisssion
Argosy	$444,474,777	3,793,756	$117.16
Belterra	$156,245,649	1,993,382	$78.38
Blue Chip	$235,999,966	2,832,991	$83.30
Caesars	$296,806,131	3,385,362	$87.67
Casino Aztar	$122,114,386	1,552,809	$78.64
Grand Victoria	$148,843,458	1,788,402	$83.23
Horseshoe	$409,190,275	4,171,689	$98.09
Majestic Star	$147,798,378	1,761,203	$83.92
Resorts	$310,089,560	3,656,248	$84.81
Trump	$135,816,824	1,761,203	$77.12
Totals	$2,407,379,404	26,697,045	$90.17

Source: 2005 Annual Report, Indiana Gaming Commission

Firms operating riverboat casinos in Indiana are licensed by the Indiana Gaming Commission. Indiana limits entry into the casino industry as described above. Riverboat casinos in Indiana provide Indiana state and local governments with several tax sources. The state of Indiana taxes riverboat casinos based on adjusted gross revenue (AGR) and admissions. The wagering tax increases from 15% of AGR to a maximum 35% of AGR. Riverboat casinos with dockside gaming pay wagering taxes based on the following graduated schedule.

Table 3.3 - Indiana's Wagering Tax Rate Schedule

Adjusted Gross Revenue (AGR)	Wagering Tax Rate (As a Percentage of AGR)
$0-$25,000,000	15.0%
$25,000,00.01 - $50,000,000	20.0%
$50,000,00.01 - $75,000,000	25.0%
$75,000,000.01 - $150,000,000	30.0%
Over $150,000,000	35.0%

In fiscal year 2005, all ten operating riverboat casinos in Indiana chose to have dockside gaming and pay the graduated wagering tax. Riverboat casinos that choose to not have dockside gaming would pay a flat 22.5% of AGR in wagering taxes.

Each riverboat casino pays the state of Indiana a $3.00 admissions tax for each person admitted to the casino. A dollar of the admissions tax is distributed to the city in which the casino is located. A dollar of the admissions tax is also distributed to the county in which the casino is located. Sixty-five cents of the admission tax is distributed to the Indiana Horse Racing Commission. Fifteen cents of the admission tax is distributed to the Indiana State Fair Commission. Ten cents of the admission tax is distributed within the county hosting the riverboat to local county convention and visitors bureaus. Ten cents of the admission tax is distributed to the Indiana Division of Mental Health and Addiction.

Table 3.4 - Riverboat Casino Taxes in Indiana
[Dollars in Millions]

Casino	Wagering Tax FY 2005	Admission Tax FY 2005	Total Gaming Tax	Property Tax	Property Tax Year	Sales and Use Tax	Sales and Use Year	Local Incentive Payments FY 2005	Total Taxes and Incentive Payments
Argosy	$140.5	$11.4	$151.9	$2.0	2003	$1.35	2004	$40.4	$195.7
Belterra	$39.5	$6.0	$45.5	$1.1	2003	$0.98	2003	$0.8	$48.4
Blue Chip	$67.7	$8.5	$76.2	$1.4	2001	$0.92	2001	$4.6	$83.2
Caesars	$88.8	$10.2	$98.9	$1.2	2002	$1.26	2002	$16.5	$117.9
Casino Aztar	$29.0	$4.7	$33.7	$1.2	2003	$0.57	2002	$8.8	$44.2
Grand Victoria	$37.1	$5.4	$42.5	$0.6	2003	$0.86	2004	$2.4	$46.3
Horseshoe	$128.2	$12.5	$140.7	$1.8	2003	$0.78	2003	$24.0	$167.4
Majestic Star	$36.9	$5.3	$42.2	$1.6	2003	$0.28	2003	$4.4	$48.5
Resorts	$93.7	$11.0	$104.6	$3.8	2001	$0.50	2001	$12.1	$121.1
Trump	$33.3	$5.3	$38.6	$2.6	2002	$0.31	2003	$7.2	$48.7
Totals	$694.8	$80.1	$774.9	$17.4		$7.80		$121.3	$921.4

Source: 2005 Annual Report, Indiana Gaming Commission; CUPE Licensing Reports, various years

In addition to the wagering and admissions taxes, both of which are apply only to casinos, riverboats casinos also pay property taxes, sales taxes, food and beverage taxes, and inn-keeper taxes. The riverboat casinos also make local incentive payments to the local government as part of their application for a license. Examples of these incentives include a percentage of revenues paid directly to the local government; capital expenditures, including roads and sewage line repairs; and donations to community foundations and local nonprofit organizations. For FY 2005, incentive payments totaled $121,295,111. In addition to incentive payments casinos may also make charitable donations.

Table 3.4 shows the amount of each tax paid by each casino. Table 3.4 also displays the amount of local incentive payments. Data on wagering taxes, admission taxes, and incentive payments to localities are from fiscal year 2005. Unfortunately, the most recent data available on property tax payments and sales tax payments for each casino are a few years old. The property tax payments and sales tax payments for each riverboat casino are noted in Table 3.4. We were unable to obtain reliable data on food and beverage taxes and inn-keepers taxes. Beverage and inn-keeper taxes are of a much smaller magnitude than gaming taxes.

Total gaming taxes (wagering tax plus admission tax) were $774,874,180 in FY 2005. Total taxes paid by casinos plus local incentive payments are estimated to be $921,412,818 for fiscal year 2005.

Wages, Employment – In and Out of State

Table 3.5 shows employment for each casino. Unfortunately, employment data was unavailable for fiscal year 2005. The most recent data on employment and wages available was only for fiscal years 2001 to 2003. Total employment reported in the most recent year available was over 14,400. Total wages for the most recent year reported are over $508 million dollars. Average wages per employee for the most recent year available range from approximately $26,500 to $43,600.

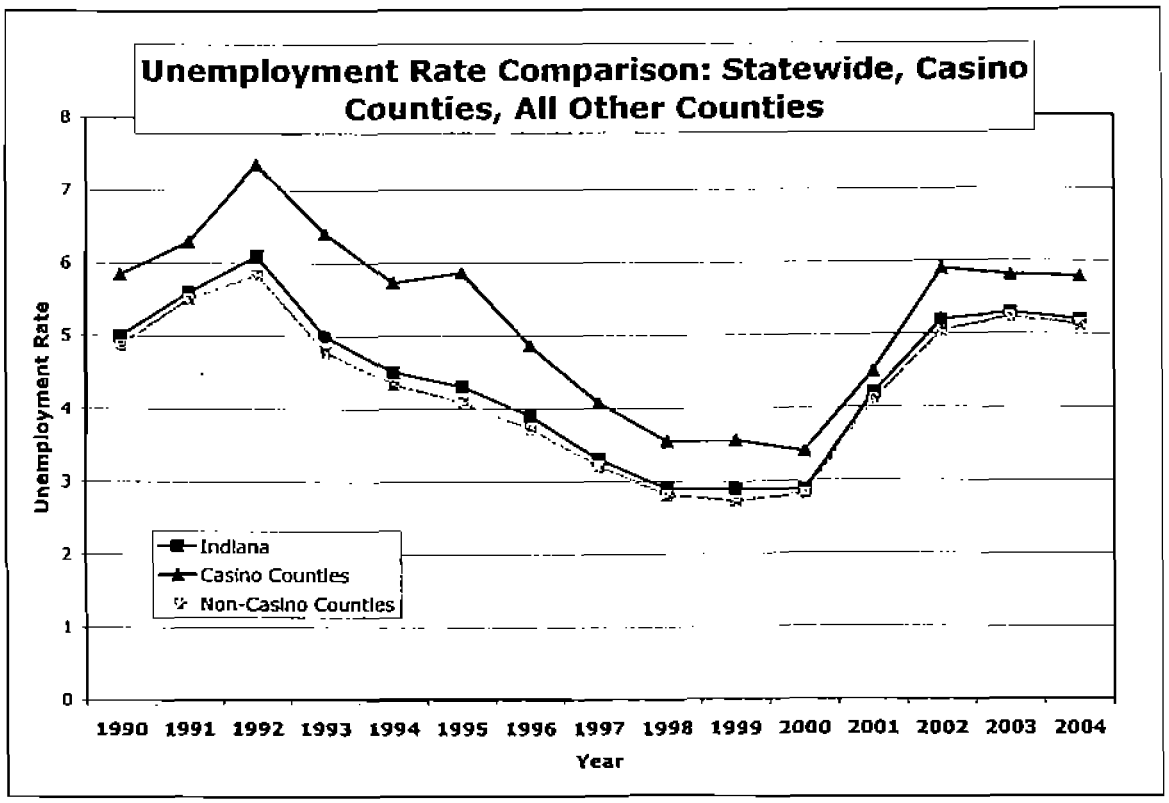
Table 3.5 also displays the percentage of employees that are minorities, the percentage of employees who reside in the same county as the riverboat casino, and the percentage of employees who reside in Indiana. The percentage of employees who are minorities in the most recent year reported ranges from 2% to 82%. The percentage of employees who resident in the county where they are employed at a riverboat casino range from 24% to 80% for the most recent year available. The percentage of employees who reside in Indiana ranges from 67% to 92%.

Table 3.5: - Employment at Riverboat Casinos
[Dollars in Millions]

Casino	Employees	Total Wages	Wages per Employee	Percentage of Minority Employees	Employee Percentage Resident in County	Employee Percentage within Indiana	Wage Year
Argosy	2,014	$87,820,074	$43,605	7%	40%	92%	2003
Belterra	1,133	$33,642,910	$29,694	7%	45%	67%	2003
Blue Chip	1,204	$38,021,950	$31,580	21%	60%	82%	2001
Caesars	2,099	$86,559,571	$41,238	14%	24%	67%	2002
Casino Aztar	1,174	$31,160,268	$26,542	17%	73%	91%	2002
Grand Victoria	996	$32,158,275	$32,287	2%	28%	82%	2003
Horseshoe	2,157	$73,093,404	$33,887	57%	64%	72%	2003
Majestic Star	960	$41,183,927	$42,900	69%	80%	84%	2003
Resorts	1,793	$57,562,060	$32,104	82%	76%	83%	2001
Trump	895	$26,834,992	$29,983	68%	77%	87%	2003
Total	14,425	$508,037,431	$35,219	34%	57%	81%	

Source: CUPE Licensing Reports, various years.

Figure 2: Unemployment Rate Comparison



Profits

The most recent available data reveals that in 2003 the owners of Indiana's ten riverboat casinos had an aggregate equity base of $1.006 billion invested in the Indiana boats. Owners of the ten riverboat casinos earned an after tax return of approximately 17.17% in 2003. Total cash flow to equity holders in 2003 was $172,787,000. The riverboat casinos are generally publicly traded stock corporations. Many of these publicly traded corporations own numerous gaming facilities in several states. The profits from the ten Indiana riverboat accrue to these stockholders on the basis of ownership not on the basis of place of residence.

Data on the share of equity in companies operating riverboat casinos is unavailable. However, the public at large probably owns a diversified portfolio of stocks including the stock of corporations operating riverboat casinos in Indiana. At most Indiana ownership of these corporations is proportional to Indiana's share of the United States population. It may be lower because of international ownership. Indiana's population was 2.12% of the total population of the United States in 2004. Using this percentage as a proxy of Indiana's share of ownership in corporations with profits from riverboat casinos operating in Indiana produces an estimated $3.67 million in Indiana casino profits accruing to Indiana citizens.[6]

[6] 2004 Annual Report of the Indiana Department of Gaming Research. Indiana Department of Gaming Research. p. 23.

Interstate Comparisons

Currently there are twelve states that allow non-Native American casino or riverboat gaming. These states are: Nevada, California, Colorado, South Dakota, Iowa, Missouri, Illinois, Indiana, Michigan, Louisiana, Mississippi, and New Jersey. States allowing Native American casino gaming include: Arizona, California, Colorado, Connecticut, Illinois, Iowa, Kansas, Michigan, Minnesota, Nebraska, New Mexico, New York, North Carolina, North Dakota, Oklahoma, Oregon, South Dakota, Washington, and Wisconsin.

Table 3.6 compares Adjusted Gross Revenue, total taxes, and the effective tax rates of several states for fiscal year 2005. Indiana ranks 3rd in total gaming taxes paid by casinos. Only Nevada and Illinois collected more gaming taxes in fiscal year 2005. Indiana ranked 4th in adjusted gross revenue in fiscal year 2005 behind only Nevada, Mississippi, and New Jersey. Indiana's effective tax rate is second only to Illinois. One reason that Indiana can sustain such high tax rates is because of limited entry into the Indiana riverboat casino market.

Indiana has limited entry because state law allows a maximum of eleven casinos and requires an extensive approval process for a proposed casino. Indiana's policy of licensing only a fixed number of riverboat casinos grants substantial market power to Indiana's riverboat casinos. This is in contrast to other states, including Nevada and Mississippi, which do not limit the total number of casinos. Indiana's policy likely leads to greater casino profitability because the ease of entry into the industry in those other states erode profits.

Table 3.6: - Comparison of Total Taxes and Effective Tax Rates; FY 2005

State	Total Taxes	AGR	Effective Tax Rate
Nevada	$904,122,239	$10,610,000,000	8.5%
Illinois	$797,404,000	$1,752,200,000	45.5%
Indiana	$774,874,181	$2,405,090,680	32.3%
New Jersey	$398,447,000	$4,807,242,000	8.3%
Missouri	$410,454,525	$1,509,325,405	27.2%
Louisiana	$335,194,917	$1,567,247,632	21.4%
Mississippi	$334,625,802	$2,796,572,526	12.0%
Iowa	$161,848,443	$745,998,062	21.7%

Source: Indiana Gaming Commission 2005 Annual Report, page 10.

Table 3.7 shows adjusted gross revenue per admission, gaming tax per square foot of casino space, and gaming taxes per admission. Indiana is second in each of these three categories behind Illinois. Indiana's gaming taxes of $1,529 per square foot of casino space and gaming tax of $29.02 per admission are significantly higher than the same statistics in Iowa, Louisiana, Mississippi, and Missouri.

Table 3.7: - Comparison of Gaming Revenue with Other States			
State	AGR per Admission	Gaming Taxes Per Square Foot	Gaming Taxes Per Admission
Illinois	$115.13	$2,809.64	$52.40
Indiana	$90.09	$1,529.41	$29.02
Iowa	$55.68	$641.23	$12.08
Louisiana	$55.36	$853.89	$11.84
Mississippi	$49.00	$231.05	$5.86
Missouri	$27.80	$586.20	$7.56

Source: 2005 Indiana Gaming Commission Annual Report and Policy Analytics Calculations

Riverboat Attendance and Revenue from within Indiana and Out-of-State

We gathered rated player patron data by zip code from Northwest Indiana and Ohio River riverboat casinos. This rated player data includes the number of admissions by zip code and the adjusted gross revenue (AGR) data by zip code. This is the first analysis for Indiana to use both categories of data to estimate the in-state share of admissions and the in-state share of AGR.

Data on the percentage of Indiana resident and non-resident rated players attending riverboat casinos can be combined with total turnstile admission data to estimate the number of turnstile admission attributable to Indiana residents and non-residents. Data on the percentage of AGR from Indiana resident and non-resident players can be combined with total AGR data to estimate the share of AGR attributable to Indiana residents and non-residents. The fifth and sixth columns estimate the number of admissions from within Indiana and the number of admissions from outside of Indiana for fiscal year 2005. The final two columns estimate the dollar amount of AGR that is from Indiana patrons and from non-Indiana patrons. The final row of the table reports weighted averages for all Indiana riverboat casinos. We weight the percentage of admissions from Indiana by the total attendance at each riverboat to obtain a weighted average. Similarly we weight the percentage of AGR from Indiana by the total AGR at each riverboat to obtain a weighted average. This estimate is that 34% of total turnstile admissions are from Indiana patrons. 66% of total turnstile admissions are from non-Indiana patrons. For those casinos where zip code level data was unavailable we used surveys of casino patrons from Riverboat Gambling in Indiana (Littlepage et al 1999).

Of a total AGR of $2,407,379,404 in FY 2005, $794,906,976 or 33% is estimated to be due to Indiana residents. $1,612,472,478, or 67% is estimated to be due to out-of-state patrons.

Table 3.8: - Riverboat Attendance and Revenue from Indiana Residents and Out-of-State Patrons, FY 2005

Casinos (Weighted Avg by Geographic Region)	Percent of Patrons from Indiana	Percent of AGR from Indiana Patrons	Estimated Number of Patrons from Indiana	Estimated Number of Patrons from Outside of Indiana	Estimated AGR from Indiana Patrons	Estimated AGR from Patrons Outside of Indiana
Northwest Region	31.74%	36.62%	4,170,257	8,968,488	$453,700,909	$785,194,094
Ohio River Boats	35.91%	29.20%	4,868,893	8,689,407	$341,206,067	$827,278,334
Statewide	33.86%	33.02%	9,039,150	17,657,895	$794,906,976	$1,612,472,428

Note: Percentage of Patrons is estimated from Casino provided player data, where necessary it was supplemented by survey data from Riverboat Gambling in Indiana: Analysis of Impacts (2004). AGR in-state is based on casino data, where necessary it is calculated from patron percent.

Indiana's Programs for Problem Gambling

Indiana created the Voluntary Exclusion Program (VEP) to address the problem of gambling addiction. The VEP program allows individuals to voluntarily ban themselves from all casino gaming areas in the state of Indiana either for 1 year, 5 years, or for life. An individual enrolls in the VEP program by completing a request form in the presence of a uniformed security guard at the casino or in the presence of an agent of the Indiana Gaming Commission. Participants in the VEP program may choose to extend the length of their ban, but cannot decrease the length of their ban. After the chosen time period has expired, an individual may be removed from the list by contacting the Indiana Gaming Commission. VEP members found in a casino will be removed from the casino and can be arrested for trespassing. Furthermore any jackpot won by a VEP member will be confiscated and given to the Indiana Gaming Commission in the form of a fine. [More information on problem gambling related programs is detailed in Chapter V of this report.]

The 1993 Indiana General Assembly passed a law requiring that ten cents of each admission tax to Indiana riverboats will be paid to the Indiana Family and Social Services Administration Division of Mental Health. In 1995, the Indiana General Assembly amended this law to allow these funds to be used for the prevention and treatment of addiction to drugs, alcohol, and compulsive gambling. These funds were used to establish a toll-free hotline to provide information about these addictions and 25% of the funds are required to be spent on the prevention and treatment of compulsive gambling. The FSSA defines a compulsive gambler as "a person who meets the criteria for Axis I diagnosis of pathological gambling in the DSM-IV and who continues to gamble despite repetitive harmful consequences. To be eligible for state funded treatment an individual must be at or below 200% of the federal poverty level guidelines and be clinically assessed by the Hoosier Assurance Plan Assessment Instrument (HAPI-A). There are currently twenty-one state endorsed providers of gambling treatment services."[7]

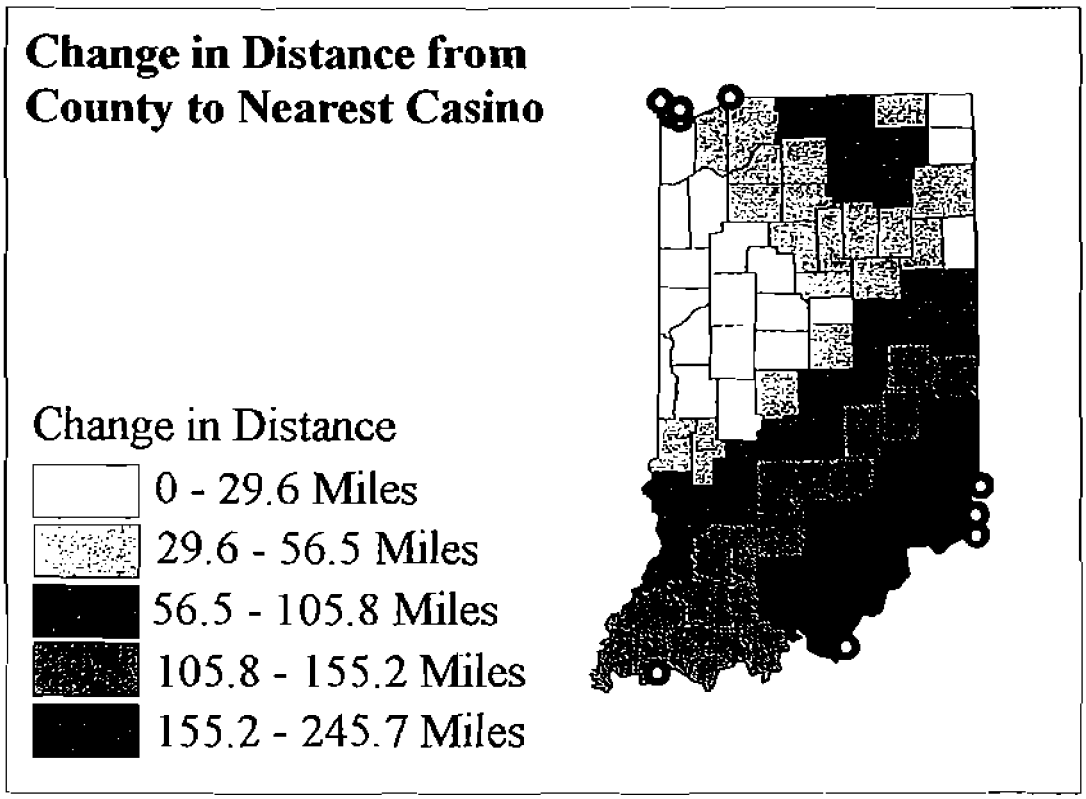
[7] (FSSA Website: http://www.in.gov/fssa/servicemental/gambling/initiatives.html)

IV. Analysis of Benefits

Enhanced Recreational Opportunities and Reduced Travel Cost to Casinos

One benefit to Indiana citizens of the current regime of riverboat casinos is increased proximity to the recreation available at casinos. Grinols (1999) in the Review of Regional Studies, a peer-reviewed journal edited at Oklahoma State University, considers how to measure benefits to individuals in their roles as consumers from closer proximity to casinos. Grinols (2004) describes the methodology he uses in this journal article and updates the estimates of distance consumer surplus. These consumption benefits to Indiana consumers from shorter travel to the entertainment offered at riverboat casino have received almost no attention in previous studies of the impact of casino gaming on Indiana citizens.

Figure 3: Change in Distance from County to Nearest Casino



Introducing any new recreational or entertainment facility can improve the economic well-being for individuals who patronize the new facility. These individuals are now closer to the new facility than the more distant facility that previously was the closest facility to them. Closer proximity to an entertainment facility reduces the costs of travel to that type of entertainment. These reduced travel costs are economic benefits to consumers. Distance consumer surplus measures how much consumers would be willing to pay to be closer to a location offering a particular good or service.

If the price of the entertainment was different at new entertainment facilities, the consumer benefits from a change in price would also have to be considered. Riverboat casinos in Indiana are very similar to riverboat and non-riverboat casinos in states near Indiana. In some cases riverboat casinos in Indiana are operated by the same firms that operate riverboat casinos in states bordering Indiana. There are no reasons to believe the introduction of Indiana riverboat casinos changes the odds or price of gaming for Indiana citizens compared to other regional casinos. Therefore the consumption benefits to Indiana citizens from the introduction of riverboat casinos are solely in the form of distance consumer surplus.

The introduction of riverboat casinos in Indiana reduces the distance to the nearest regional casino for Indiana residents in most counties. Table 4.1 shows the distance between the centroid of each county and the nearest casino outside of Indiana and the distance between the centroid of each county and the nearest casino within Indiana. Table 4.1 also displays the change in the distance to the nearest casino caused by the introduction of riverboat casinos in Indiana for each county. All counties in Indiana are within 250 miles of a casino located outside of Indiana. All Indiana counties are within 127 miles of a casino after the introduction of riverboat casinos in Indiana. The casino closest to Fountain, Parke, and Vermillion Counties is located in Illinois. In all other Indiana counties the closest casino is located within Indiana.

Grinols (2004) provides three methods for estimating the amount of distance consumer surplus. Each method produces very similar estimates of the dollar value of distance consumer surplus per adult. Table 4.1 shows Grinols' estimates of distance consumer surplus per adult. Distance consumer surplus depends on both the starting distance to the nearest casino and the final distance to the nearest casino. Intuitively, distance consumer surplus is higher when the initial distance to the nearest casino is great and the final distance to the nearest casino is small. For example, in Table 4.1, when the starting distance to the nearest casino is 50 miles and the final distance is 20 miles the distance consumer surplus is $8.03.

Table 4.1: - Distance Benefits per Adult Calculated by Grinols, 2004

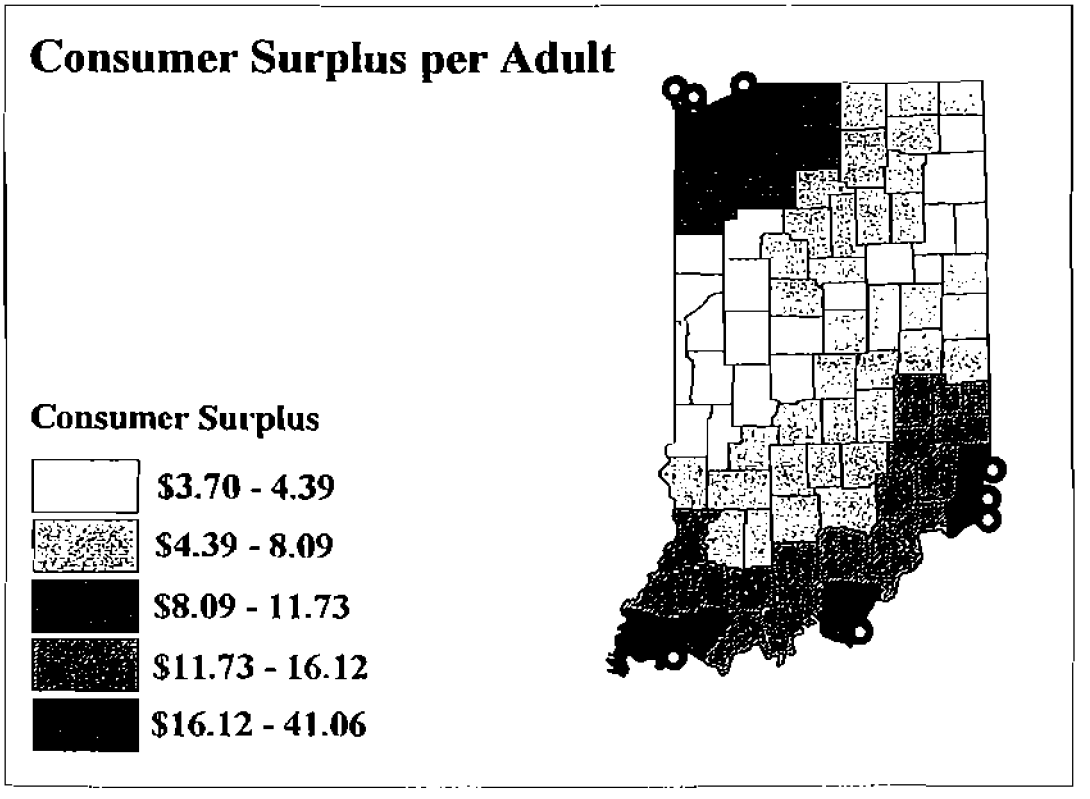
Distance	2000	1000	500	100	50	20	10	5
3000	$0.25	$0.84	$1.75	$6.14	$9.84	$17.87	$27.74	$42.81
2000	$0.00	$0.59	$1.50	$5.89	$9.59	$17.62	$27.49	$42.56
1000		$0.00	$0.91	$5.30	$9.00	$17.03	$26.90	$42.56
500			$0.00	$4.39	$8.09	$16.12	$25.99	$41.06
100				$0.00	$3.70	$11.73	$21.60	$36.67
50					$0.00	$8.03	$17.90	$32.97
20						$0.00	$9.87	$24.94
10							$0.00	$15.07
5								$0.00

Final Distance (miles)

Source: Grinols, *Gambling in America*, 2004, p.120.

We calculate distance consumer surplus per adult for each Indiana county – the results are shown in Appendix B. Distance consumer surplus per adult is based on the county's initial distance to the nearest casino and the final distance to the nearest casino. This is reported for each Indiana county in the second column of Appendix C and shown in the figure below.

Figure 4: Consumer Surplus per Adult



The number of adults aged 20 and older in each county for 2004 is reported in the third column of Appendix C. Unfortunately, we did not have recent data on the number of adults age 21 and older for each Indiana county. The total dollar value of distance consumer surplus for each county is reported in the final column of Appendix C. This is computed by multiplying the per adult distance consumer surplus by the population that is age 20 and over for each county. Total distance consumer surplus is greater in counties with larger populations and in counties that are now much closer to the nearest casino because of the introduction of Indiana riverboat casinos.

The total gain to Indiana citizens from the consumption amenity of enhanced proximity to the recreation offered at casinos is $52,622,176. The population-weighted average for all of Indiana is $11.65 per adult. This is a significantly lower estimate than Grinols (2004). His estimates of the national consumer surplus from the introduction of regional casinos were over $30 per adult.

These estimates are different because we consider different before and after policy regimes than Grinols. Grinols estimated distance consumer surplus by comparing an initial situation in which casinos were available only in Nevada and New Jersey to a counterfactual situation in which casinos were nearby all Americans. This makes the initial distance to a casino rather high in his analysis. This makes the final distance to a casino very small in his analysis.

The policy we consider is the introduction of riverboat casinos in Indiana. The geography of Indiana, the presence of casinos outside of Indiana, and the location of riverboat casinos on the northern and southern edges of Indiana result in a lower distance consumer surplus per adult for Indiana citizens. All Indiana counties are within 250 miles of a casino in another state. This makes the initial distance to a casino smaller. The strategic placement of riverboat casinos in Indiana on the Indiana state border results in the final distance to a casino being greater for some Indiana counties. This also reduces the distance consumer surplus benefit per adult for Indiana.

Net Increase in Indiana State and Local Taxes

The gross amount of taxes paid in admission taxes, wagering tax on the adjusted gross revenue (AGR), and payments to local government are publicly available information released by the Indiana Gaming Commission on a regular basis. Tax payments clearly act as a benefit either by reducing the tax burden on other citizens or by allowing the government to provide additional services. However, when performing a benefit-cost analysis only the net increase in taxes are considered as benefits.

Money spent at the riverboat casinos would have been spent elsewhere or saved if Indiana did not have riverboat casinos. Gambling is a form of entertainment and therefore the availability of gambling shifts spending from other forms of entertainment. This is the finding of Siegel, Anders, and Yacoub (1998) in a study of the effect of Native American casinos on tax revenues in Arizona. There casino spending displaced spending from retail, restaurants and bars, hotels and motels, and amusements. Siegel and Anders

find similar effects in a study of riverboat gambling in Missouri. These results demonstrate that a dollar spent at the casino would most likely have been spent on another form of entertainment or amusement where it would be taxed at Indiana's 6% sales tax rate.

Another important consideration is where the tax dollars are coming from. Some Indiana residents may now be spending entertainment dollars in Indiana casinos, dollars that would otherwise have been spent on casino gaming out of state. Indiana casinos also draw non-Indiana residents, thus capturing entertainment dollars that would otherwise have been spent outside Indiana. Surveys of casino patrons performed by the Center for Urban Policy and the Environment show that most out-of state casino visitors came to Indiana specifically to visit the casino. The surveys were performed at 8 of Indiana's riverboat casinos. A total of 1,443 patrons were surveyed. Surveyed patrons were asked the main reason for their traveling to the community in which the riverboat was docked. Ninety-two percent of riverboat patrons indicated that gambling was their primary reason for visiting the community. This evidence shows it is reasonable to assume that spending by non-Indiana residents would have been spent out of state if Indiana did not have riverboat gaming.

Based on the above set of assumptions, the net impact of wagering tax can be determined by first determining the amount of AGR attributable to Indiana and to non-Indiana residents. This is done using estimates of the percent of casino revenues from Indiana and non-Indiana residents. These estimates, where possible, are calculated using zip code level data on rated casino patrons. The wagering tax on the amount attributable to non-Indiana residents is a net benefit based on the assumption that the money wagered would have been spent outside Indiana in the absence of riverboat casinos. The wagering tax attributable to Indiana residents must be adjusted downward to account for the fact that the state would still have received 6% on the amount wagered if it were spent on other entertainment options in Indiana.

Admission tax is handled in the same way with the exception that the amount from Indiana and non-Indiana residents is determined using estimates of the fraction of trips to casinos from Indiana and non-Indiana residents. The fractions of trips by residents and non-residents were estimated, when possible, using zip code level data on rated casino patrons.

In State fiscal year 2005 gross wagering taxes were $694,783,045 and gross admissions taxes were $80,091,135 for a total of $774,874,180. Wagering taxes are progressive as casino AGR increases. The average wagering tax rate, calculated as wagering tax divided by adjusted gross revenues (AGR) is 28.86%. This is over 4 times the sales tax rate in Indiana. The above methodology arrives at a net increase in state taxes of $647,088,626 from wagering taxes. The net increase in state taxes due to admission tax is $78,464,088. The total net increase in state tax revenues due to wagering and admissions taxes is $725,552,714.

Each of the ten riverboat casinos has agreements with its host county to make incentive payments. Some of these payments are made on a fixed schedule while others vary as a function of the casino's AGR. These payments are essentially local taxes which the casino has agreed to pay in exchange for the pleasure of conducting business. These payments are included here as a benefit with a total value of $121 million.

Property taxes are also a tax benefit. A fraction of the property tax paid is for the value of the land and would be paid by some entity even if the riverboat casinos were not there. This fraction is estimated to be 10%. Thus the additional amount of property tax revenues due to the casinos is estimated at $15.66 million.

Riverboat casinos also pay sales tax and some pay local food and beverage taxes and inn keepers taxes. Sufficient data was not available to determine the net impact of these taxes. These other taxes are of a much smaller magnitude than gaming taxes.

State lotteries increasingly have faced additional competition from recent expansions of legal gaming. The rapid statewide growth in Hoosier Lottery sales in the early 1990s slowed during the introduction of riverboat casinos between 1995 and 2000. More recently the Hoosier lottery has experienced growth in sales and profits.

Spry (2003) in the 2003 Proceedings of the National Tax Association 96th Annual Conference on Taxation explored the relationship between the additional competition from the introduction of riverboat casinos in Indiana and lottery sales near riverboat casinos. Using a panel of zip code level data on lottery sales from 1995 to 2000, Spry finds that total Hoosier Lottery sales drop 22.5% within 25 miles of a newly opened riverboat casino. This reduction in total sales was driven primarily by reduced sales of instant games and the Hoosier Lotto game. Perhaps instant games are strongly and negatively affected by nearby operating riverboat casinos because casinos are very similar to the instant gratification that can be provided by quickly winning with a scratch-off ticket.

Elliott and Navin (2002) in Public Finance Review, a peer-reviewed journal edited at the Andrew Young School of Policy Studies, Georgia State University, estimated the average statewide reduction in state net lottery revenue associated with introducing riverboat casinos into states operating state lotteries. Elliott and Navin estimate that on average a one dollar increase in state casino tax revenue crowds out $0.83 in net lottery proceeds to the state.

Fink and Rork (2003) expand on Elliott and Navin's analysis of crowding-out by expanding their panel to 1988-2000 and addressing self-selection in the decisions to have casino gaming and the decision to have a state lottery. Fink and Rork estimate that on average a one dollar increase in state casino tax revenue crowds out $0.56 in net lottery proceeds to the state.

The location of Indiana's riverboat casinos on the southern and northern edges of the state suggests that there might be less crowding out of lottery profits in Indiana because the riverboat casinos are distant from much of Indiana's population. We regress annual lottery profits (net proceeds to Indiana) on a constant, time trend, and gambling taxes for fiscal years 1992-2004.

We estimate that a one dollar increase in gaming taxes in Indiana crowds out $0.13 in net Hoosier Lottery proceeds. We tested the hypothesis that this estimate was equal to the Fink and Rork national estimate of $0.56 of crowding out. We are able to reject the hypothesis that the degree of crowding out lottery profits for Indiana is as high as this national average found by Fink and Rork at the 95% confidence level. Therefore we use our estimate of the amount of crowding out. Applying the estimated crowding out of $0.13 of lottery proceeds for each dollar of gaming taxes to gaming tax revenue to Indiana for fiscal year 2005 we estimate that lottery profits are lower by $98,522,784 because of increased competition from riverboat casinos.

Spry and Voshell (2005) estimate that Indiana charitable gambling tax revenue is 46% lower in counties hosting or bordering counties hosting riverboat casinos. Charitable gambling in Indiana is lightly taxed. They estimate approximately $80.9 million is lost charitable gambling gross revenue, $9.65 million is in lost proceeds for charity, and approximately $763,000 is lost in reduced charitable gambling taxes and fees for the state of Indiana because of competition from riverboat casinos in these counties for fiscal year 2005. The total, combined loss of lottery profits and charitable gaming taxes is $99.28 million.

Riverboat casinos have a very large impact through gaming taxes, property taxes, and local incentive payments. They also reduce lottery profits and tax revenues from charitable gaming. The total benefit from all these sources is estimated at $763 million dollars.

Net Increase in Profits Accruing to Indiana Residents

The introduction of riverboat casinos in Indiana might theoretically change the total amount of profits accruing to Indiana citizens from all firms. This net change in profits accruing to Indiana citizens should be estimated across all Indiana firms, not just the riverboat casino sector of the economy.

The total, gross increase in profits from riverboat casinos located in Indiana accruing to Indiana citizens is $3.67 million for 2003. The reason that the gross profits accruing to Indiana citizens from the Indiana riverboat casino industry is so small is that many people around the world own shares in publicly traded gaming corporations. This figure is greater than the net change in profits accruing to Indiana citizens because it is only from one industry in the Indiana economy.

Other sectors of the Indiana economy may have reduced profits because they are negatively affected by casinos. The entertainment and recreation sectors of the economy

have reduced revenues due to casino expansion as documented in the research literature. Anders, Siegel and Yacoub (1998) and Siegel and Anders (1999) find displaced revenue in amusement and recreation spending due to increased casino spending.

Changes in Transactional Constraints

Changes in non-price, transactional constraints are a theoretical benefit for Indiana citizens in their participation in the labor market. Whether this theoretical benefit is a real-world benefit depends on the functioning of labor markets. If the introduction of riverboat casinos changes the functioning of the Indiana labor market by reducing unemployment caused by transactional constraints this would be a benefit. There is no evidence that introducing riverboat casinos in Indiana results in more liquid labor markets with lower long-run unemployment.

Figure 3.1 shows that the unemployment rate in casino and non-casino counties changes in the same manner with the business cycle. There does not appear to be any change in the long-run unemployment rate in casino counties compared to non-casino counties after the introduction of riverboat casinos in Indiana. Therefore this effect is estimated to be zero for Indiana citizens.

Grinols and Mustard (2001) point out a widespread misunderstanding about the benefits and costs of the expansion of any industry in a region. The jobs created in a location are not equal to the total benefits of a business expansion. Jobs produce labor income for workers but also costs to workers. The cost of any job to any employee is the cost of time and effort that the individual trades to an employer for compensation.

V. Analysis of Costs

There are two different ways to estimate the external costs of gambling that have been used in peer-reviewed journals articles. One method is to estimate the percentage of the population that is problem or pathological gamblers through a survey. NORC at the University of Chicago used this approach for their report to the National Gambling Impact Study. (Gerstein, et. al., 1999) This approach then combines the resulting population estimates with estimates on the costs per pathological or problem gambler from the problem gambling literature. This approach seeks to estimate the social costs of a policy change from prohibition of all forms of gambling to gambling legalization, including lotteries and casinos.

Following this approach exactly is not appropriate for this research project, because it seeks to estimate the benefits and costs from Indiana's current riverboat policy regime. Under the alternative policy regime there would still be external costs to Indiana residents from casino gambling in other states, charitable gambling, lotteries, and illegal gambling. An estimate of the marginal, incremental number of additional pathological or problem gamblers due to Indiana's current policy regime would be required to use a modification of this approach. There is some evidence from other states, such as Iowa, on the change in the number of pathological or problem gamblers associated with increased availability of gambling. Indiana data on calls to the problem gambling help-line by geographical location helps identify the geographical relationship between proximity to a riverboat casino and the fraction of the population contacting problem gambling organizations.

The second approach uses a large dataset of demographic data by geographical area for years before and after a change in policy regime to estimate the effects of the policy change. An idea research design would utilize a panel of county-level data for the entire country for many years during which casino expanded into additional counties. A large data set reduces sampling variation. Demographic data allows researchers to control for many factors besides the opening of a casino. Panel data allows researchers to control for the idiosyncrasies of each county. This approach estimates the treatment effect of interest to policymakers in Indiana: the incremental effect of Indiana riverboat casinos on external costs to Hoosiers. A review of the literature can provide strong statistical evidence of the effect of casino openings on crime and bankruptcy. Evidence on other potential social costs is not available using this methodology in the current literature.

Problem and Pathological Gambling: Background

According to The Diagnostic and Statistical Manual of the American Psychiatric Association (DSM-IV, 1994), "the essential feature of pathological gambling is persistent and recurrent maladaptive gambling behavior that disrupts personal, family, or vocational pursuits."

The DSM-IV Criteria for determining pathological gambling are:

1. Preoccupation: Individual is preoccupied with gambling.
2. Tolerance: Needs to gamble with increasing amounts of money to achieve the desired excitement.
3. Withdrawal: Is restless or irritable when trying to stop or cut down on gambling.
4. Escape: Gambles as a way of escaping from problems or relieving a dysphoric mood.
5. Chasing: After losing money gambling, often returns another day to get even.
6. Lying: Lies to family members, therapists, or others to conceal the extent of involvement with gambling.
7. Loss of control: Has repeated and unsuccessful efforts to control, cut back, or stop gambling.
8. Illegal acts: Has committed illegal acts such as forgery, fraud, theft, or embezzlement to finance gambling.
9. Risked significant relationship: Has jeopardized or lost a significant relationship, job, or educational or career opportunity because of gambling.
10. Bailout: Relies on others to provide money to relive a desperate financial situation.

An individual must exhibit a minimum of five of the above DSM-IV characteristics to be classified as a pathological gambler. An individual who reports three or four of the DSM-IV characteristics is classified as a problem gambler. An at-risk gambler is one who reports one or two of the DSM-IV criteria. The above definitions are used in epidemiological studies. However, problem gambling is also widely used as a term to refer to individuals who experience difficulties with their gambling (Volberg 2001). This section of the report uses the formal definitions of at-risk, problem, and pathological gambler.

In reporting the prevalence of problem and pathological gambling the proportion of the population currently exhibiting these behaviors is used to determine the past year prevalence of problem and pathological gambling. The proportion of the population who either have in the past or currently exhibit these behaviors is used to determine the lifetime proportion of problem or pathological gamblers. This allows one to distinguish between individuals who currently exhibit problem or pathological gambling behavior and those who have exhibited these behaviors in the past.

Table 5.0: - Critieria for Classifying Respondents to the National Gambling Problem Survey

Classification	Criteria / Response
Non-Gambler	Has Never Gambled
Low risk gambler	Gambled, but never lost more than $100 in a single day or year
	Lost more than $100 in a single day or year but reported no DSM-IV criteria
If Respondent Answers – Lost more than $100 in a single day or year AND Reported	
At-Risk Gambler	One or two DSM-IV criteria
Problem gambler	Three or four DSM-IV criteria
Pathological gambler	Five or more DSM-IV criteria

Source: Gerstein, et.al., *Gambling Behavior and Impact Study* (1999).

In 1988, the third edition of the Diagnostic and Statistical Manual (DSM-III) was published. This version of the DSM featured a systematic approach to psychiatric diagnosis. DSM-III included diagnostic criteria for problem gambling. This set of criteria was used to develop the South Oaks Gambling Screen (SOGS). SOGS was the standard tool in the field until the mid 1990s when the revised DSM-IV criteria where published.

The NORC Gambling Impact and Behavior Study (1999) implements the DSM-IV criteria by creating a screen, the NODS screen. The NODS screen consists of 17 lifetime items and 17 corresponding past-year items. Each of the items can be matched up with one of the 10 criteria on the DSM-IV list. In the national survey, NORC chose to administer the NODS only to those respondents who admitted to ever losing $100 or more either in a single day of gambling or over an entire year of gambling at some time in their life. The NODS screen classifies individuals as low-risk gamblers, at-risk gamblers, problem gamblers, and pathological gamblers. Table 5.0 illustrates the classification criteria respondents. NODS only identifies potential problem gamblers, clinical diagnosis is necessary for a conclusive diagnosis. Despite this fact, this report will follow the terminology used in the NORC study and refer to those diagnosed as probable pathological gamblers as pathological gambles.

Prevalence of Pathological and Problem Gamblers

The NORC Study (1999) uses a RDD (Random Digit Dialing) survey combined with a Patron Survey of individuals at gaming facilities to estimate the prevalence of problem and pathological gambling in the US population. The NORC study reports that 1.5% of the population can be classified as lifetime problem gamblers and 0.7% can be classified as previous year problem gamblers. Furthermore, 1.2% of the population can be classified as lifetime pathological gamblers and 0.6% are past year problem gamblers. Thus the prevalence of lifetime problem and pathological gamblers is 2.7% and the prevalence of past year problem and pathological gamblers is 1.3%.

Table 5.1: - Estimated Percentages of Adult Pathological and Problem Gamblers; National Studies

Category	University of Michigan (1976)	Harvard Met-analysis (1997)	National Research Council (1998)	National Opinion Research Center (1998)
Lifetime **Pathological** Gamblers	0.8%	1.6%	1.5%	1.2%
Past Year **Pathological** Gamblers	NA	1.1%	0.9%	0.6%
Lifetime **Problem** Gamblers	2.3%	3.9%	3.9%	1.5%
Past Year **Problem** Gamblers	NA	2.8%	2.0%	0.7%

Source: National Gambling Impact Study Commission Final Report (1999)

A Harvard meta-analysis (Volberg 2001) of 120 North American problem gambling studies finds a prevalence rate of 1.6% for lifetime pathological gamblers and a rate of 1.14% for past year pathological gamblers. The prevalence rate for lifetime problem gamblers is 3.85% and the rate for past year problem gamblers is 2.8%. The Harvard study also finds that prevalence rates in studies from 1994 to 1996 are significantly higher than prevalence rates in studies from 1975 to 1993. This change corresponds roughly with the increase in the availability of gambling opportunities. The NORC and Harvard studies find that there are higher incidences of pathological and problem gambling among active gamblers. These results are show in Table 5.2.

Table 5.2: - Prevalence of Pathological and Problem Gamblers Combined

Study:	JAMA	NORC
Active Casino Gamblers	6.4%	4.6%
Active Lottery Gamblers	5.2%	3.6%
Active Racetrack Gamblers	25.0%	14.0%

Source: Gerstein, et.al., *Gambling Behavior and Impact Study* (1999), and Potenza, Kosten, and Rounsaville, Pathological Gambling, *Journal of the American Medical Association* (2001)

The NORC study also reports the prevalence of pathological and problem gambling for several demographic groups. Males are more likely to be problem and pathological gamblers than females. African-Americans exhibit higher rates of past-year and lifetime problem and pathological gambling than do Whites. While Hispanics have lower rates of problem and pathological gambling compared to Whites.

Table 5.3: - Prevalence of Lifetime and Past-Year Gambing Problems by Demographics

Demographic Characteristic	Problem Gamblers		Pathological Gamblers	
	Life	Year	Life	Year
Gender				
Male	2.0%	0.9%	1.7%	0.8%
Female	1.1%	0.6%	0.8%	0.3%
Race				
White	1.4%	0.6%	1.0%	0.5%
Black	2.7%	1.7%	3.2%	1.5%
Hispanic	0.9%	0.7%	0.5%	0.1%
Other	1.2%	0.5%	0.9%	0.4%

Source: Gerstein, et.al., *Gambling Behavior and Impact Study* (1999).

In 1998, the Gambling Studies Unit of Louisiana State University Medical Center in Shreveport performed a study to estimate the prevalence of problem and pathological gambling among Indiana residents. The Indiana study finds a lifetime level of pathological gambling for Indiana residents of 0.8%, a rate that is significantly different from the Harvard Medical School Division on Addictions adult lifetime gambling estimate of 1.6%. The lifetime problem gambling rate for Indiana residents of 5.3%, while higher than the Harvard adult lifetime estimate of 3.85%, is not statistically different from that number.

The Indiana study also takes a cursory look at the social cost of gambling. The study reports that level 1 gamblers reported significantly (at the 5% level) less lost time at work than level 2 and 3 gamblers. Only 1.4% of level 1 gamblers reported problems with drugs or alcohol in the past year, while 5.2% of level 2 and 13.6% of level 3 gamblers reported these problems. Level 3 gamblers also sought more counseling, inpatient treatment, and participated more in self-help groups. These findings should be interpreted with caution due to the small sample size (155 level 2 gamblers, 22 level 3 gamblers), but they do suggest a higher incidence of negative outcomes for problem and pathological gamblers (level 2 and 3, respectively).

Analysis of Indiana's Voluntary Exclusion Program

Since July 1, 2004, the ten riverboat casinos operating in Indiana have participated in a Voluntary Exclusion Program (VEP). Individuals can self exclude from all Indiana riverboats by filing a single form witnessed by an Indiana Gaming Commission agent. The VEP allows individuals to sign up at any Indiana casino or the offices of the Indiana

Gaming Commission in Indianapolis to be excluded for one year, five years, or a lifetime. "It is the responsibility of the VEP participant to stay away from gaming areas of the casinos and not the responsibility of the IGC or gaming facility."[8] Data on enrollment in VEP as of December 29, 2005 was provided by the Indiana Gaming Commission. Enrollment in VEP does not require an individual to be classified as a problem or pathological gambler according to a diagnostic screen. However, enrollment in VEP strongly suggests that an individual personally believes that he has a problem with gambling at casinos.

Table 5.4: Location of VEP Registration

Casino	Count	Percent of Total
Argosy	143	13.9%
Aztar	27	2.6%
Belterra	47	4.6%
Blue Chip	65	6.3%
Caesars	196	19.0%
Grand Victoria	62	6.0%
Horseshoe	180	17.5%
IGC Office	6	0.6%
Majestic Star	80	7.8%
Resorts	125	12.1%
Trump	100	9.7%
Total	1,031	

Source: Indiana Gaming Commission. "VEP All Members Summary." December 29, 2005.

Table 5.4 shows the location of individuals registered with VEP. Registration in the VEP occurred at a riverboat casino for 99.42% of program members. The remaining 6 individuals registered in VEP at the Indianapolis offices of the Indiana Gaming Commission.

Table 5.5: - VEP Participation by Duration of Exclusion

Exclusion Period	Count	Percent
One Year	328	32%
Five Years	214	21%
Life	489	47%
Total	1,031	100%

Source. Indiana Gaming Commission. "VEP All Members Summary." December 29, 2005

[8] 2005 Annual Report of the Indiana Gaming Commission. p. 14.

Table 5.5 shows the number of individuals enrolled in VEP for one year, five years, and life. Males are 52.38 percent of VEP participants. Females are 47.62% of VEP participants. Table 5.6 displays the age distribution of VEP members. Senior citizens are 3.2% of participants in VEP.

Table 5.6: VEP Participation by Age Range

Age Range	Count	Percent
21 To 25	40	3.88%
26 To 30	87	8.44%
31 To 35	122	11.83%
36 To 40	138	13.39%
41 To 45	162	15.71%
46 To 50	173	16.78%
51 To 55	145	14.06%
56 To 60	85	8.24%
61 To 65	44	4.27%
66 To 70	20	1.94%
71 To 75	9	0.87%
Above 75	4	0.39%

Source: Indiana Gaming Commission. "VEP All Members Summary." December 29, 2005.

Table 5.7 shows the number of individuals in the VEP program by state. 29.58% of individuals in the VEP program are Indiana residents. Illinois has more VEP participants than any other state. 35.11% of VEP participants are from Illinois. 18.04% of VEP participants are from Kentucky. 14.16% of VEP participants are from Ohio. All other VEP participants are from one of the following states: Michigan, Tennessee, Wisconsin, Missouri, Texas, Georgia, and California.

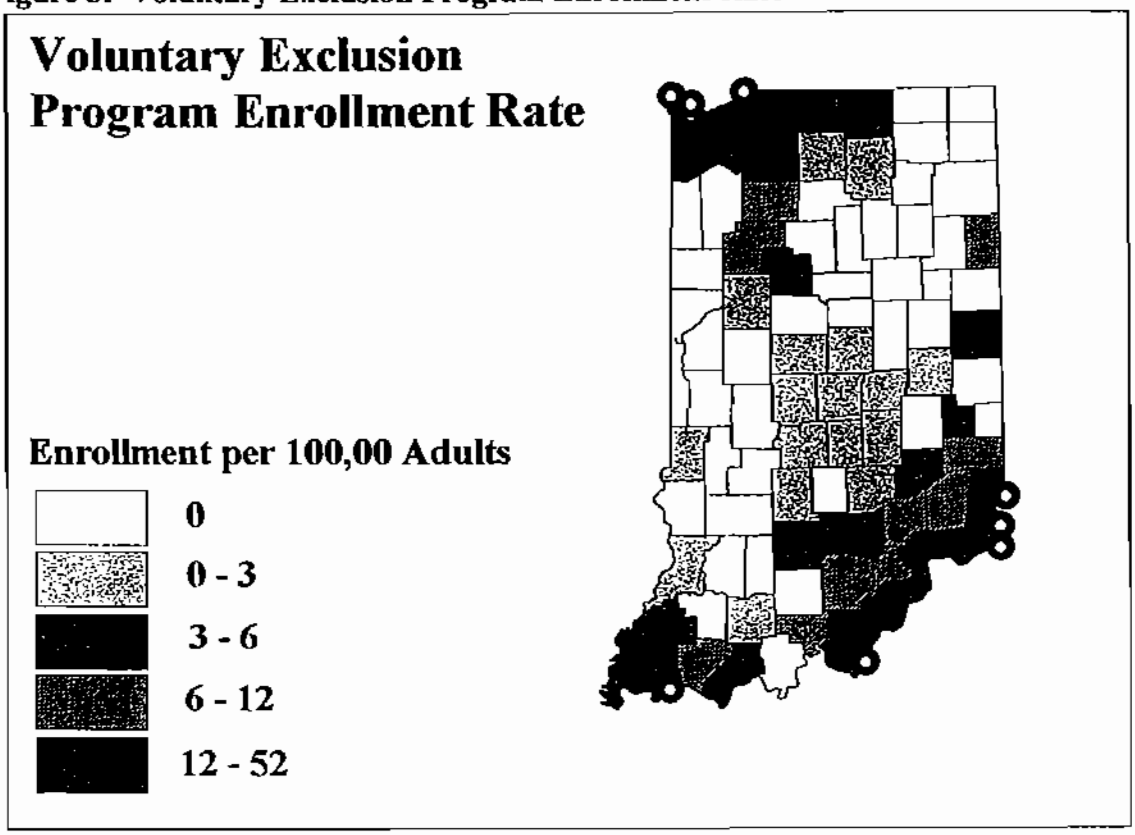
Table 5.7: VEP Participation by State

State	Count	Percent
Illinois	362	35.11%
Indiana	305	29.58%
Kentucky	186	18.04%
Ohio	146	14.16%
Michigan	16	1.55%
Tennessee	7	0.68%
Wisconsin	4	0.39%
Missouri	2	0.19%
Texas	1	0.10%
Georgia	1	0.10%
California	1	0.10%
Total	1,031	100.00%

Source: Indiana Gaming Commission. "VEP All Members Summary." December 29, 2005.

Appendix D shows show the location of VEP participants by Indiana county. [In Figure 5 below, the number of VEP participants by county for Indiana is shown geographically.] Lake County, which has 99 residents enrolled in the VEP, has the largest number of VEP members of any Indiana county. 31.23% of Indiana residents enrolled in VEP live in Lake County. Porter County has 31 VEP participants or 9.78% of total Indiana VEP members.

Figure 5: Voluntary Exclusion Program Enrollment Rate

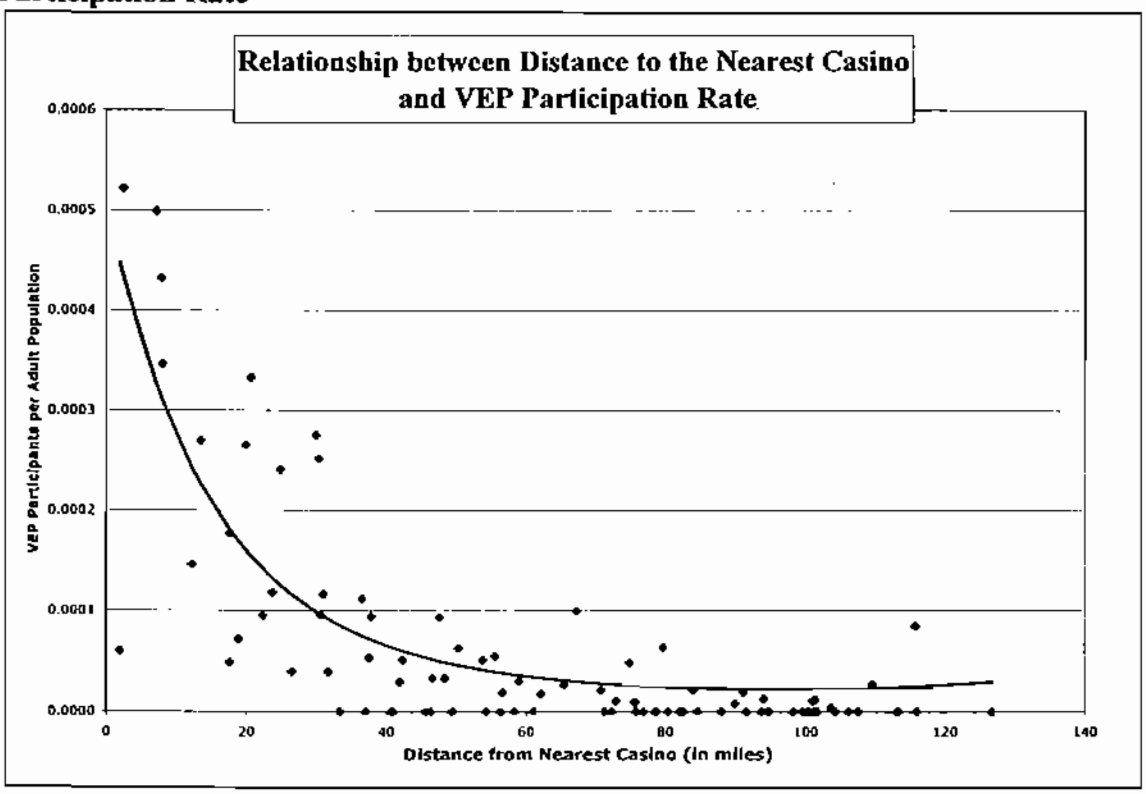


The enrollment rates in VEP as a percentage of the adult population are very low. The highest percentage of the adult population enrolled in the VEP in Indiana is in Switzerland County, where 0.0522% of the adult population is in the VEP. In Dearborn County 0.04992% of the adult population is in the VEP. In Ohio County, two individuals, or 0.04323% of the adult population is enrolled in VEP. Forty-one Indiana counties have no residents enrolled in the VEP.

Regression Analysis:
The Effects of Distance to a Casino on VEP Enrollment Per Adult

We statistically test whether the distance to the nearest casino is related to the enrollment rate in the VEP per adult. We combined data on the number of participants in the VEP by county for Indiana from Table I with data on the distance to the nearest casino. Distances were calculated between the centroid of each county and the location of the nearest riverboat casino. We use data from all 92 Indiana counties regarding the VEP enrollment rate per adult and distance to the nearest casino.

Figure 6: Relationship between Distance to the Nearest Casino and VEP Participation Rate



VEP enrollment per adult, the dependant variable is a ratio bounded between 0 and 1. We use a logistic transformation of VEP participants per adult per county because of the lower bound at zero. We regress the Cox logistic transformation[9] of VEP enrollment per adult on a constant, distance, and distance squared. White standard errors adjusted for heteroscedasticity are reported. The results of this regression are reported in Table 5.8.

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[9] Cox suggests estimating the following equation: $\log\left(\frac{\hat{p}_i + (2n_i)^{-1}}{1 - \hat{p}_i + (2n_i)^{-1}}\right) = \beta' x_i$ where $\hat{p}_i$ is the empirical probability of and n_i is the number of observations. See Maddala (1983) and Cox (1970) for theoretical treatments.

Table 5.8: - Statistics for Figure 6: - Dependent Variable is VEP Enrollment per Adult

Statistic	Coefficient	Standard Error	t-statistic	P-value
Constant	-7.58638	0.30753	-24.6688	0
Distance to Nearest Casino	-0.06443	0.0108	-5.96488	0
Distance Squared	0.00033	0.00008	4.06595	0.0001
R-squared	0.60803	F-statistic	69.03	
		P-value for F-		
Adjusted R-squared	0.59923	statistic	0	

The regression results reveal a strong relationship between proximity to a casino and higher VEP enrollment rates. Distance to the nearest casino has a strong, statistically significant effect on VEP enrollment rates per adult for Indiana counties. The F-statistic testing the joint hypothesis that distance and distance squared have zero effect on VEP enrollment rates is 69. The probability-value for this F-statistic is 0.00000. This statistic means that there is only a miniscule probability that the estimated relationship between VEP enrollment rates and distance and distance squared occurs by chance. The R-squared is 0.61. This means that 61 percent of the variation in VEP enrollment rates by county in Indiana is explained by the variables included in the regression analysis. The explanatory power of this regression equation is fairly high for an equation estimated with cross-section data.

Distance to the nearest casino has a negative coefficient. The t-statistic for this variable is 5.94, which indicates that there is an extremely small probability that this relationship occurred by chance. Distance to the nearest casino squared has a positive coefficient. The t-statistic for this variable is 4.07, which also indicates that there is an extremely small probability that this relationship occurred by chance. These results indicate that the VEP enrollment rate per adult declines as distance to the nearest casino increases. Importantly, this decline in VEP enrollment rates is steeper near casinos. This decline in VEP enrollment rates per county becomes flatters at greater distances from the nearest casino. It is important to keep in mind that the fitted model is quadratic and is only a local approximation of the relationship between distance and VEP enrollment. This model should not be used to make predictions of VEP enrollment at distances greater than 130 miles from a casino.

Figure 5.1 plots the relationship between distance to the nearest casino and the per adult enrollment rate in the VEP for Indiana counties. The distance to the nearest casino is displayed on the horizontal axis. The rate of enrollment in the VEP is on the vertical axis. Actual observations for Indiana counties are shown as blue diamonds in the scatter-plot. The predicted non-linear relationship between distance and VEP enrollment rates from the regression is displayed as a black line. This shows a non-linear negative relationship between distance to the nearest casino and VEP enrollment per adult. VEP enrollment per adult initially declines quickly as distance to the nearest casino increases.

The decline in VEP enrollment slows as distance from the nearest casino increases. The estimated VEP enrollment per adult tends to asymptote to zero as distance becomes large.

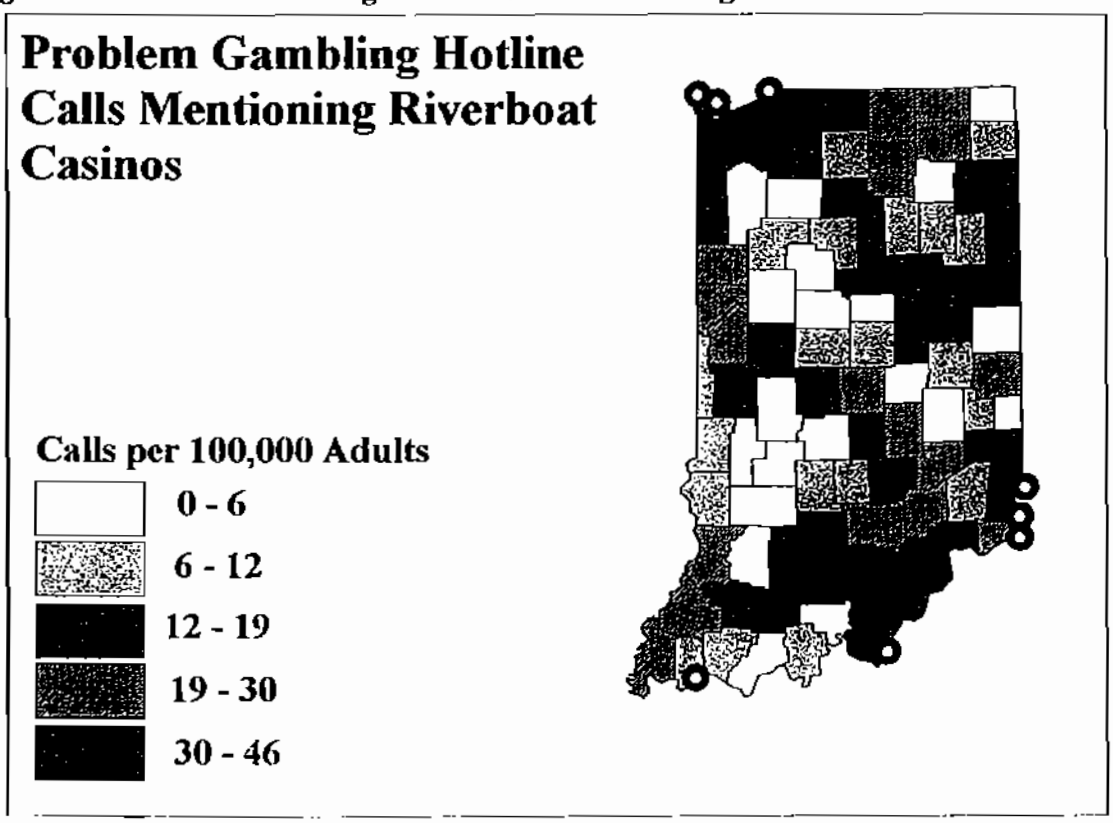
These results should be carefully interpreted. The rate of enrollment in the Voluntary Exclusion Program is not an estimate of the rate of problem or pathological gamblers in Indiana. The Voluntary Exclusion Program only applies to riverboat casinos in Indiana. Therefore analysis of data on VEP enrollment per adult provides no information about problem or pathological gambling involving any other form of gambling, legal or illegal. Enrollment in VEP does not require an individual to be classified as a problem or pathological gambler according to a clinical diagnostic screen. However enrollment in VEP strongly suggests that the enrollee believes that they have a problem with gambling at casinos. Enrollment rates in VEP increase when the nearest casino is closer. This suggests that proximity to casinos is associated with higher rates of problems with gambling.

Analysis of Calls to the Indiana Council on Problem Gambling Helpline

The Indiana Council on Problem Gambling (ICPG) operates a telephone helpline for individuals who have questions about problem gambling. The phone number is: (800) 994-8448. According to the website of the ICPG, "if you are assessed as having a gambling problem, you will be referred to a State supported treatment provider."[10] The problem gambling helpline phone number is displayed on lottery tickets, riverboat admission tickets, and displayed in riverboat casinos. Therefore, it is likely that the percentages of calls to the helpline relating to a particular type of gaming is not a useful random sample of the actual percentage of problem or pathological gamblers who engage in a particular type or types of gaming.

Problem or pathological gamblers who engage in illegal gambling may be reluctant to contact the helpline because of fears of the legal consequences. Calls to the ICPG that are classified as an intake may or may not refer to individuals who would be classified as problem or pathological gamblers by a diagnostic screen. However, individuals placing a call to the ICPG helpline are personally concerned that they or somebody they know has a problem with gambling.

Figure 7: Problem Gambling Hotline Calls Mentioning Riverboat Casinos



[10] http://www.indianaproblemgambling.org/

In fiscal year 2005, the telephone helpline received 4,229 calls. 2,960 phone calls were non-intakes. Non-intakes occur when the Indiana Council on Problem Gambling telephone helpline received requests for information unrelated to problem gambling.

Callers may ask questions about current wining lottery numbers, locations of riverboat casinos, locations of racetracks, etc. During fiscal year 2005, 1,269 phone calls were classified as intakes concerning problem gambling. These intake phone calls resulted in 647 referrals and 455 transferred calls. 167 intake calls were classified as non-applicable. We analyze intake phone calls to the Indiana problem helpline for fiscal year 2005.

Table 5.9: - Requests for Assistance

Category	Total Number	Percent
Treatment for Self	913	71.9%
Treatment for Other	290	22.9%
Other	66	5.2%
Total	1,269	100.0%

Source: Indiana Problem Gambling Hotline; Data for FY 2005; http://www.indianaproblemgambling.org.

Table 5.10: - Problem Gambler Hotline Caller Profile

Relationship	Number	Percent
Gambler	963	75.9%
Friend	69	5.4%
Spouse	96	7.6%
Parent	34	2.7%
Child	42	3.3%
Sibling	23	1.8%
Therapist	12	0.9%
Other	30	2.4%
Total	1,269	100.0%

Source: Indiana Problem Gambling Hotline; Data for FY 2005; http://www.indianaproblemgambling.org

Appendix E displays the number of intake callers to the ICPG helpline for fiscal year 2005 by county. Figure 7 above shows the number of calls that mentioned riverboat casinos graphically. 37.3% of intake calls in FY 2005 were from out-of-state. 62.7% of intake calls in FY 2005 were from Indiana. The greatest number of calls was from Lake County, which had 22.1% of all calls originating in Indiana.

Table 5.9 classifies request for assistance. 71.9% of calls were classified as requests for treatment for the caller. 22.9% of calls were classified as requests for treatment for another person. 5.2% of calls were classified as other.

Table 5.10 provides additional detail about the relationship between the caller and the person with a possible gambling problem. 75.9% of calls were from the gambler. 5.4% of calls were from a friend. 15.4% of calls were from a close relative.

Table 5.11 shows the referral source cited by callers to the problem helpline. The most common sources of referral were riverboat signs and tickets and lottery tickets.

Tables 5.12 to 5.15 provide socio-economic data on callers to the problem gambling helpline. Table 5.12 shows the age of callers to the problem gambling helpline. 3.4% of callers were over age 65.

Table 5.12: - Problem Gambler Hotline Caller Age

Age Range	Number	Percent
Under 21	22	1.7%
Age 21-25	81	6.4%
Age 26-35	205	16.2%
Age 36-45	260	20.5%
Age 46-55	263	20.7%
Age 56-65	143	11.3%
Age 66-75	40	3.2%
Age 76-85	3	0.2%
Unknown	251	19.8%
Total	1,268	100.0%

Source: Indiana Problem Gambling Hotline; Data for FY 2005; http://www.indianaproblemgambling org.

Table 5.11: - Problem Gambler Hotline Caller Referral Source

Caller Referral Source	Number	Percent
Riverboat Sign	372	29.3%
Riverboat Ticket	216	17.0%
Brochure/Poster	76	6.0%
Lottery Ticket	186	14.7%
Phone Book	42	3.3%
Newspaper	3	0.2%
TV	11	0.9%
Radio	39	3.1%
Billboard	8	0.6%
Other	160	12.6%
Unknown	156	12.3%
Total	1,269	100.0%

Source: Indiana Problem Gambling Hotline; Data for FY 2005; http://www.indianaproblemgambling.org.

Table 5.13 breaks down callers to the problem helpline by marital status. 42.6% of callers were married.

Table 5.13: - Problem Gambler Hotline Caller Marital Status

Status	Number	Percent
Single	333	26.2%
Married	538	42.4%
Separated/Divorced	120	9.5%
Living With	61	4.8%
Widowed	41	3.2%
Unknown	176	13.9%
Total	1,269	100.0%

Source: Indiana Problem Gambling Hotline; Data for FY 2005; http://www.indianaproblemgambling org.

Table 5.14: Problem Gambler Hotline Caller Ethnicity

Ethnicity	Number	Percent
Black	290	22.9%
White	795	62.6%
Hispanic	22	1.7%
Asian	15	1.2%
American Indian	1	0.1%
Other Ethnicity	8	0.6%
Unknown	138	10.9%
Total	1,269	100.0%

Source: Indiana Problem Gambling Hotline; Data for FY 2005; http://www.indianaproblemgambling.org.

Table 5.14 displays helpline calls by caller ethnicity. 62.6% of callers reported their ethnicity as white. 22.9% of callers reported their ethnicity as black, while 1.7% reported as Hispanic. 1.2% of callers reported their ethnicity as Asian.

Table 5.15 classifies callers to the helpline by income range.

Table 5.15: - Problem Gambler Hotline Caller Annual Household Income

Income Range	Number of Callers	Percent
Under $15,000	133	10.5%
$15,000 - $24,999	121	9.5%
$25,000 - $34,999	172	13.6%
$35,000 - $49,999	166	13.1%
$50,000 - $74,999	185	14.6%
Over $75,000	155	12.2%
Unknown	337	26.6%
Total	1,269	100.1%

Source: Indiana Problem Gambling Hotline; Data for FY 2005; http://www.indianaproblemgambling.org.

Table 5.16: - Primary Gambling Reference Identified by Indiana Problem Hotline Caller

Gambling Type	No. of Callers	Percent
Riverboat	954	75.2%
Lottery	144	11.3%
Horse Racing	18	1.4%
Sports Betting	6	0.5%
Bingo	19	1.5%
Internet	25	2.0%
Other	37	2.9%
Unknown	66	5.2%
Total	1,269	100.0%

Source: Indiana Problem Gambling Hotline; Data for FY 2005; http://www.indianaproblemgambling.org.

Table 5.16 reports the primary form of gambling activity identified by callers to the helpline. Three-fourths of all calls referred primarily to riverboats. 11.3% of calls referred to the lottery. These percentages should be interpreted as simply the primary form of gambling referenced by callers to the Indiana problem gambling helpline.

These percentages are not statistically unbiased and consistent estimates of the percentage of the population of Indiana problem gamblers who primarily engage in each form of gambling because differences in advertising the ICPG helpline number creates a sample selection bias. Riverboat casinos and the lottery are forms of gambling that advertise the ICPG helpline extensively. Other gambling venues may not provide any information about the ICPG helpline.

Appendix E displays the number of callers to the ICPG helpline in fiscal year 2005 for each Indiana county.

Table 5.17: - State funded problem gambling Outpatient treatment admissions by Gender

Year	FY01	FY02	FY03	FY04	FY05
Male	94	52	120	124	312
Female	31	35	34	36	73
Total	125	87	154	160	385

Source: Indiana Problem Gambling Hotline; Data for FY 2005; http://www.indianaproblemgambling.org.

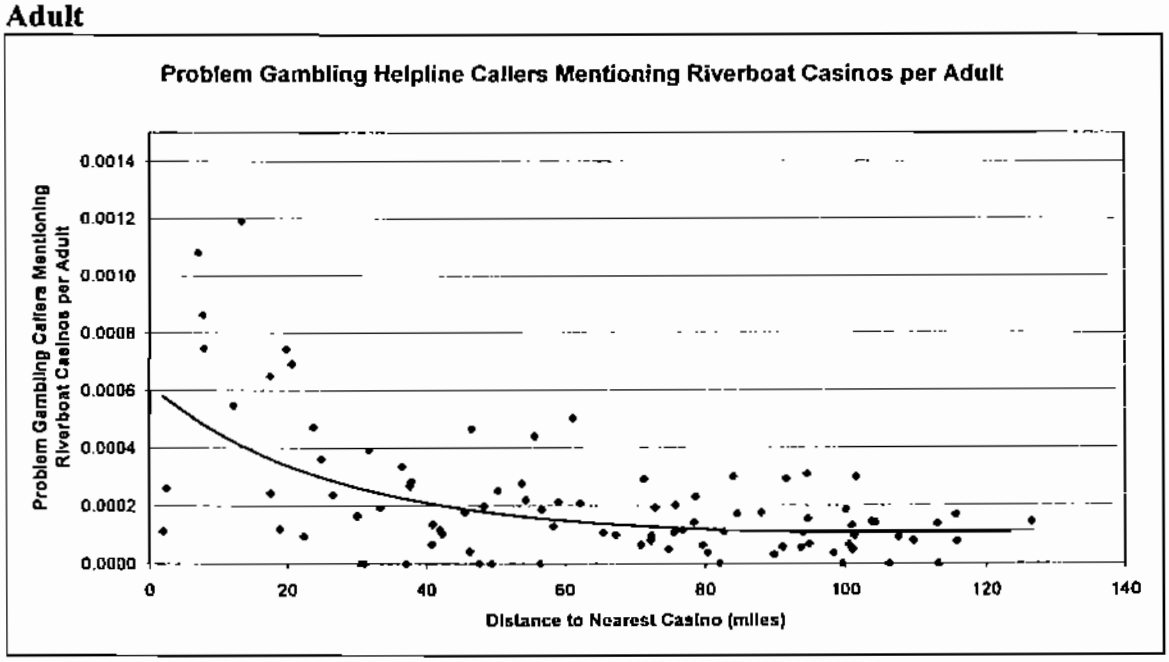
Table 5.17 shows the number of individuals entering state funded outpatient treatment form fiscal years 2001 to 2005 by gender. Individuals receiving state funded treatment for problem gambling are overwhelmingly male. Males were 81% of individuals receiving state funded treatment. Females were only 19% of individuals receiving state funded treatment. State funded outpatient treatment has risen sharply. The 385 individuals receiving state funded treatment in FY 2005 are triple the number of individuals receiving state funded treatment just a few years earlier.

Regression Analysis:
The Effects of Distance to a Casino on Helpline Phone Calls per Adult

We statistically test whether the distance to the nearest casino is related to the rate of phone calls to the Indiana helpline per adult. We combined data on the number of phone calls to the helpline by county for Indiana from Appendix E with data on the distance to the nearest casino. Distances were calculated between the centroid of each county and the location of the nearest riverboat casino. We analyze data on problem gambling helpline calls that result in intakes from fiscal years 2003 to 2005 in order to use the largest, richest dataset available.

The rate of phone calls per adult by county to the Indiana problem gambling helpline over this three year timeframe is not an estimate of the rate of problem or pathological gamblers in Indiana. A call to the problem gambling helpline is not a definitive indicator of problem or pathological gambling. However, intake calls to the problem gambling helpline suggest that the caller may personally believe that they or someone they know has a gambling problem.

Figure 8: Problem Gambling Helpline Callers Mentioning Riverboat Casinos per Adult



We consider four categories of intake calls to the Indiana problem gambling helpline

a) all calls,
b) calls mentioning riverboat casinos,
c) calls mentioning the lottery
d) all calls not mentioning riverboat casinos.

Using regression models we tested the relationship between distance to a casino and the above categories a, b, and c of calls to the helpline. Calls to the problem gambling helpline mentioning riverboat casinos could be related to distance to the nearest casino if

proximity to a casino increases the number of problem or pathological gamblers. Calls to the problem gambling helpline not related to riverboat casinos and those specifically related to lotteries are not expected to be related to the distance from the nearest casino.

Figure 8, on the previous page, plots the relationship between distance to the nearest casino and the rate of intake phone calls mentioning riverboats to the ICPG helpline for Indiana counties per adult. The distance to the nearest casino is displayed on the horizontal axis. The rate of intake phone calls to the ICPG helpline for Indiana counties per adult is on the vertical axis. Actual observations for Indiana counties are shown as blue diamonds in the scatter-plot. The predicted non-linear relationship between distance and the rate of intake phone calls to the ICPG helpline for Indiana counties per adult from the regression is displayed as a black line.

Table 5.18: Statistics for Figure 8 - Dependent Variable is Problem Gambling Helpline Callers Mentioning Riverboat Casinos per Adult

	Coefficient	Standard Error	t-statistic	P-value
Constant	-7.3868	0.3280	-22.523	0.0000
Distance to Nearest Casino	-0.0334	0.0112	-2.985	0.0037
Distance Squared	0.0002	0.0001	1.842	0.0688
R-squared	0.2452	F-statistic	14.460	
Adjusted R-squared	0.2283	P-value for F-statistic	0.000	

The F-statistic which tests the join hypothesis that distance and distance squared have zero effect on the rate of riverboat related intake phone calls per adult is 14.46. The probability-value for this F-statistic is .00000, meaning that the probability that the estimated relationship between riverboat related intake phone call rate and distance and distance squared occur by chance is extremely small. The R-squared is 0.25. This means that 25 percent of the variation in riverboat related intake phone calls to the ICPG helpline by county in Indiana is explained by the variables included in the regression analysis.

This result is in concordance with other studies that find that distance to casinos correlates with the prevalence of casino related problem gambling. Regressions were done to determine the effect of distance and distance squared from a casino on non-riverboat casino related ICPG intake call rates and lottery related ICPG intake call rates. Both regressions turned up no statistically significant result, confirming the hypothesis that ICPG intake call rates for non-riverboat casino gambling problems does not vary with distance from casinos.

This methodology does not provide a useful estimate of the number of problem or pathological gamblers in Indiana or the rate of problem or pathological gambling in

Indiana. Some callers may be problem or pathological gamblers, however it has not been demonstrated that any of the screens for problem and pathological gamblers have been applied to these callers. This methodology simply tests for whether distance to the nearest casino does or does not have any effect on the per adult rate of calls to the ICPG helpline.

The problem gambling helpline phone number is displayed on lottery tickets, riverboat admission tickets, and at riverboat casinos. Therefore, it is likely that the percentages of calls to the helpline relating to a particular type of gaming is not a useful random sample of the actual percentage of problem or pathological gamblers who engage in a particular type or types of gaming.

These results should be carefully interpreted. The rate of callers to the ICPG helpline over a three year period does not provide an estimate of the rate of problem or pathological gamblers in Indiana. This helpline is heavily advertised at some gambling venues and not at other gambling venues.

The rate of calls per adult by county to the helpline mentioning a form of gambling other than riverboat casinos is unrelated to proximity to a casino. This suggests that proximity to casinos is not statistically associated with higher rates of problems with other forms of gambling.

The rate of calls per adult by county to the helpline mentioning the lottery is unrelated to the distance to the nearest riverboat casino. This suggests that proximity to casinos is not associated with higher rates of problems with lottery gambling.

Social Costs of Pathological and Problem Gamblers

The NORC Gambling Impact and Behavior Study identified several key costs associated with problem and pathological gambling. These costs are:

- bankruptcy
- crime
- unemployment and loss of productivity
- poor health and mental health problems
- divorce

The NORC study focuses on the tangible economic value of gamblers' problems that have been identified in the literature on problem and pathological gambling. Other, less tangible costs such as broken families are not included in the NORC study. This report will discuss bankruptcy and crime in a later section which applies economic values to these manifestations of social stress.

There is significant overlap between those diagnosed as problem and pathological gamblers and those diagnosed as having addictive disorders such as alcohol and drug dependence. This is referred to as co-morbidity.

The National Research Council finds that individuals admitted to chemical dependence treatment programs are three to six times more likely to be problem gamblers than those individuals in the general population. Similarly, a Minnesota study found that one-third of those in the state's problem gambling treatment program had received prior treatment for some form of chemical dependency and 47 percent had received prior treatment for mental health reasons. These studies show that problem gamblers often have other addiction and mental health problems and that those with addiction problems are more likely than the general population to have gambling behavior problems.

Unemployment and Loss of Productivity

Problem gambling can lead to work related problems, including irritability, moodiness, low productivity, poor decision-making, lateness and absence from work, and gambling on company time. Problem gamblers also borrow money from other coworkers and may even resort to stealing from the company to cover gambling expenses. The net result of these behaviors is not only decreased productivity, but also the possibility that the employer will find it necessary to fire the problem gambler and face the cost of replacing the employee and training his replacement.

According to the NORC study about seven out of ten problem gamblers missed work at some point in their lives to gamble. Of those individuals who missed work to gamble, three out of ten lost a job because of gambling. Costs to the employer are incurred in the form of search and training costs of approximately ten percent of the salary of each employee replaced (National Gambling Impact Study Commission, 1999). The NORC study also finds that pathological and problem gamblers have higher rates of job loss,. Pathological gamblers have a job loss rate of 13.8% and problem gamblers have a job loss rate of 10.8% compared to rates of 5.8% for low risk gamblers and 5.5% for non-gamblers. Pathological gamblers in the NORC survey earned about $18 per hour, or $40,000 per year, so firing an employee costs an employer an average of $4,000 (10% * $40,000). Pathological gamblers have an expected job loss rate of 13.8%, which is 8% more than the expected rate of job loss of 5.8%. Thus the average pathological gambler costs an employer about $320 (8% of $4,000). A similar calculation shows that the average problem gambler costs an employer about $200.

Poor Health and Mental Health Problems

Pathological gambling is characterized by extreme distortions in thoughts and beliefs. Pathological gamblers typically believe that money is both the root of all their problems and the solution to all their woes. Health problems related with stress, such as hypertension, are present in pathological gamblers at a higher rate than in the general population (American Psychiatric Association, 1994). The claims of the American Psychiatric Association regarding pathological gamblers are supported by an article in the Journal of the American Medical Association which finds that individuals who are diagnosed as pathological or problem gamblers are subject to mood disorders, psychotic disorders, anxiety, attention-deficit disorder, personality, and substance use disorders at a rate higher than the general population (Potenza, Kosten, and Rounsaville, 2001). The

NORC report, "Gambling Impact and Behavior Study," also finds evidence supporting the DSM-IV criteria for pathological gambling.

While several previous studies have suggested that pathological and problem gambling have adverse effects on health outcomes, the NORC study (1999) does not identify research that examined personal health care use and expenditures or health status. The NORC study also points out that it is unclear how gambling problems would affect health outcomes and identified stress and strain as the most likely cause of health problems.

The NORC survey finds that 33.8% of pathological gamblers reported poor or only fair health and about 14% of problem gamblers reported poor or only fair health. NORC estimates that health problems result in additional costs of $750 per year for pathological gamblers and that mental health problems result in an additional cost of $360 per year for each pathological gamblers and $330 per year for each problem gambler.

Divorce

Family problems are another major concern associated with problem and pathological gambling. Between 26 and 30 percent of Gambling Anonymous members attribute divorces or separations to their gambling problems (Lesieur, 1998). Many of the consequence of divorce can be difficult to measure; however, the additional number of divorces and the associated legal fees can be estimated. The NORC study estimates that the average pathological gambler has accumulated $4,300 more than expected in legal fees due to higher divorce rates than non-problem gamblers. The average problem gambler is found to have losses of $1,950 dollars in excess legal fees associated with divorce. In addition to the legal costs of divorce, there are also significant emotional costs borne not only by the divorcing couple but also by immediate family and any children. The NORC study does not calculate these costs because they "involve interpersonal losses and gains by the adults and the children involved, and entail detailed information about the timing and duration of marriage, divorce, and any remarriage" (1999). It is outside of the scope and resources available to this project to attempt to measure these costs, but it is important for policy makers to keep these costs in mind.

Cost Estimates

The NORC study finds that those costs that could be calculated on an annualized, present-value basis sum to approximately $1,200 and $700 for each pathological and problem gambler, respectively. The NORC study reports other costs are very infrequent (divorce, bankruptcy, arrest and incarceration) on a "lifetime" cost basis. These lifetime costs are estimated at approximately $10,500 and $5,100 for each pathological and problem gambler, respectively. These costs reported by NORC include costs that would be treated as wealth transfers in a standard cost-benefit analysis. Excluding transfers the annual costs are $1215 for pathological gamblers and $648 for problem gamblers.

Table 5.19: - Social Costs per Pathological or Problem Gambler; Range of Estimates in 2005 $'s

Category of Cost	Pathological Gambler Costs *Grinols*	Pathological Gambler Costs *NORC*	Problem Gambler Costs *Grinols*	Problem Gambler Costs *NORC*
Crime		***Elsewhere estimated***		
Business and Employment Costs				
Lost Productivity on Job*	$750.79		$40.95	
Lost Time and Unemployment	$1,725.24	$370.20	$1,033.25	$231.37
Bankruptcy		***Elsewhere estimated***		
Illness	$811.69	$809.80		
Social Services Costs				
Therapy/Treatment Costs	$134.41	$34.71	$271.96	$416.47
Uemployment and Other Social Service	$301.37	$167.75	$283.52	$179.31
Family Costs				
Divorce, Separation	$65.10			
Abused Dollars	$3,024.16		$1,016.45	
Total	$6,812.76	$1,382.45	$2,646.14	$827.16
Less: Transfers	$4,076.32	$167.75	$1,340.92	$179.31
Social Costs Net of Transfers	$2,736.44	$1,214.70	$1,305.22	$647.85

Source: Grinols, Gambling in America (2004), and Gerstein, et.al., Gambling Impact and Behavior Study: Report to the National Gambling Impact Study Commission, 1999. Pathological and problem gambler costs from these sources have been adjusted to 2005 dollars.

Grinols describes a taxonomy of social costs that includes crime, business and employment costs, bankruptcy, suicide, illness, social service costs, direct regulatory costs, family costs, and abused dollars. Grinols defines abused dollars as "lost gambling money acquired from family, employers, or friends under false pretenses." While stealing or borrowing money with no intention of paying it back is not respectable behavior, this behavior represents a transfer of wealth and is not considered a social cost within a formal cost-benefit analysis.

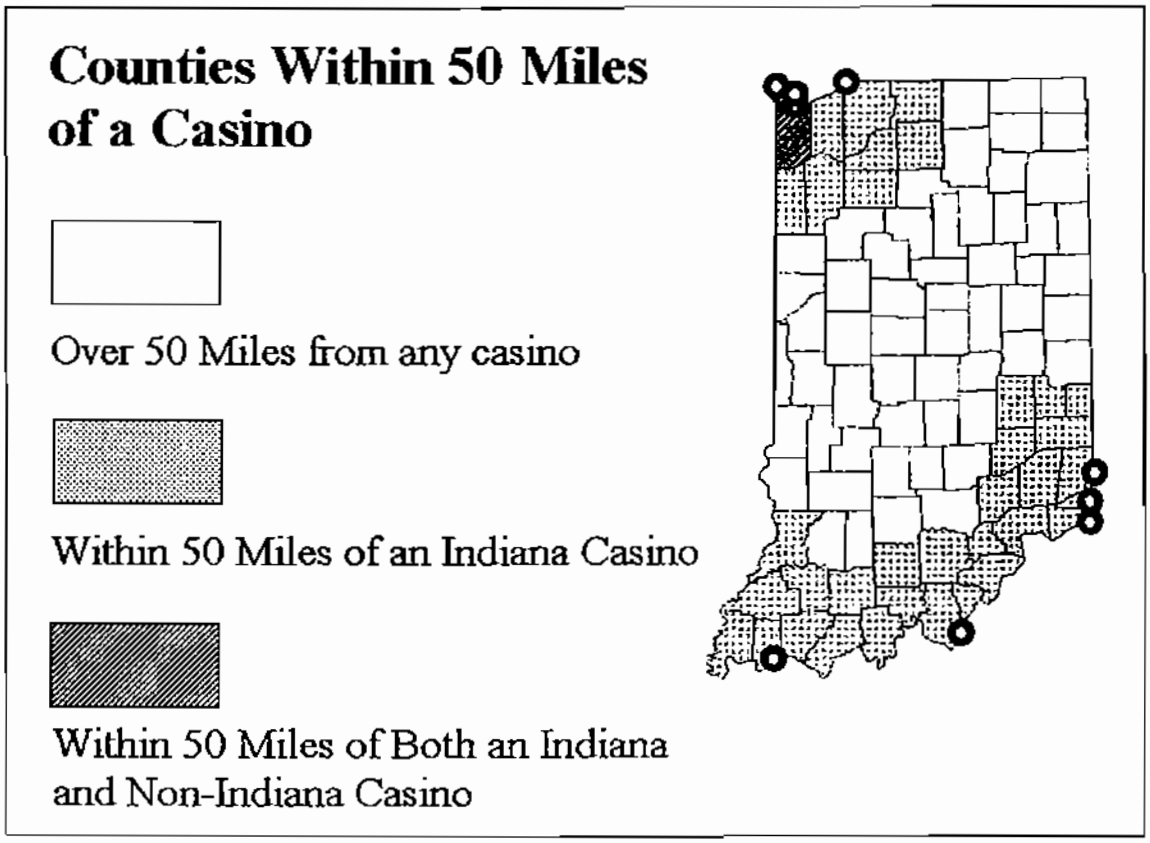
In *Gambling In America*, Grinols presents a meta-analysis of the social costs of gambling. The analysis arrives at "social costs" of $6,800 per pathological gambler and $2,646 per problem gambler. The above "social costs" include transfers from other individuals or businesses to the problem or pathological gambler, which should not be included in a social costs measure. Correcting the calculation to return to true social costs requires subtracting transfers from Grinols' total. This adjustment yields social costs of $2,736 per pathological gambler and $1,305 per problem gambler.

Gambling Pathology and Proximity of Gambling Opportunities

The prevalence of problem gambling behavior can be expected to vary with the availability of gambling. NORC (1999) tests for this in two ways; first by looking at the effect of a state-owned lottery on problem gambling behaviors and second by looking at the effect of the distance to the nearest casino on gambling behavior. The availability of a state lottery has a statistically significant and positive effect on the prevalence of at risk gamblers, but does not have a statistically significant effect on the prevalence of problem and pathological gamblers. The availability of a casino with 50 miles (versus 50-250 miles) results in an increase in the level of past-year casino gambling (40 percent of adults with 50 miles versus 23% of adults within 50-250 miles) and nearly doubles the prevalence of problem and pathological gamblers; however, they find little difference in the prevalence of at-risk gamblers as distance to the casino varies.

Welte et al (2004) considers the effects of environment on gambling behavior. Those living within ten miles of a casino are found to have twice the rate of problem or pathological gambling as those who live further than ten miles from a casino. In addition Welte et al finds that individuals living in disadvantaged neighborhoods have higher rates of pathological and problem gambling. Disadvantaged neighborhoods are determined using a measure used in previous studies which considers percentage of households on public assistance, percentage of families headed by a female, percentage of adults employed, and percentage of people in poverty at the census block level.

Figure 9: Counties within Fifty Miles of a Casino



Without riverboat casinos in Indiana, all consumers in Indiana would still be within 250 miles of a casino. The presence of riverboat casinos results in some of Indiana's population being within 50 miles of a casino who would otherwise be over 50 miles from a casino. Based on the number of adults so affected in Indiana and the difference in prevalence rates of problem and pathological gamblers within 50 miles of a casino (versus prevalence rates for 51-250 miles from a casino) the additional number of problem and pathological gamblers can be calculated. The additional number of problem gamblers attributable to Indiana's riverboat casinos is estimated to be 6,178. The additional number of pathological gamblers is estimated to be 12,356.

These numbers are small in large part because the riverboat casinos in Indiana are near the borders of the state and as such move a relatively small proportion of Indiana's population to within 50 miles of a casino. If a casino where to be located in or near Indianapolis one could expect a much larger increase in the number of problem and pathological gamblers in Indiana.

Table 5.20: - Estimation of the number of additional Problem and Pathological Gamblers Due to the Introduction of Casinos in Indiana

Distance to Nearest Casino	Percentage of Problem Gamblers in the Population During Past year	Percentage of Pathological Gamblers in the Population During Past Year	Percentage of Problem Gamblers in the Population During Lifetime	Percentage of Pathological Gamblers in the Population During Lifetime
0-50 miles	1.1%	1.3%	2.3%	2.1%
51-250 miles	0.6%	0.3%	1.2%	0.9%
250+ miles	0.3%	0.4%	1.2%	1.3%
Adults Previously w/l 50 Miles of a Casino	353,730	353,730	353,730	353,730
Adults now w/i 50 miles of a Casino	1,235,632	1,235,632	1,235,632	1,235,632
Change in Adults w/l 50 miles of a Casino	1,187,364	1,187,364	1,187,364	1,187,364
Percent Change w the Introduction of Casinos in Indiana	0.5%	1.0%	1.1%	1.2%
Number	6,178	12,356	13,592	14,828
Past Year Combined		18,534		
Lifetime Combined				28,420

Source: Table 7. Lifetime and Past-Year Prevalence of Gambling Problems Among Demographic Groups, in Percentages. RDD+ Patron Survey; Gerstein, et.al., *Gambling Behavior and Impact Study* (1999).

Estimated Social Costs of Indiana's Riverboat Casinos

An estimate of social costs due to riverboat casinos can be made using social cost figures from the NORC study and Grinols (2004) along with the additional number of problem and pathological gamblers attributable to Indiana's riverboat casinos. This calculation will be done excluding any social costs that are wealth transfers and will also exclude social costs associated with crime and bankruptcy as these will be calculated using estimates from panel data models discussed below. Using the costs from Grinols (2004), which is an average from previous studies, results in social costs of $42 million for the state. Relying solely on the numbers for the NORC Study results in social costs of $19 million. This difference is due to the fact that NORC's estimates of the social costs tend to be lower than the other figures cited by Grinols. These differences in numbers can be attributed largely to a dearth of quality research on the social costs of problem and pathological gambling.

Grinols and Mustard (2001) concludes that there is a lack of quality research on both the benefit and cost sides of gambling policy analysis. This report makes use of Indiana specific data and several recent papers to arrive at the best available estimate for the costs and benefits of riverboat casino gambling in Indiana.

Panel Data Usefulness

- Statistical analysis of a large national panel dataset produces more precise estimates of the effects of casino expansion on crime rates or bankruptcy rates than statistical analysis of only a single state because a large number of observations reduces sampling variation. The statistical effect is the same as in public opinion polling. A poll with a small sample size is very imprecise. A poll with a large sample size has a smaller margin of error. Statistical analysis of panel data is powerful because it identifies effects both across geography and over time.

Casinos and Crime

The expansion of casinos has spurred extensive debate about the impact of casinos on many social, economic, and political issues. Thusly, casinos, and their effect upon crime rates, are widely researched. It is often difficult to understand the true impact that a casino may have on crime rates. New research by Grinols and Mustard (2006) helps to identify these relationships, and their approach is used in this report to address the estimate of social costs. The following section is a brief discussion of a forthcoming detailed research document that will be published in the Review of Economics and Statistics, which is edited at the Harvard University Department of Economics. For a more detailed examination of Grinols and Mustard's research please consult Appendix F.

Grinols and Mustard's research is significant for three basic reasons. First, they provide controls to limit the effects of other variables (other than casinos) on the crime rate. Second, whereas other previous studies have used very small samples, their sample covers all 3,165 counties in the United States with over 57,000 observations. Third, some other studies have used arrests rates, which are less precise than using actual crime rates. Grinols and Mustard use actual crime rates by county with crime offense data provided by the FBI's Uniform Crime Report.

The effect of a casino on crime will vary with the time from the casino's date of opening. Generally, a reduction in crime is observed shortly before and shortly after a casino's opening date. This trend can be attributed to the casino's effects on the local labor market by providing jobs, especially those targeted to low-skill individuals. In contrast the effects from pathological and problem gamblers will not be felt until a gambling problem has been developed. Previous studies suggest that it takes about one year for individuals to become addicted to video gaming (Breen and Zimmerman 2002) while other forms of gaming (horses, sports betting, blackjack, et cetera) become compulsive after three and a half years (RI Gambling Treatment Program, 2002.)

Pathological and problem gamblers may resort to crime to cover gambling related debts or to fund their gambling activity. Pathological and problem gamblers in treatment have admitted to a variety of crimes to finance their gambling activity, including: passing bad checks, shoplifting, check forgery, thefts form employers, tax evasion and tax fraud, loan

fraud, embezzlement, larceny, bookmaking, hustling, fencing stolen goods, and bookmaking. 46% of Gambling Anonymous participants in Wisconsin admit to stealing to fund gambling (Thompson et al. 1996) while 56% of Gambling Anonymous participants in Illinois admitted to stealing to gamble (Lesieur and Anderson 1995). The NORC study reports that an estimated 23% of pathological gamblers and 13% of problem gamblers have been arrested compared to only 4% and 0.3% of low-risk gamblers and non-gamblers. The individual level evidence clearly suggests a direct link between gambling behavior and crime, especially larceny.

Grinols and Mustard report their results for the effect of casinos from 2 years prior to casino opening to 5 years after casino opening for seven separate criminal offenses. These seven offenses include: aggravated assault, rape, robbery, murder, larceny, burglary, and auto-theft. They find that casino-county crime rates do increase relative to non-casino county crime rates after the introduction of a casino in a county. Their findings suggest that the estimated crime in casino-counties is the result of a net increase in crime, not simply a shift in the location of crime to casino-counties.

Aggravated Assault & Rape

Grinols and Mustard find that the effects of a casino on the aggravated assault and rape crime rates increase from the third to fifth year after a casino opens. This pattern of increased crime rates differs from the pattern of increased visitors to the county with a casino. Generally, the number of visitors rises quickly right after a casino opening. The growth in visitors to the casino county is much slower in the later years. There are an estimated 100 additional aggravated assaults per 100,000 in population and 10 additional rapes per 100,000 in population for counties five years after casinos open.

Robbery & Murder

Robbery rates are higher from the second to fifth year after a casino opens in a county. There are an estimated 65 additional robberies a year per 100,000 in population in counties five years after a casinos open. The effects on murder rates are not statistically different from zero before or after a casino opens in a county.

Larceny, Burglary, & Auto Theft

Larceny, burglary, and auto theft are all higher fiver years after a casino opens. The transitory pattern is different for larceny and burglary when compared to auto theft. Larceny and burglary rates are not significantly higher in casino counties until the fifth year after a casino opens. There are 615 additional larcenies a year per 100,000 in population and 325 more burglaries a year per 100,000 in population five years after a casino opens. In contrast auto thefts are higher in each of the years after a casino opens. There are an additional 272 auto thefts per year per 100,000 in population five years after the opening of a casino in a county.

Social Cost of Crime in Dollars

Table 5.21: - Estimated Additional Crime Impact Resulting from Casino Gambling

Type of Crime	Additional Crimes per 100,000 Population per Year	Average Property Loss (2005 $'s)	Total Cost Per Victim (2005 $'s)
Aggravated Assault	100	n/a	$19,930
Rape	10	n/a	$115,592
Robbery	65	$1,377	$17,272
Murder	0	n/a	$3,035,283
Larceny	615	$766	$492
Burglary	325	$1,729	$1,933
Auto Theft	272	$6,432	$5,315

Source: Grinols and Mustard, "Casinos, Crime, and Community Costs," *Review of Economics and Statistics*, (2006) forthcoming.

Grinols and Mustard find that "...roughly 8% of crime in counties containing casinos is attributable to the presence of casinos, costing the average adult $75 per year." Grinols and Mustard measure this social cost of crime per adult in 2003 dollars. In 2005 dollars, this cost is $79 per adult in counties with casinos. In addition, they find that the value of lost property from larceny, burglary, auto theft, and robbery was $29 per adult in counties containing casinos. In 2005 dollars this is $31 per adult annually. The lost value of property represents a transfer from crime victims to criminals and is therefore not counted as a social cost of crime. Table 5.21 demonstrates the national average costs per victim for the seven crimes examined in the research study.

Cost to Indiana Residents

It is assumed that the Indiana effect of opening a casino in a county is equal to the national effect. The seven Indiana counties with riverboat casinos are Dearborn, Harrison, Lake, Laporte, Ohio, Switzerland, and Vanderburgh, had an adult population of 660,173 in 2004. Applying the social cost of crime per adult or $79 to this adult population produces a social cost of crime to Indiana of $52,136,362. The estimated value of lost property from property crimes is $20,194,151.

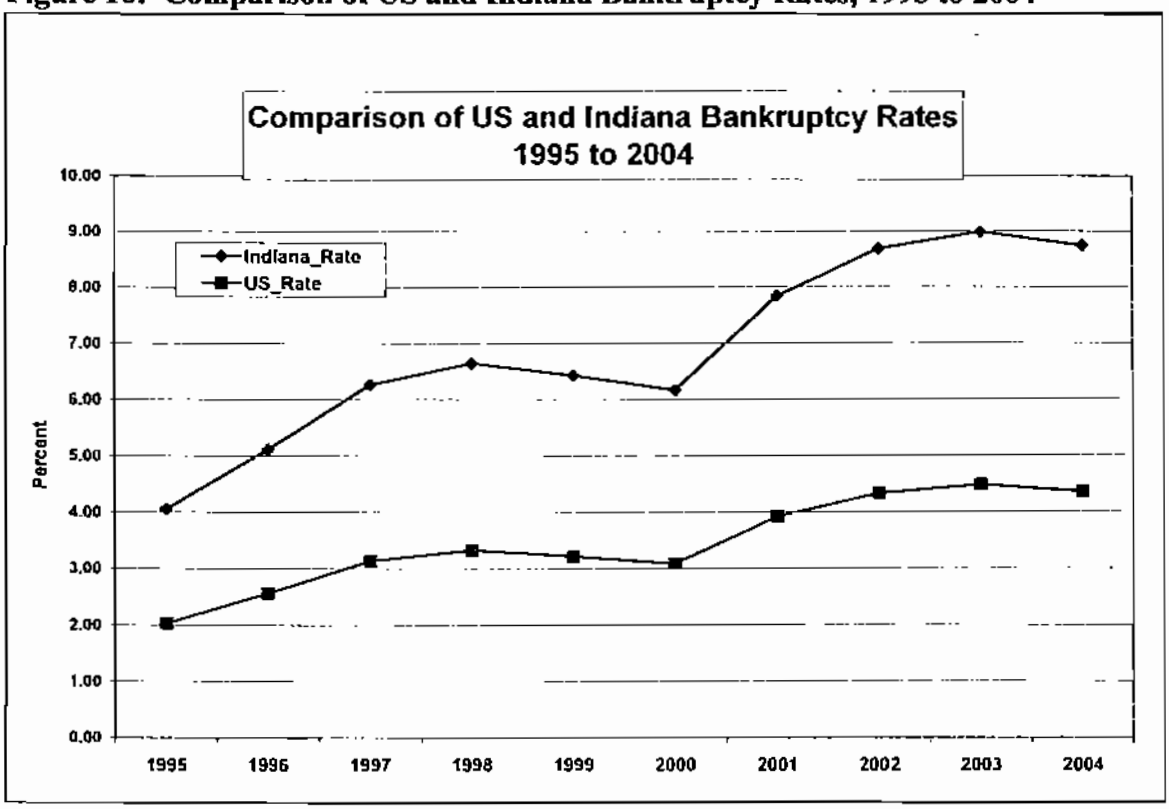
Bankruptcy

The NORC Gambling Impact and Behavior Study finds that 19.2% of pathological gamblers have declared bankruptcy versus an expected 10.8% given their personal characteristics. For problem gamblers the observed rate is 10.3% compared to an expected rate of 6.3%. (These differences were found to be significant at the 10% level.)

Personal bankruptcies result in an average of $39,000 in losses to creditors, although it is important to keep in mind that the debtor gains the amount that he no longer has to pay the creditor. Thus the debt that is written off under bankruptcy is a transfer cost and as such will not be included in the cost-benefit analysis. The social costs of bankruptcy are the resources diverted to legal costs and bill collection, resources that could have been otherwise employed.

The decision to file for bankruptcy can be triggered by insolvency events that reduce wealth. These events can include reduced income due to a layoff, or high expenses from a divorce, uninsured illness or accident. Any of these changes can create a situation in which an individual might conclude that bankruptcy is the best path of action. Changes in the legal treatment of bankruptcy may also affect bankruptcy rates.

Figure 10: Comparison of US and Indiana Bankruptcy Rates, 1995 to 2004



Source: US Bankruptcy Court website, http://www.uscourts.gov/bnkrptcystats/bankruptcystats.htm

Personal bankruptcy rates have generally been rising from 1995-2004. The Figure 10, above, shows the trend in bankruptcy filing rates from 1995 to 2004 for Indiana and the United States. The bankruptcy rate in Indiana is higher than the rate in the United States as a whole; however, the time trend is similar. Changes in the Indiana bankruptcy rate mirror changes in the national bankruptcy rates over this time. There were 55,117 non-business bankruptcy filings in Indiana in 2004.

The national increase in personal bankruptcies occurred simultaneously with the rapid growth in casino gaming outlets during the 1990s. This rise prompted SMR Research (1997), a credit industry consulting firm, to declare gambling as the single fast-growing driver of bankruptcy. To reach this conclusion SMR compared aggregated personal bankruptcy filing rates of the 298 counties identified as having at least one major legal gambling facility with the aggregated personal bankruptcy rates of counties without gambling. SMR found that counties with casinos had an aggregated personal bankruptcy filing rate 18% higher than in counties without casinos. This finding might suggest that casino gambling could increase the personal bankruptcy rate. However, the ideal methodology would use a panel dataset for all counties in the United State over a number of years for the reasons discussed above.

Barron, Staten, and Wilshusen (2002) perform a panel study to investigate variation in the bankruptcy rate across counties and time. Their study covers 3,027 US counties for the period from 1993 to 1999, a period during which personal bankruptcy was on the rise. Their panel model includes variables to control for debt, home value, income, unemployment, divorce rates, proportion of households with health insurance, age, percent of wages exempt from garnishment, and casinos net revenues. Where possible they use county level data. When county level data is unavailable they use control variables at the state level. They control for other factors that may influence bankruptcy rates, including levels of consumer debt, proportion of debt that is revolving debt, unemployment rates, health insurance coverage, population density, housing values, percentage of population over age 50, and divorce rates. These other factors play a large role in the total changes in bankruptcy rates. Had all households had health insurance the national bankruptcy filing rate would drop by 13.7%. The national bankruptcies rate would have increased by 23.3% if the national economy had been stagnant from 1994 to 1998. Rising debt levels and increasing percentage of debt in revolving accounts also increased the national bankruptcy rate.

Holding these other factors constant, the Barron et al model estimates that the presence of casino gambling within 50 miles of a county increases the bankruptcy rate by 5.4 percent. We apply this estimate to the population of Indiana counties within 50 miles of a casino, excluding Lake County.[11] The introduction of riverboat casinos in Indiana results in an annual increase of 774 bankruptcies. This is a 1.4% increase in the number of bankruptcies in Indiana.

[11] Lake County is already within 50 miles of a casino in Illinois. Lake County is the only Indiana county within 50 miles of a casino outside of Indiana. We omit Lake County from our calculation of additional bankruptcies due to proximity to Indiana riverboat casinos because Lake County is already within 50 miles of an Illinois casino.

Bankruptcy results in transfers from creditors to debtors. These transfers are a gain for one party and a loss to another party. Transfers resulting from bankruptcy change the distribution of income but have no effect on the level of social welfare. However, the transactional costs of bankruptcy drain real resources from society. The filing fees and attorney fees for additional bankruptcies within 50 miles of casinos are a social cost to Indiana. The filing fees for chapter 7 bankruptcy are $274.[12] The filing fees for chapter 11 bankruptcy are $1,039. The filing fees for chapter 13 are $189. "Currently, it's typical for a Chapter 7 filing to cost about $1,000 in attorney's fees, and a base of $2,500 for a Chapter 13 filing, according to Sam Gerdano, executive director of the American Bankruptcy Institute. A Chapter 13 filing is more expensive because it's more labor-intensive than a Chapter 7."[13]

The total additional filing costs due to additional bankruptcies are $198,839. The additional legal costs due to additional bankruptcies are $1,011,053. The additional transaction social costs from additional bankruptcies in counties near casinos are $1,209,892. Additional bankruptcies may also create additional costs that are extremely difficult to quantify. Higher bankruptcy rates may raise consumer interest rates which harms Indiana consumers. By definition the intangible personal and human costs of bankruptcy are very difficult to measure in dollars.

Summary and Aggregation of Social Costs

We employed two approaches to estimate the social costs of gambling. The first is to look at the increase in the prevalence of problem and pathological gamblers as a result of the presence of riverboat casinos in Indiana. Social costs per problem and pathological gambler (excluding crime and bankruptcy costs) are used with this increase to determine the social costs from additional problem and pathological gamblers. Using Grinol's valuations of the social costs results in a cost of $41.87 million for the state. Using the NORC valuations results in a cost of $19.02 million The second method is to use results from national panel data studies on crime and bankruptcy to determine the increased in crime and bankruptcy and the affiliated social costs. The Grinols and Mustard article (2006) finds that casinos increase crime rates in their host county by 8% and that costs associated with this increase are $79 per adult. Combining this with the adult population of all seven counties hosting riverboat casinos results in a total cost of $52.14 million. Finally a national study on casinos and bankruptcy (Barron et al 2002) finds that casinos increase bankruptcy rates by 5% in counties within 50 miles. This implies 774 additional bankruptcies in Indiana with measurable social costs of $1.21 million. In addition, the regulation of casinos is a social costs. The Indiana Gaming Commission spent $3.34 million in fiscal year 2005.

The total measurable social costs for Indiana are $98.56 million if the Grinols valuations are used and $75.71 million if the NORC valuations are used.

[12] Source: http://www.innb.uscourts.gov/pdfs/increase.pdf
[13] "Bankruptcy fees could skyrocket." April 14, 2005 http://money.cnn.com/2005/04/12/pf/bankruptcy_fees/

VI. Conclusion

This report estimates both the benefits and the costs to Indiana citizens from opening ten riverboat casinos in Indiana. It compares an alternative, counterfactual policy in which Indiana did not permit casinos with Indiana's fiscal year 2005 policy of licensing, regulating, and taxing ten riverboat casinos. On a single-year basis for FY 2005 we find that the benefits significantly exceed the costs of this policy to Indiana by a minimum of $717.29 million as displayed in Table C.1.

This result is driven from Indiana's current ability to export the tax burden of gaming taxes to non-Indiana residents who patronize casinos within Indiana. Using actual patron data provided from the riverboats, we find that 67% of adjusted gross casino revenue comes from out-of state. 66% of casino admissions are visitors from out-of-state. The estimated net increase in Indiana state and local tax revenue from this policy is $763.23 million.

Table C.1: - Calculation of Net Costs and Benefits to the State of Indiana on the Presence of Casino Gambling in FY 2005 $'s
[Dollars in Millions]

Summary of Costs			Summary of Benefits	
Cost Categories	Grinols Valuation	NORC Valuation	Benefit Categories	Policy Analysis Valuations
Social Costs (excluding bankruptcy/crime)	$41.87	$19.02	Distance Consumer Surplus	$52.62
Bankruptcy	$1.21	$1.21	Tax Benefits	$763.23
Crime	$52.14	$52.14	Net Change in Profits	$0.00
Regulatory Costs	$3.34	$3.34	Change in Transactional Constraints	$0.00
Subtotal Costs and Benefits	$98.56	$75.71		$815.85
Net Benefit	$717.29	$740.14		

Source: Gerstein, et.al., *Gambling Behavior and Impact Study* (1999) Grinols, Gambling in America, 2004 Policy Analytics, LLC calculations.

Indiana citizens also gain from enhanced proximity to the entertainment offered at riverboat casinos. This distance consumer surplus, a measure of consumer welfare, is estimated at $52.62 million for Indiana citizens. (The net change in corporate profits accruing to Indiana citizens is estimated to be zero). While we consider the theoretical possibility that Indiana citizens may benefit by a reduction in transactional constraints in labor markets, there is no evidence of any change in transaction constraints caused by the introduction of riverboat casinos. Adding these benefits produces an estimated gross benefit to Indiana citizens of $815.85 million dollars for fiscal year 2005.

The additional tangible social costs per year, from job loss, unemployment, health costs, and gambling treatment are estimated at between $19.02 million and $41.87 million. The tangible social costs to Indiana citizens of additional crime are estimated to be $52.14

million. The measurable social costs of these additional bankruptcies are estimated an estimated $1.21 million. Introducing riverboat casinos requires real resources to be used regulating this industry. Indiana spent $3.34 million for casino regulation in fiscal year 2005. There are further intangible costs of additional problem and pathological gamblers that are not quantifiable. The total tangible costs to Indiana citizens are estimated to be between $75.71 million and $98.56 million for fiscal year 2005. The annual net benefits of current policy to Indiana citizens are estimated at between $717.29 million and $740.14 million.

This report analyzes detailed player data from both northern and southern Indiana riverboat casinos. This is the first time actual player zip code data on both adjusted gross revenue and admissions has been analyzed for Indiana. We use this novel dataset to estimate that statewide 33% of adjusted gross revenue (AGR) comes from within Indiana. 67% of AGR comes from outside Indiana. Statewide 66% of admissions are from out-of-state visitors. At Ohio River casinos 71% of AGR and 64% of admissions are from out-of-state. 63% of AGR and 68% of admissions at Northwest Indiana Casinos are from outside of Indiana.

Social costs are driven by an increase in the prevalence of problem and pathological gamblers near casinos. This increase does not happen immediately when a new casino opens. The social impact of casino introduction tends to increase within the first five years after opening. The scholarly literature finds that the odds of being a problem or pathological gambler increase by 90% when there is a casino within ten miles of home.

This is the first study to analyze the effects of distance to the nearest casino on enrollment rates in a voluntary exclusion program. Our analysis of data from the Indiana Voluntary Exclusion Program (VEP) shows the enrollment rate in VEP by county increases with greater proximity to casinos. We also carefully analyze the effects of distance to a casino on intake phone calls to the Indiana Council on Problem Gambling Helpline. Our analysis of this new dataset shows that the rate of calls mentioning problems with casino gambling per adult is higher in counties closer to riverboat casinos.

We estimate that an additional 6,178 problem gamblers in Indiana are attributable to the introduction of riverboat casinos. This number is 0.13% of Indiana's adult population. The additional number of pathological gamblers within Indiana is 12,356. This is 0.26% of Indiana's adult population. Both of these estimates are well under one percent of Indiana's adult population. These numbers are relatively small because the riverboat casinos in Indiana are located on the edges of Indiana and as such only a relatively small proportion of Indiana's population resides relatively close to casinos.

Policy Implications

The benefits to Indiana citizens from Indiana's policies of licensing, regulating, and taxing ten riverboat casinos are significantly larger than the costs. This finding is driven by the strategic placement of Indiana's riverboat casinos. Riverboat casinos in Indiana are placed across from major population centers in other states, like Chicago, Cincinnati, and Louisville. This tax exporting of gambling taxes places much of the tax burden on non-Indiana residents. The location of riverboat casinos on the northern and southern borders of Indiana also helps to limit the increase in the number of problem and pathological gamblers within Indiana.

These same favorable factors could create potential future concerns for Indiana. Any reduction in out-of state patronage could harm Indiana because gaming tax revenue is heavily dependent on out-of-state patronage. Any factor that lowers out-of-state demand for casino gaming in Indiana will reduces Indiana's ability to shift some of the tax burden to non-Indiana residents. Factors that could reduce the demand include changing consumer tastes for travel and entertainment, establishment of new casinos outside Indiana along Indiana's borders, changes in casino regulation in bordering states, and changes in casino tax policy in neighboring states. Decisions regarding the location, regulation, and taxation of casinos in other states are obviously not made by Indiana lawmakers. However, policy changes in other states in the future may affect the benefits and/or costs to Indiana from its riverboat casino policies.

We find the proximity to casinos results in higher rates of problem and pathological gambling, bankruptcy, and crime. Enrollment in the Voluntary Exclusion Program and calls to the problem gambling helpline occur at higher rates in counties close to casinos. One implication of these findings is that the resources to prevent and treat gambling problems should be available in communities hosting and proximate to casinos. Since social costs associated with casinos are clustered around the locations of casinos, these geographic areas have the most pressing need for access to problem gambling programs. These areas have higher rates of problems with gambling and therefore more of a need for resources to deal with these problems. Areas rather distant from casinos have very lower rates of enrollment in the Voluntary Exclusion Program. Several counties located away from casinos did not have any residents make an intake phone call to the problem gambling helpline over the past three years.

Recommendations for Further Study

This report presents benefit-cost analysis of current policy compared to a policy of no casinos in Indiana. Indiana may additionally benefit from a formative evaluation of the benefits and costs resulting from changes in the way it regulates and taxes riverboat casinos. This type of study could address the following questions: What is the balance of admissions and wagering taxes? How would the benefits and costs to Indiana change if alternative regimes of different admission or wagering taxes were compared? What are the costs and benefits of a progressive wagering tax compared to alternative proportional wagering tax schedules?

Additional survey research of the general population could lead to better estimates of the prevalence of problem and pathological gambling in Indiana. Survey research could also develop a better understanding of the relationship between the distance from casinos and the prevalence of problem and pathological gambling. This survey would help to develop better estimates of the social costs of Indiana's problem gamblers and the costs of treatment. Tracking problem gamblers and their treatment episodes could help in understanding the cycles of problem and pathological gamblers.

A considerable portion of the gain from riverboat casino gaming is due to tax exporting. It would be beneficial for the state to systematically track and report both the proportion of AGR from out of state patrons and the proportions of admissions from visitors to Indiana.

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Appendix A

Appendix to Chapter 2: Derivation of the Taxonomy of Benefits and Costs for Hoosiers – Applying the Theoretical Model of Grinols and Mustard (2001) to Indiana

The methodology of deriving a complete and mutually exhaustive listing of benefits and costs begins with the individual well-being of people, called individual utility, a fundamental economic concept for benefit-cost analysis. We compare the sum of social welfare in Indiana between two situations. In scenario 1, ten riverboat casinos operate under the regulatory and tax regime Indiana adopted for fiscal year 2005. In scenario 0, Indiana does not license or permit ten riverboat casinos to operate. Under both of these scenarios other forms of gambling are available to Indiana and non-Indiana citizens. Under both scenario 0 and scenario 1, Indiana and all states bordering Indiana operate state lotteries, casinos are available in Illinois and Michigan, charitable gambling, such as bingo is legally available, and wagering on horse racing is available in Indiana and other states. Under both scenarios individuals may engage in illegal wagering in person, by phone, or using the internet. This methodology allows us to list the additional benefits and costs of the ten riverboat casinos in Indiana summed over Indiana citizens by comparing scenario 0 with scenario 1.

We define the utility for resident i of Indiana, $u_i\left(x_i, x_i^g\right)$, to be a standard utility function defined over a K-dimensional vector of private goods, x_i, and a L-dimensional vector of public goods, x_i^g. Let the price of goods facing each individual i, be p_i. Consumption enters the utility function as positive values and individual provision of goods and services enters the utility function as negative values. Individual i owns a share θ_{ij} of firm j, $\sum_i \theta_{ij} = 1$, and owns endowment w_i. The economy wide endowment is $w = \sum_i w_i$. Let Π = after-tax profits accruing to Indiana citizens. $p \cdot w$ is income from endowments. T is taxes collected in Indiana. E is expenditures on resources taken out of production to deal with externalities. From the accounting identity that consumption equals production we have:

$$\sum_{i}^{\text{Indiana}} p_i \cdot x_i = \Pi + p \cdot w + T - E \qquad \text{(A1)}$$

This equation states that consumption in Indiana equals profits accruing to Indiana citizens plus income from endowments in Indiana plus Indiana tax revenue minus expenditures to deal with externalities in Indiana.

We define the expenditure function $e_i\left(d_i, x_i^g, p_i, u_i\right)$ as the smallest expenditure needed to for Indiana resident i to obtain utility level u_i when prices are p_i, the distance to the

nearest casino is d_i, and the amount of public goods provided is x_i^g. The expenditure function is increasing in u_i.

For an individual Indiana citizen, the change in individual well-being between scenario 0 and scenario 1 is

$$u_i^1\left(x_i^1, x_i^{g1}\right) - u_i^0\left(x_i^0, x_i^{g0}\right)$$

The sign of $e_i\left(d_i^1, x_i^{g1}, p_i^1, u_i^1\right) - e_i\left(d_i^0, x_i^{g0}, p_i^0, u_i^0\right)$ is the same as the sign of $u_i^1\left(x_i^1, x_i^{g1}\right) - u_i^0\left(x_i^0, x_i^{g0}\right)$ because the expenditure function is increasing in u_i. $e\left(d_i, x_i^g, p_i, u_i\left(x_i, x_i^g\right)\right)$ measures utility in dollars for Indiana resident i, holding distance to a casino, d_i, prices, p_i, and public goods, x_i^g constant.

The change in social welfare for Indiana citizens is defined as the sum over all Indiana citizens of the change in individual utility from scenario 0 to scenario 1:

$$\text{Change in Indiana Welfare} = \Delta = \sum_i^{\text{Indiana}} e_i\left(d_i^1, x_i^{g1}, p_i^1, u_i^1\right) - e_i\left(d_i^0, x_i^{g0}, p_i^0, u_i^0\right) \quad \text{(A2)}$$

This formula explicitly assigns an equal weight to all Indiana citizens. Any change in welfare for Indiana is explicitly the result of increases in the welfare of individual Indiana citizens. This assumption also places equal weight on profits from all firms in Indiana.

To use the above equation we follow the modeling assumptions of Grinols and Mustard (2001), except we sum over all Indiana citizens instead of summing over all individuals. Using their algebra we can re-write the equation (A2). Notice that this equation is a series of telescoping sums where each term cancels part of the preceding term.

$$\sum_i^{\text{Indiana}} e_i\left(d_i^1, x_i^{g1}, p_i^1, u_i^1\right) - e_i\left(d_i^0, x_i^{g0}, p_i^0, u_i^0\right) =$$

$$\left[\sum_i^{\text{Indiana}} e_i\left(d_i^1, x_i^{g1}, p_i^1, u_i^1\right) - p_i^1 \cdot x_i^1\right] \quad (A3)$$

$$+\left[\sum_i^{\text{Indiana}} p_i^1 \cdot x_i^1 - p_i^0 \cdot x_i^0\right] \quad (A4)$$

$$+\left[\sum_i^{\text{Indiana}} p_i^0 \cdot x_i^0 - e_i\left(d_i^0, x_i^{g0}, p_i^0, u_i^0\right)\right] \quad (A5)$$

$$+\left[\sum_i^{\text{Indiana}} e_i\left(d_i^0, x_i^{g0}, p_i^0, u_i^0\right) - e_i\left(d_i^0, x_i^{g1}, p_i^0, u_i^0\right)\right] \quad (A6)$$

$$+\left[\sum_i^{\text{Indiana}} e_i\left(d_i^0, x_i^{g1}, p_i^0, u_i^0\right) - e_i\left(d_i^1, x_i^{g1}, p_i^0, u_i^0\right)\right] \quad (A7)$$

$$\left[\sum_i^{\text{Indiana}} e_i\left(d_i^1, x_i^{g1}, p_i^0, u_i^0\right) - e_i\left(d_i^1, x_i^{g1}, p_i^1, u_i^0\right)\right] \quad (A8)$$

Differencing equation A1, derives equation A9.

$$\left[\sum_{i}^{\text{Indiana}} p_i^1 \cdot x_i^1 - p_i^0 \cdot x_i^0\right] = \Delta\Pi + \Delta p \cdot w + \Delta T - \Delta E \qquad \text{(A9)}$$

Substituting the term in equation A4 using equation A9, we obtain an exact, exhaustive, and mutually exclusive listing of the benefits and costs moving from scenario 0 to scenario 1. The total change in welfare for Indiana citizens is the entire sum of the above equation. With this equation we now can describe each of these the terms A10-A18 in detail.

$$\sum_{i}^{\text{Indiana}} e_i\left(d_i^1, x_i^{g1}, p_i^1, u_i^1\right) - e_i\left(d_i^0, x_i^{g0}, p_i^0, u_i^0\right) =$$

$$\left[\sum_{i}^{\text{Indiana}} e_i\left(d_i^1, x_i^{g1}, p_i^1, u_i^1\right) - p_i^1 \cdot x_i^1\right] \qquad (A10)$$

$$+\left[\Delta\Pi\right] \qquad (A11)$$

$$+\left[\Delta p \cdot w\right] \qquad (A12)$$

$$+\left[\Delta T\right] \qquad (A13)$$

$$-\left[\Delta E\right] \qquad (A14)$$

$$+\left[\sum_{i}^{\text{Indiana}} p_i^0 \cdot x_i^0 - e_i\left(d_i^0, x_i^{g0}, p_i^0, u_i^0\right)\right] \qquad (A15)$$

$$+\left[\sum_{i}^{\text{Indiana}} e_i\left(d_i^0, x_i^{g0}, p_i^0, u_i^0\right) - e_i\left(d_i^0, x_i^{g1}, p_i^0, u_i^0\right)\right] \qquad (A16)$$

$$+\left[\sum_{i}^{\text{Indiana}} e_i\left(d_i^0, x_i^{g1}, p_i^0, u_i^0\right) - e_i\left(d_i^1, x_i^{g1}, p_i^0, u_i^0\right)\right] \qquad (A17)$$

$$\left[\sum_{i}^{\text{Indiana}} e_i\left(d_i^1, x_i^{g1}, p_i^0, u_i^0\right) - e_i\left(d_i^1, x_i^{g1}, p_i^1, u_i^0\right)\right] \qquad (A18)$$

Equation A10 is the welfare effect of transactional constraints on consumers in scenario 1. $e_i\left(d_i^1, x_i^{g1}, p_i^1, u_i^1\right)$ is least costly way of obtaining utility level u_i^1 that is actually achieved under scenario 1. The consumption bundle an individual picks under scenario 1, $\left(x_i^1, x_i^{g1}\right)$, is one way of obtaining this level of utility because $u_i^1 = u\left(x_i^1, x_i^{g1}\right)$. Therefore equation A10 can be read as the sum over all Indiana citizens of the cheapest way to reach the level of utility in scenario 1 minus the actual cost of achieving that level of utility. If there are no transactional costs in scenario 1 then these terms would be equal, $\sum_{i}^{\text{Indiana}} e_i\left(d_i^1, x_i^{g1}, p_i^1, u_i^1\right) = p_i^1 \cdot x_i^1$ and equation A3 would equal zero. Equation A15 is the welfare effect of transactional constraints in scenario 0. Equation A15 is the difference

between the actual costs of obtaining utility level u_i^0 under scenario 0, and the lowest cost method of obtaining this utility level, u_i^0. If there were no transaction constraints on individuals, the two terms in equation A15, $\sum_{I}^{Indiana} p_i^0 \cdot x_i^0 = e_i\left(d_i^0, x_i^{g0}, p_i^0, u_i^0\right)$, would cancel each other. The most important transactional constraints might be in labor markets. If individuals are willing to work for a reservation wage, but cannot find a job at that wage because of transactional barriers, they may suffer from involuntary unemployment. If there is a change in the sum over all Indiana citizens of transactional constraints in moving from scenario 0 to scenario 1, this change would be a benefit to Indiana citizens.

The net change in profits accruing to Indiana citizens enters in equation A11. If scenario 1 results in higher profits accruing to Indiana residents than scenario 0, then this term is a net benefit for Indiana. It should be noted that this term is the net increase in profits not the gross profits of the Indiana riverboat casinos. This term is summed over all businesses with profits accruing to Indiana residents.

Equation A12 is the increased value of endowments owned by Indiana citizens between scenarios.

Equation A13 is the net change in tax revenue for Indiana. Equation A16 represents the change is welfare from a change in the level of public goods provide under two scenarios.

If tax revenue is higher under scenario 1 then the amount of net increase in tax revenue which could be used for greater expenditures by Indiana state and local government or for lower taxes for Indiana citizens is a net benefit for Indiana. If all of the net change in tax revenue for Indiana is used only to lower other taxes on Indiana citizens, and the level of public goods was unchanged, then all of the benefits to Indiana would be in equation A13. In that case equation A16 would equal zero. If some of the tax revenue is used to provide public goods this would be a benefit listed in equation A16. Following Grinols (2004) we assume a dollar of taxes produces public goods worth a dollar. With this assumption, regardless of the exact break down between using additional tax revenue for other tax reductions or using additional tax revenue for additional spending in Indiana, this benefit to Indiana citizens will be equal to the net change in tax revenue for Indiana.

Equation A14 is the net change in real resources using in Indiana to deal with externalities. If a scenario results in larger externalities so that more resources are used dealing with those externalities, then the cost of these resources are a net cost to Indiana. Social costs that would be incurred in scenario 1 but not in scenario 0 enter the calculus through this equation. It should be noted that equation A14 is the net change in resources to deal with externalities generated from moving from scenario 0 to scenario 1. It is not the total costs of all real resources using in dealing with any gambling problem.

Equation A17 is the distance consumer surplus for Indiana citizens from closer proximity to a casino in scenario 1 than in scenario 0. All Indiana counties are within 250 miles of

a casino under scenario 0, without Indiana riverboat casinos. In scenario 1, many Indiana residents are closer to the entertainment amenity of riverboat casinos. Distance consumer surplus is the amount of money Indiana citizens would be willing to pay when the nearest casino in scenario 1 is closer compared to when the nearest casino is farther away in scenario 0, while remaining no worse off. This net benefit to Indiana citizens is the sum over all Indiana citizens of this distance consumer surplus.

Equation A18 is the consumer surplus from a change in prices. If the introduction of riverboat casinos in Indiana favorably changes the odds for Indiana residents this would be a reduction in prices. Lower prices increase consumer surplus. If Indiana riverboats are similar to other regional casinos in the odds of the games then this term would be zero and all the consumption gains for Indiana citizens would be in the form of distance consumer surplus in equation A17.

Appendix B: Change in Distance to Nearest Casino; Basis for Consumer Surplus [Benefit]

County	Distance to Nearest Casino Outside IN	Distance to Nearest Casino w/i IN	Change in Distance to Nearest Casino	County	Distance to Nearest Casino Outside IN	Distance to Nearest Casino w/i IN	Change in Distance to Nearest Casino
Adams	145	116	30	Lawrence	199	56	143
Allen	134	104	30	Madison	156	88	68
Bartholomew	198	57	141	Marion	157	84	73
Benton	74	71	3	Marshall	98	42	56
Blackford	162	100	62	Martin	181	61	120
Boone	131	110	22	Miami	120	78	42
Brown	187	72	115	Monroe	182	76	106
Carroll	102	80	23	Montgomery	118	113	5
Cass	105	72	33	Morgan	164	91	73
Clark	242	21	221	Newton	52	46	6
Clay	155	101	54	Noble	138	79	59
Clinton	119	100	19	Ohio	240	8	233
Crawford	202	31	171	Orange	199	41	158
Daviess	166	56	110	Owen	164	94	71
Dearborn	233	7	226	Parke	127	127	0
Decatur	206	38	168	Perry	196	41	155
DeKalb	118	101	18	Pike	158	33	124
Delaware	167	85	83	Porter	55	20	35
Dubois	179	47	133	Posey	131	18	113
Elkhart	118	54	65	Pulaski	81	48	33
Fayette	201	42	159	Putnam	143	113	30
Floyd	233	8	225	Randolph	181	75	106
Fountain	102	102	0	Ripley	223	22	201
Franklin	217	24	193	Rush	190	49	141
Fulton	105	58	46	St. Joseph	96	32	64
Gibson	138	26	111	Scott	231	37	194
Grant	145	104	41	Shelby	183	59	124
Greene	173	80	92	Spencer	176	30	146
Hamilton	146	94	52	Starke	76	30	46
Hancock	169	71	98	Steuben	110	98	12
Harrison	221	12	209	Sullivan	147	77	70
Hendricks	146	101	45	Switzerland	248	2	246
Henry	179	65	114	Tippecanoe	99	90	9
Howard	126	95	32	Tipton	135	106	29
Huntington	145	95	50	Union	211	37	174
Jackson	210	50	159	Vanderburgh	147	2	145
Jasper	63	46	17	Vermillion	116	121	0
Jay	164	94	70	Vigo	142	101	40
Jefferson	236	25	211	Wabash	130	83	47
Jennings	217	38	179	Warren	92	92	0
Johnson	174	73	101	Warrick	163	19	144
Knox	148	48	100	Washington	221	31	190
Kosciusko	119	62	57	Wayne	198	54	144
LaGrange	130	76	55	Wells	157	108	50
Lake	40	13	26	White	85	67	17
LaPorte	74	18	57	Whitley	139	82	57

Appendix C: - Calculation of Distance Consumer Surplus by Indiana County for Adults 20+

County	Distance Consumer Surplus Per Adult 20+	2004 Population Age 20+	Distance Consumer Surplus for County	County	Distance Consumer Surplus Per Adult 20+	2004 Population Age 20+	Distance Consumer Surplus for County
Adams	$4.39	22,615	$99,282	Lawrence	$8.09	35,143	$284,308
Allen	$4.39	240,158	$1,054,292	Madison	$8.09	98,205	$794,475
Bartholomew	$8.09	51,550	$417,038	Marion	$8.09	627,977	$5,080,338
Benton	$3.70	6,601	$24,426	Marshall	$11.73	32,760	$384,270
Blackford	$4.39	10,333	$45,361	Martin	$8.09	7,689	$62,201
Boone	$4.39	35,460	$155,670	Miami	$8.09	27,056	$218,885
Brown	$8.09	12,253	$99,127	Monroe	$8.09	91,823	$742,850
Carroll	$8.09	15,112	$122,255	Montgomery	$4.39	27,621	$121,258
Cass	$8.09	29,800	$241,085	Morgan	$8.09	50,355	$407,374
Clark	$16.12	75,543	$1,217,749	Newton	$11.73	10,930	$128,204
Clay	$4.39	19,798	$86,913	Noble	$8.09	33,423	$270,389
Clinton	$8.09	24,261	$196,269	Ohio	$41.06	4,458	$183,040
Crawford	$16.12	8,276	$133,409	Orange	$16.12	14,275	$230,117
Daviess	$8.09	21,203	$171,530	Owen	$8.09	17,090	$138,258
Dearborn	$41.06	34,744	$1,426,587	Parke	$4.39	13,344	$58,578
Decatur	$16.12	18,071	$291,309	Perry	$16.12	14,422	$232,489
DeKalb	$4.39	29,118	$127,829	Pike	$16.12	10,043	$161,887
Delaware	$8.09	85,781	$693,964	Porter	$21.60	112,283	$2,425,323
Dubois	$16.12	28,982	$467,198	Posey	$25.99	19,788	$514,286
Elkhart	$8.09	131,779	$1,066,094	Pulaski	$11.73	10,343	$121,327
Fayette	$16.12	18,867	$304,136	Putnam	$4.39	26,951	$118,314
Floyd	$41.06	53,020	$2,177,010	Randolph	$8.09	19,869	$160,738
Fountain	$4.39	12,867	$56,486	Ripley	$16.12	20,276	$326,848
Franklin	$16.12	16,389	$264,195	Rush	$16.12	13,099	$211,152
Fulton	$8.09	14,991	$121,278	St. Joseph	$11.73	191,792	$2,249,723
Gibson	$16.12	24,345	$392,446	Scott	$16.12	17,214	$277,486
Grant	$4.39	53,421	$234,517	Shelby	$8.09	31,541	$255,166
Greene	$8.09	25,281	$204,527	Spencer	$16.12	15,342	$247,311
Hamilton	$8.09	150,495	$1,217,504	Starke	$11.73	17,546	$205,818
Hancock	$8.09	44,891	$363,169	Steuben	$8.09	25,551	$206,709
Harrison	$25.99	26,419	$686,620	Sullivan	$8.09	16,841	$136,244
Hendricks	$4.39	87,843	$385,631	Switzerland	$41.06	7,418	$304,566
Henry	$8.09	36,086	$291,938	Tippecanoe	$3.70	112,679	$416,912
Howard	$8.09	61,962	$501,275	Tipton	$4.39	12,282	$53,919
Huntington	$8.09	27,762	$224,598	Union	$16.12	5,487	$88,454
Jackson	$8.09	30,714	$248,479	Vanderburgh	$41.06	127,498	$5,235,062
Jasper	$11.73	22,759	$266,959	Vermillion	$4.39	12,531	$55,010
Jay	$8.09	15,637	$126,500	Vigo	$4.39	77,849	$341,756
Jefferson	$16.12	23,844	$384,368	Wabash	$8.09	25,770	$208,479
Jennings	$16.12	20,419	$329,153	Warren	$3.70	6,572	$24,316
Johnson	$8.09	89,507	$724,111	Warrick	$25.99	40,254	$1,046,193
Knox	$16.12	28,449	$458,592	Washington	$16.12	20,177	$325,256
Kosciusko	$8.09	55,165	$446,287	Wayne	$8.09	52,007	$420,735
LaGrange	$8.09	23,577	$190,735	Wells	$4.39	20,495	$89,972
Lake	$17.90	353,730	$6,331,765	White	$3.70	19,358	$71,623
LaPorte	$21.60	81,833	$1,767,592	Whitley	$8.09	23,153	$187,306
				Indiana	**$ 11.65**	**4,520,289**	**$52,662,176**

Appendix D: - VEP Participation by Indiana County

County	Count	Percent of Indiana VEP Participants	VEP Participants Percent of Adult Pop	County	Count	Percent of Indiana VEP Participants	VEP Participants Percent of Adult Pop
Adams	2	0.63%	0.008%	Lawrence	2	0.63%	0.006%
Allen	1	0.32%	0.000%	Madison	0	0.00%	0.000%
Bartholomew	1	0.32%	0.002%	Marion	14	4.42%	0.002%
Benton	0	0.00%	0.000%	Marshall	1	0.32%	0.003%
Blackford	0	0.00%	0.000%	Martin	0	0.00%	0.000%
Boone	1	0.32%	0.003%	Miami	0	0.00%	0.000%
Brown	0	0.00%	0.000%	Monroe	1	0.32%	0.001%
Carroll	1	0.32%	0.006%	Montgomery	0	0.00%	0.000%
Cass	0	0.00%	0.000%	Morgan	1	0.32%	0.002%
Clark	26	8.20%	0.033%	Newton	0	0.00%	0.000%
Clay	0	0.00%	0.000%	Noble	0	0.00%	0.000%
Clinton	0	0.00%	0.000%	Ohio	2	0.63%	0.043%
Crawford	1	0.32%	0.012%	Orange	0	0.00%	0.000%
Daviess	0	0.00%	0.000%	Owen	0	0.00%	0.000%
Dearborn	18	5.68%	0.050%	Parke	0	0.00%	0.000%
Decatur	1	0.32%	0.005%	Perry	0	0.00%	0.000%
DeKalb	0	0.00%	0.000%	Pike	0	0.00%	0.000%
Delaware	0	0.00%	0.000%	Porter	31	9.78%	0.027%
Dubois	1	0.32%	0.003%	Posey	1	0.32%	0.005%
Elkhart	7	2.21%	0.005%	Pulaski	1	0.32%	0.009%
Fayette	1	0.32%	0.005%	Putnam	0	0.00%	0.000%
Floyd	19	5.99%	0.035%	Randolph	1	0.32%	0.005%
Fountain	0	0.00%	0.000%	Ripley	2	0.63%	0.010%
Franklin	2	0.63%	0.012%	Rush	0	0.00%	0.000%
Fulton	0	0.00%	0.000%	St. Joseph	8	2.52%	0.004%
Gibson	1	0.32%	0.004%	Scott	2	0.63%	0.011%
Grant	0	0.00%	0.000%	Shelby	1	0.32%	0.003%
Greene	0	0.00%	0.000%	Spencer	4	1.26%	0.025%
Hamilton	2	0.63%	0.001%	Starke	5	1.58%	0.028%
Hancock	1	0.32%	0.002%	Steuben	0	0.00%	0.000%
Harrison	4	1.26%	0.015%	Sullivan	0	0.00%	0.000%
Hendricks	1	0.32%	0.001%	Switzerland	4	1.26%	0.052%
Henry	1	0.32%	0.003%	Tippecanoe	1	0.32%	0.001%
Howard	0	0.00%	0.000%	Tipton	0	0.00%	0.000%
Huntington	0	0.00%	0.000%	Union	0	0.00%	0.000%
Jackson	2	0.63%	0.006%	Vanderburgh	8	2.52%	0.006%
Jasper	0	0.00%	0.000%	Vermillion	0	0.00%	0.000%
Jay	0	0.00%	0.000%	Vigo	1	0.32%	0.001%
Jefferson	6	1.89%	0.024%	Wabash	0	0.00%	0.000%
Jennings	2	0.63%	0.009%	Warren	0	0.00%	0.000%
Johnson	1	0.32%	0.001%	Warrick	3	0.95%	0.007%
Knox	1	0.32%	0.003%	Washington	2	0.63%	0.010%
Kosciusko	1	0.32%	0.002%	Wayne	0	0.00%	0.000%
LaGrange	0	0.00%	0.000%	Wells	0	0.00%	0.000%
Lake	99	31.23%	0.027%	White	2	0.63%	0.010%
LaPorte	15	4.73%	0.018%	Whitley	0	0.00%	0.000%

Source: Indiana Gaming Commission. "VEP All Members Summary " December 29, 2005; Policy Analytics, LLC calculations.

Appendix E: Indiana Problem Gambling Hotline Calls by County

Caller County	Count of Intake Calls	Percent of Indiana Callers	Problem Gambling Callers % of Adult Pop Age 18+	Caller County	Count of Intake Calls	Percent of Indiana Callers	Problem Gambling Callers % of Adult Pop Age 18+
Adams	1	0.141%	0.004%	Madison	6	0.844%	0.006%
Allen	23	3.235%	0.009%	Marion	108	15.190%	0.017%
Bartholomew	1	0.141%	0.002%	Marshall	7	0.985%	0.021%
Benton	2	0.281%	0.029%	Martin	1	0.141%	0.013%
Blackford	1	0.141%	0.009%	Miami	8	1.125%	0.029%
Boone	3	0.422%	0.008%	Monroe	4	0.563%	0.004%
Brown	4	0.563%	0.032%	Montgomery	4	0.563%	0.014%
Carroll	0	0.000%	0.000%	Morgan	0	0.000%	0.000%
Cass	5	0.703%	0.016%	Newton	3	0.422%	0.027%
Clark	23	3.235%	0.029%	Noble	3	0.422%	0.009%
Clay	3	0.422%	0.015%	Ohio	1	0.141%	0.022%
Clinton	0	0.000%	0.000%	Orange	1	0.141%	0.007%
Crawford	1	0.141%	0.012%	Owen	1	0.141%	0.006%
Daviess	0	0.000%	0.000%	Parke	1	0.141%	0.007%
Dearborn	9	1.266%	0.025%	Perry	3	0.422%	0.020%
Decatur	0	0.000%	0.000%	Pike	30	4.219%	0.289%
DeKalb	5	0.703%	0.017%	Porter	1	0.141%	0.001%
Delaware	11	1.547%	0.012%	Posey	1	0.141%	0.005%
Dubois	5	0.703%	0.017%	Pulaski	0	0.000%	0.000%
Elkhart	18	2.532%	0.013%	Putnam	0	0.000%	0.000%
Fayette	0	0.000%	0.000%	Randolph	0	0.000%	0.000%
Floyd	12	1.688%	0.022%	Ripley	1	0.141%	0.005%
Fountain	8	1.125%	0.060%	Rush	3	0.422%	0.022%
Franklin	5	0.703%	0.030%	St. Joseph	3	0.422%	0.001%
Fulton	3	0.422%	0.019%	Scott	0	0.000%	0.000%
Gibson	3	0.422%	0.012%	Shelby	21	2.954%	0.064%
Grant	5	0.703%	0.009%	Spencer	1	0.141%	0.006%
Greene	2	0.281%	0.008%	Starke	0	0.000%	0.000%
Hamilton	18	2.532%	0.012%	Steuben	1	0.141%	0.004%
Hancock	2	0.281%	0.004%	Sullivan	0	0.000%	0.000%
Harrison	7	0.985%	0.026%	Switzerland	4	0.563%	0.052%
Hendricks	9	1.266%	0.010%	Tippecanoe	0	0.000%	0.000%
Henry	3	0.422%	0.008%	Tipton	1	0.141%	0.008%
Howard	6	0.844%	0.009%	Union	2	0.281%	0.035%
Huntington	5	0.703%	0.017%	Vanderburgh	0	0.000%	0.000%
Jackson	4	0.563%	0.013%	Vermillion	5	0.703%	0.039%
Jasper	0	0.000%	0.000%	Vigo	5	0.703%	0.006%
Jay	2	0.281%	0.012%	Wabash	1	0.141%	0.004%
Jefferson	17	2.391%	0.068%	Warren	3	0.422%	0.044%
Jennings	3	0.422%	0.014%	Warrick	0	0.000%	0.000%
Johnson	12	1.688%	0.013%	Washington	26	3.657%	0.125%
Knox	3	0.422%	0.010%	Wayne	8	1.125%	0.015%
Kosciusko	3	0.422%	0.005%	Wells	1	0.141%	0.005%
LaGrange	2	0.281%	0.008%	White	1	0.141%	0.005%
Lake	157	22.082%	0.043%	Whitley	0	0.000%	0.000%
LaPorte	26	3.657%	0.031%	Out of State	423	59.494%	
Lawrence	9	1.266%	0.025%				

Source: Indiana Problem Gambling Hotline; Data for FY 2005; http://www.indianaproblemgambling.org.

Appendix F

Casinos and Crime: A Panel Study

One of the key issues of the debate about the impact of casinos is the effect of casinos on crime rates. Grinols and Mustard (2006) explore the relationship between casinos and crime using county level data for the United States between 1977 and 1996. Their sample covers all 3,165 counties in the United States. Each of their estimated regressions includes over 57,000 observations of counties by year. This large number of observations results in precise estimates.

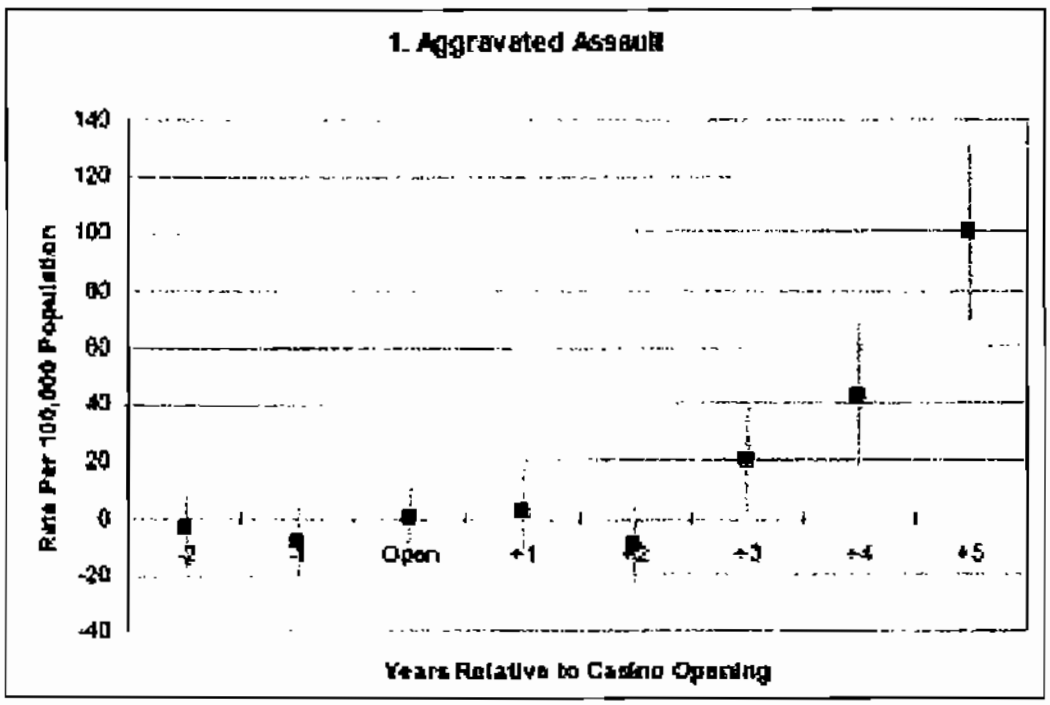
The Grinols and Mustard paper, which is forthcoming in the prestigious, peer-reviewed *Review of Economics and Statistics* edited at the Harvard University Department of Economics in February 2006, has several advantages over earlier studies in the precise and accurate estimation of the effects of casino expansion on crime rates.[14] First, this paper is the first study to account for both other factors that affect crime rates over time and other factors that affect crime rates across counties while estimating the effects of casino introduction on crime rates. This study uses panel data to distinguish general time trends in crime rates from the direct effect of casino introduction on the crime rate in the county containing the casino. This is possible because panel data allows one to compare differences in time and differences across counties simultaneously.

Grinols and Mustard control for many other variables that may influence the crime rate, including population density, total county population, population distributions by race, age, and sex, income, unemployment, income maintenance transfers, retirement, county fixed effects, and year fixed effects. Second, other studies have used very small samples, while their study uses county level data for all of the United States with over 57,000 observations. Third, some other studies have used arrests rates which while correlated with crime rates are less precise than using actual crime rates. They use actual crime rates by county with crime offense data provided from the FBI's Uniform Crime Report.

Grinols and Mustard calculate the crime rate per county in the conventional manner as the number of criminal offenses divided by county population. They demonstrate that when the policy effect under consideration is the costs to the host county regardless of the source of the crime this is the proper crime rate to use. They also point out that the three largest tourist attractions in the United States in 1994 were the Mall of America in Bloomington, Minnesota, Disney World in Orlando, Florida, and Branson, Missouri. These locations had 38 million, 34 million, and 5.6 million visitors respectively in 1994. Los Vegas had 30.3 million visitors in 1994. "Visitors per resident were 1,345 for

[14] For a more detailed of the fundamental methodological weaknesses of some of this previous literature see the first page of Grinols and Mustard (2006).

Branson, 436 for Bloomington, 188 for Orlando, and 40 for Las Vegas. If visitors of any type are the predominate mechanism for crime, Branson and Bloomington should be among the most crime-ridden places in North America. Even adding visitors to residents in the denominator to calculate diluted crime rates, the crime rate per 100,000 visitors-plus-residents was 187.3 for Las Vegas, 64 for Orlando, 16.4 for Branson, 11.9 for

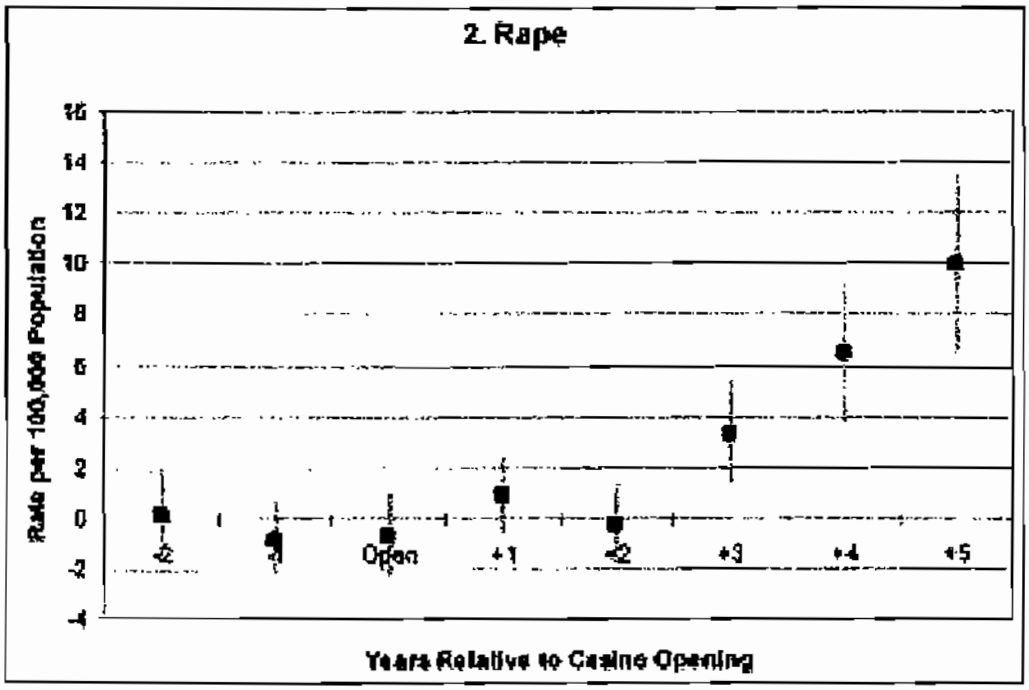


Bloomington. Bloomington received 7.7 more visitors than Las Vegas, but had a diluted crime rate less than 1/15 of Las Vegas's."[15]

Grinols and Mustard estimate the effects of a million additional visitors to National Park Service sites on the crime rate in counties containing National Park Service sites. Additional visitors to National Park Service sites are associated with fewer crimes for rape, murder, robbery, and burglary. Additional visitors to National Park Service sites do not have a statistically significant effect on auto theft crime rates. Additional visitors to National Park Service sites have do not have a meaningful effect on larceny and assaults.

The effect of casinos on crime will vary with the time from the casinos date of opening. Reductions in crime due to improvements in labor market opportunities will be observed prior to and shortly after the casino opening as people may be hired by the casino or casino related industries. Effects from pathological and problem gamblers will not be felt until a gambling problem has developed. Previous studies suggest that it takes about one year for individuals to get hooked on video gaming (Breen and Zimmerman 2002) while other forms of gaming (horses, sports betting, blackjack, etc.) become compulsive after three and a half years (RI Gambling Treatment Program, 2002).

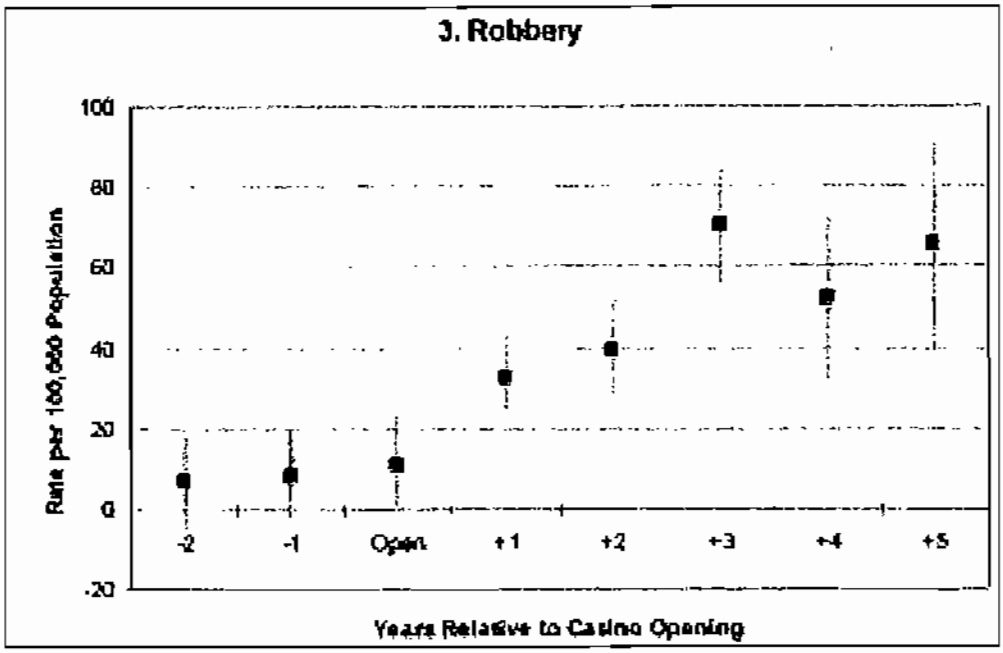
[15] Grinols and Mustard (2006), fifth page.

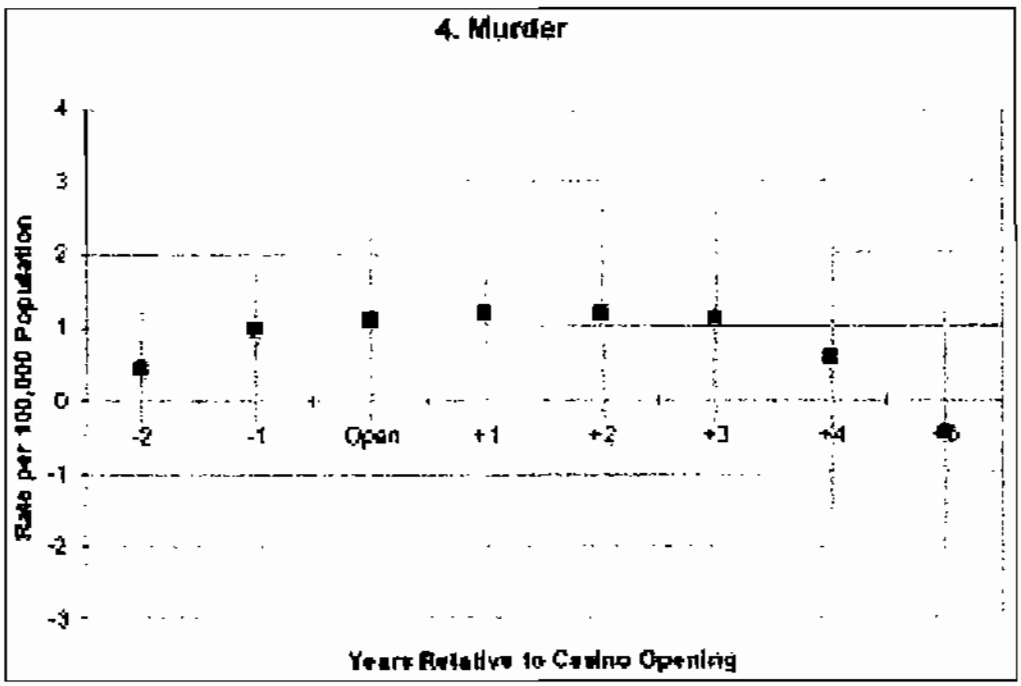


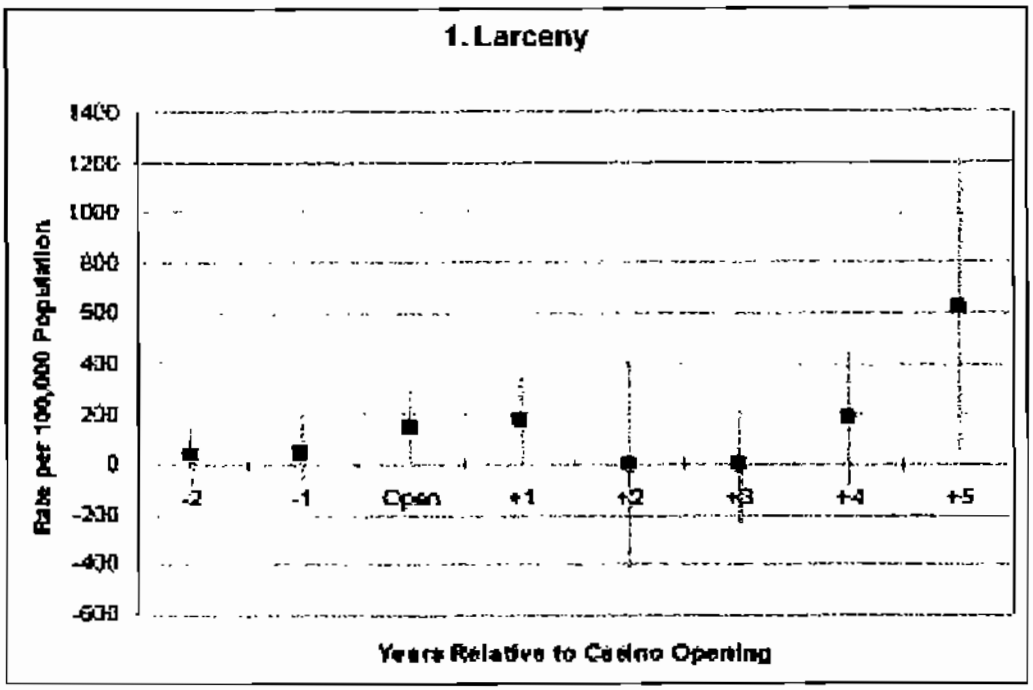
The seven figures in this appendix show the marginal effects of the opening of a casino the crime rate per 100,000 people for aggravated assault, rape, robbery, murder, larceny, burglary, and auto-theft. These figures show the effects of casinos on the crime rate in counties hosting casinos for 2 years prior to casino opening until 5 years after the opening of a casino holding other factors unchanged. The point estimates are displayed in black, with statistical 95% confidence intervals in gray.

Casino-county crime rates increase relative to non-casino county crime rates after the opening of a casino. Five years after a casino opens aggravated assault, rape, robbery, larceny, burglary, and auto-theft increase, holding other factors constant. Casino openings have no statistically significant effect on murder rates. The transitory changes in the crime rate for counties hosting casinos in the early years after opening are smaller. The effects of casino opening on the aggregated assault and rape crime rates increase from the third to fifth year after a casino opens.

Grinols and Mustard find that the crime rate does not drop in counties bordering casino-counties when casinos open. This result suggests the increased crime in casino-counties is the result of a net increase in crime, not simply a shift in the location of pre-existing crime to casino-counties.

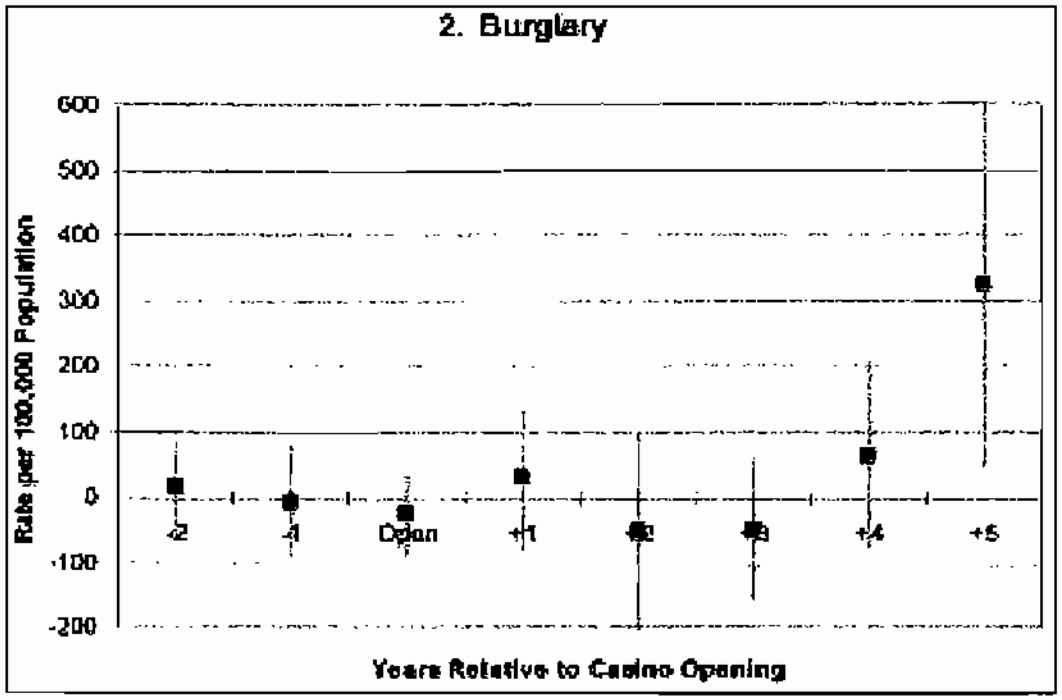

3. Robbery
Rate per 100,000 Population
100
80
60
40
20
0
-20
-2
-1
Open
+1
+2
+3
+4
+5
Years Relative to Casino Opening


4. Murder
Rate per 100,000 Population
4
3
2
1
0
-1
-2
-3
-2
-1
Open
+1
+2
+3
+4
Years Relative to Casino Opening

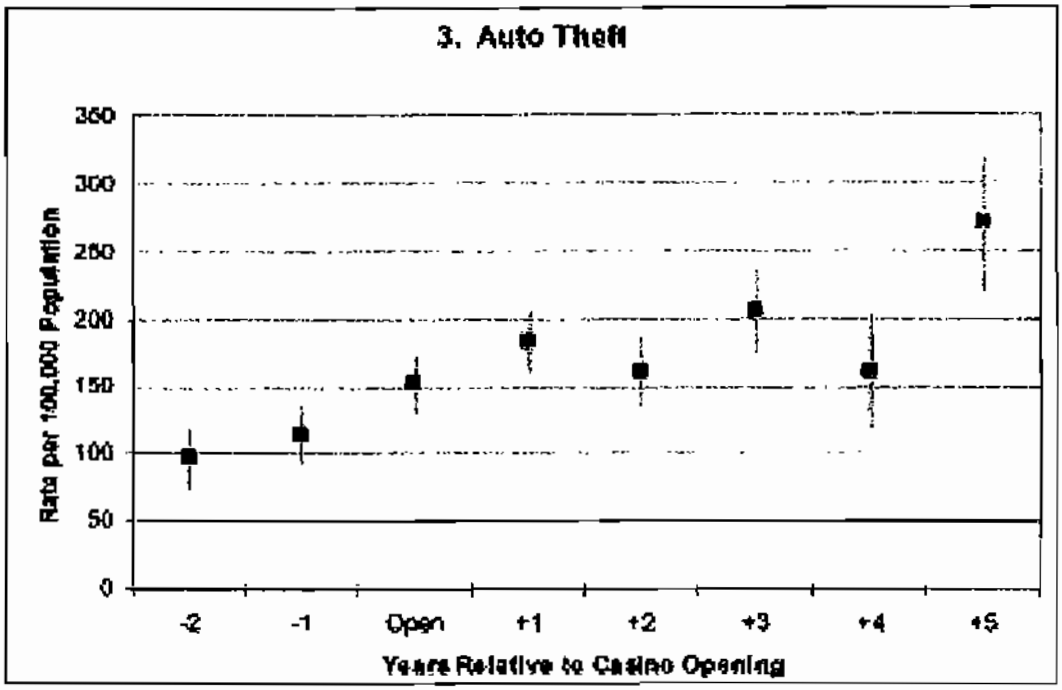


The pattern of increased crime is quite different than the pattern of increased visitors to a county after a new casino opens. The number of visitors rises quickly when a casino opens. The growth in visitors is much slower in later years as the market matures. There are an estimated 100 additional aggravated assaults a year per 100,000 people in counties hosting casinos five years after casinos open. There are an estimated 10 additional rapes a year per 100,000 people in counties hosting casinos five years after casinos open.

Robbery rates are higher from the second to fifth year after a casino opens in a county. This effect is statistically significant. There are an estimated 65 additional robberies a year per 100,000 people in counties hosting casinos five years after casinos open.



The transitory patterns are different for larceny and burglary compared to auto theft. Larceny and burglary rates do not increase until five years after a casino opens. There are 615 additional larcenies per year per 100,000 people in counties hosting casinos five years after a casino opens. There are an estimated 325 additional burglaries per year per 100,000 people in counties hosting casinos five years after casinos open. Auto theft rates are higher in each of the years after the opening of a casino in a county. There are an estimated 272 additional auto thefts per year per 100,000 people in counties hosting casinos five years after casinos open.



A brief discussion of how the social costs of crime are calculated in a benefit-cost analysis is useful. As discussed in the body of this report, a benefit-cost analysis for Indiana sums the benefits and costs for all Indiana citizens. The social costs of crime are measured in benefit-costs analysis as the lost real resources used in dealing with crime, but not the value of goods stolen by criminals and lost by law-obeying citizens. The value of lost property is counted as a transfer in benefit-cost analysis since it is a gain to one person, the criminal, but a loss to another member of society, the crime victim. The net effect would be zero in a benefit-cost analysis. It is important to calculate the value of property stolen from law-obeying citizens even if property transfers are not a social cost in the sense of benefit-cost analysis. Resources used in catching, judging, jailing, and rehabilitating criminals are a cost to society and count as costs in a benefit-cost framework.

Grinols and Mustard use the above estimates of the additional number of crimes combined with information on the social costs of crime to calculate the total social cost of additional crime. The property loss per crime is reported in the third column of Table F.1. This is the value of the average property loss to victims of robbery, larceny, burglary, and auto theft. This data is from the *Crime in the United States* (FBI, 2004). The social cost per crime is reported in the fourth column of Table C1. This data is from Miller, Cohen, and Wiersema (1996).

Grinols and Mustard find that "roughly 8% of crime in counties containing casinos is attributable to the presence of casinos, costing the average adult $75 per year." Grinols and Mustard measure this social cost of crime per adult in 2003 dollars. In 2005 dollars, this is $79 per adult per year for Indiana counties containing casinos. In addition, they find that the value of lost property from larceny, burglary, auto theft, and robbery was $29 per adult in counties containing casinos. In 2005 dollars this is $31 per adult

annually. The lost value of property represents a transfer from crime victims to criminals and is therefore not counted as a social cost of crime.

Table F.1: - Estimated Additional Crime Impact Resulting from Casino Gambling

Type of Crime	Additional Crimes per 100,000 Population per Year	Average Property Loss (2005 $'s)	Total Cost Per Victim (2005 $'s)
Aggravated Assault	100	n/a	$19,930
Rape	10	n/a	$115,592
Robbery	65	$1,377	$17,272
Murder	0	n/a	$3,035,283
Larceny	615	$766	$492
Burglary	325	$1,729	$1,933
Auto Theft	272	$6,432	$5,315

Source: Grinols and Mustard, "Casinos, Crime, and Community Costs," *Review of Economics and Statistics*, (2006) forthcoming.

We use the national marginal treatment effect of opening a casino on crime in a county estimated by Grinols and Mustard as the best and most precise estimate of the marginal treatment effect of opening a casino in a county in Indiana. Applying their estimate of a social cost of from of $79 per adult to the seven Indiana counties with riverboat casinos, Dearborn, Harrison, Lake, LaPorte, Ohio, Switzerland, and Vanderburgh produces precise estimate the total social cost of crime to Indiana citizens. The adult population of these counties was 660,173 in 2004. The estimated additional social cost of crime due to the introduction of riverboat casinos in Indiana is $52,136,362. The estimated value of lost property from property crimes due to casino introduction in Indiana is $20,194,151.

Appendix G

Biographical Sketches

William J. Sheldrake, President

The President and founder of Policy Analytics is Bill Sheldrake, a recognized and respected leader in economic analysis, state and regional government policy, and statistical research. With more than 20 years experience in public policy analysis, research, and finance, Bill's expertise makes him an invaluable resource for clients who seek out Policy Analytics to help them in defining analytical projects, structuring organizational issues, or carrying out complex research projects.

Bill Sheldrake is perhaps best known for his leadership of the Indiana Fiscal Policy Institute where he served for more than eight years as President and CEO. The Institute, a non-partisan, independent, governmental research organization, is widely regarded as the leading voice on public sector fiscal policy issues in Indiana. Under his leadership, the IFPI conducted research on human capital shortages in Indiana, examined public pension funds, and assisted in the development of Indiana tax restructuring legislation, among many other projects. In addition to leading the organization, Bill was the principal investigator and published reports on these and other policy issues which have resulted in new or amended legislation for the State of Indiana.

Before serving with IFPI, Bill was on the staff of the Indiana State Budget Agency, the state's office of financial control for ten years. He was Indiana's chief revenue forecaster, head of tax analysis, and Deputy Budget Director during his service there. Bill is also a former member of the National Board of Trustees of the Governmental Research Association and member of the Governmental Accounting Standards Board Advisory Council. Bill earned a master's degree with a public finance concentration from Purdue University.

Dr. John A. Spry, Associated Consulting Scientist

Dr. John A. Spry is an assistant professor of economics at the University of St. Thomas. He teaches Managerial Economics in the MBA program and undergraduate economics.

He has authored several publications in scholarly journals, has made frequent conference presentations, and has served as a reviewer for academic journals. He has been a member of the faculty at the Bloustein School of Planning and Public Policy at Rutgers University, and has been a visiting professor at Brandeis University and Ball State University. He is a member of the American Economic Association, the Econometric Society, the National Tax Association, and the Western Economic Association. He earned his B.S. in economics at Ohio State University, and his M.A. and Ph.D. in economics at the University of Rochester.

Daniel Clendenning, Senior Consultant

Daniel Clendenning recently joined policy analytics as a Senior Consultant. Between October of 2003 and August of 2005 he worked as a Quantitative Analyst for the RAND Corporation in Santa Monica, California. While at RAND Mr. Clendenning developed innovative estimation techniques for use in dynamic choice models related to military retirement and pension forecasts.

Mr. Clendenning has a Master of Science in Agricultural Economics from Purdue University and a Master of Social Science in Economics from the California Institute of Technology. While at the California Institute of Technology, Mr. Clendenning served as a Teaching and Research Assistant. Mr. Clendenning is a member of The Western Economic Association.

Dr. Rachel Harter, Associated Consulting Scientist

Rachel Harter, Vice President of Statistics and Director of the Statistics and Methodology Department at NORC, is an expert statistician, an accomplished programmer, and an experienced director of large-scale analytical projects. Across a wide range of studies, Harter has been responsible for complex probability sample design, database management, survey and statistical analysis, and technical writing and editing. She joined NORC in 1995 after serving as a Manager and Research Director at A.C. Nielsen Co. Harter received her Ph.D. in statistics from Iowa State University.

Dr. Rachel Volberg, Contributor

Dr. Rachel A. Volberg has been involved in research on gambling and problem gambling since 1985, when she became director of evaluation for treatment programs for pathological gamblers in New York State. Dr. Volberg has guided baseline surveys of gambling and problem gambling in the general population in numerous states, Canadian Provinces and national studies in New Zealand, Sweden and the United States. In addition to research on gambling and problem gambling in the general population, Dr. Volberg has been active in assisting state and provincial governments to develop prevention and treatment services for problem and pathological gamblers.

Dr. Volberg is the president of Gemini Research, Ltd., the only company internationally that specializes in studies of gambling and problem gambling in the general population. Dr. Volberg is a member of the Graduate Faculty of the School of Public Health at the University of Massachusetts, Amherst. She is a member of the Board of Directors of the National Council on Problem Gambling. Dr. Volberg also sits on the Editorial Board of the internationally recognized Journal of Gambling Studies. Dr. Volberg is a Senior Research Scientist at the National Opinion Research Center. Dr. Volberg is the author of When The Chips Are Down: Problem Gambling in America, published by The Century Foundation.