The Economic Effects of Casino Gambling: A Perspective from the U.S.

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Abstract

Casino gambling is very popular with consumers and politicians, and it has become one of the fastest growing entertainment industries within the U.S. and around the world. However, the economic effects of casino gambling and gambling behavior still have not received much research attention from economists. The purpose of this paper is to give an overview of my gambling research, with a focus on casinos in the U.S. Issues examined include the economic growth effects of casino gambling, the relationships among gambling industries and the implications of these relationships on net government tax revenue, the social costs of gambling, casinos and crime, and problems with cost-benefit analysis applied to gambling. Although my research has focused on the casino experience in the U.S., many of the same issues are relevant to Macao's casino market.

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In the past two decades there has been a significant increase in academic interest in gambling behavior and the economic and social impacts of legal gambling. As in the U.S., researchers in the rest of the world have given more attention to gambling issues as the industry has grown. The majority of published research has focused on gambling behaviors, the diagnosis of "pathological gambling," and the treatment thereof. The research on gambling *behavior* has grown significantly, as evidenced by the growing number of journals dedicated to gambling issues.[1] However, a relatively small portion of gambling research has been performed by economists. This is curious, given that the major reasons casinos and other forms of legal gambling exist are strictly economic in nature. Indeed, despite the negative impact the 2007-09 recession has had on the casino industry worldwide, governments continue to look toward legal casinos as way to alleviate fiscal stress. Nowhere is this more obvious than in the U.S., as numerous states are in the process of or are currently considering legalizing casinos. A similar pattern can also be seen in countries across the globe.

The purported economic benefits from casino gambling include tax revenues, increased employment, higher wages and payments to capital, and enhanced economic growth. These benefits, should they occur, are not necessarily without costs. For example, the casino industry may partially or entirely "cannibalize" other industries. In addition, a small percentage of gamblers may exhibit "problem gambling" behavior. Such people are believed to cause significant social costs. The analyses of these benefits and costs of gambling – the economics of gambling – is a young field of research, with only a handful of economists actively researching the various issues.

This paper describes some of the issues that I have studied, mainly related to casino gambling. Although the empirical analysis tends to focus on the U.S., the various issues are relevant to all countries that have, or are considering adopting, commercial casino gambling. The paper is organized into six sections, by topic. Section 1 examines the explanatory factors in the adoption of commercial casinos. Section 2 is a discussion of the economic growth effects of casino gambling, including how gambling can affect growth after a natural disaster. Section 3 discusses the relationships among different gambling industries and the implications of these relationships on government tax revenues. Section 4 is an introduction to the social costs of gambling; it also discusses casinos and crime. In Section 5, I describe some of the hurdles in cost-benefit analysis as it applies to gambling. Section 6 concludes.

[1] The *Journal of Gambling Behavior*, now the *Journal of Gambling Studies*, was the first journal dedicated to gambling; it started in 1985. In the meantime several other journals have begun: *International Gambling Studies*, *Journal of Gambling Issues*, *Gambling Research*, *UNLV Gaming Research & Review Journal*, and *Gaming Law Review & Economics*.

1. Determinants of casino adoption

The legalization of casino gambling is typically a controversial issue. Disagreement over casinos arises from moral objections to gambling, concerns over potentially negative social impacts, as well as uncertainty as to the economic benefits from legalization. Clearly, recent history has shown that casinos have been legalized in a variety of jurisdictions, for a number of different reasons. Perhaps the greatest motivation for introducing casinos is to raise tax revenues. Casinos are generally taxed at a relatively high rate, and therefore offer politicians a relatively easy source of revenues. Yet, casinos are not always welcome, as recently demonstrated by the surprising rejection of casinos on the Penghu Islands, Taiwan. States in the U.S. that already welcome legalized gambling in the form of lotteries are often unsympathetic to the prospects of casino gambling. What factors help to explain why casinos are – or are not – legalized? This issue has not been analyzed for casinos, until recently. We examine this issue for the U.S. in a recent paper (Calcagno, Walker, and Jackson 2010). The economics literature has a number of papers that have examined the adoption of lotteries. Our paper follows this work and applies a similar model to analyze what factors seem to explain the adoption of casinos in the U.S.

Prior to 1989, commercial casinos were legal only in Las Vegas, Nevada, and Atlantic City, New Jersey. After an important legal decision and subsequent legislation in the late 1980s the stage was set for commercial casino legalization. By 1995 commercial casinos had been legalized in eight states. Two other states have legalized casinos since then, and tribal casinos now appear in around 30 states. If casinos represent an easy source of tax revenues, and if a state's population can easily travel to out-of-state casinos, why not just legalize casinos in your state? The interesting question may be why haven't more states introduced commercial casinos in the U.S.? The Calcagno et al. paper examines state governments' adoption of commercial casinos; it does not examine tribal casino decisions.

Our analysis follows the earlier analysis by Jackson, Saurman, and Shughart (1994) in explaining lottery adoption in the U.S. We posit a tobit model to explain the probability and timing of casino adoption using state-level annual data from 1985-2000, a period which covers most of the casino expansion outside of Las Vegas and Atlantic City. Among the variables that are included in the model are "fiscal" variables, such as long- and short-term debt; whether the state has tax/expenditure limits such as balanced budget provisions; the level of state government revenue; and the amount of federal government transfers to the state government. The model also includes variables measuring the influence of the different political parties in the states, as well as the existing gambling opportunities within the state and in nearby states. Finally, a variety of demographic variables are included.

Calcagno et al. (2010) find mixed evidence to support the proposition that "fiscal stress" explains casino adoption in U.S. states. They find more clear evidence that interstate competition helps to explain casino adoption. States seem to legalize casinos in order to attract tourism and to keep their own gamblers in the state ("defensive legalization"). States are more likely to introduce casinos – and to do it sooner – if neighboring states have casinos. But there is little evidence that intrastate competition among gambling industries is relevant to the decision to adopt casinos. Hence, the evidence is consistent with common sense, that legislators look to casinos mainly as a way to increase tax revenues.

Although the Calcagno et al. (2010) paper examines data for the U.S., obviously the same framework could be applied at an international level to explain why some countries have introduced casinos and others have not. The analysis could also be applied to a more local level,

to explain why some communities welcome casinos and others do not. Clearly, the decision to adopt casinos depends, at least in part, on how legislators and voters believe casinos will affect the local or state economy. We examine several related issues below.

2. Casino gambling and economic growth

Although the casino industry argues that it spurs local and regional economic growth by providing high paying jobs and paying taxes and fees to local and state governments, there is little empirical research on the issue. Studies such as Arthur Andersen (1996), commissioned by the casino industry, are biased and amount to little more than static comparisons or listings of taxes paid and employees hired by the casino industry.

The lack of empirical studies on the casino industry is not surprising in the U.S., given the relatively recent expansion of casinos. Even so, there have been few studies on the economic effects of the casino industry. The studies that have been published tend to focus on the relationships among casinos, other gambling industries, and tax revenues. Other studies have examined the negative consequences of casino gambling and pathological gambling behavior, such as crime and bankruptcy. Few studies have examined whether casinos stimulate economic growth or supplement state government revenues.

Walker and Jackson (1998) were among the first to study the effects of the new casino industry in the U.S. We analyzed the relationship between state-level casino revenues and per capita income. To do this, we developed a process for adapting Granger causality testing to panel data. The reason we utilized a panel was because at the time of the analysis, there were relatively few states that had casino gambling. The states that did have casinos, other than Nevada and New Jersey, had them for at most six years. Hence, it was impossible at the time to analyze the states individually. In a more recent paper (Walker and Jackson 2007) we repeated the earlier study using annual data through 2005. The process we used to adapt Granger causality testing for use with panel data is described below.

Granger causality applied to panel data

Granger causality is said to exist between two variables, say x and y, when past values of one variable (x) significantly enhance the ability to predict future values of the other variable (y). The implication is that the first variable is affecting or "causing" the second. Admittedly, Granger causality does not *prove* the two variables are related, and it does not imply that the one variable is the only, or even most important, factor affecting the other variable. What it does do is allow us to assess the relative likelihood of the following four possibilities: (i) x and y are not related; (ii) x Granger causes y; (iii) y Granger causes x; or (iv) x and y Granger cause each other.

In order to adapt Granger causality analysis to panel data, Walker and Jackson (1998, pp. 52-55) propose a three-step process: (i) filtering trend and state-specific effects from the data; (ii) selecting the appropriate time series process that generates each variable; and (iii) conducting the Granger causality tests based on the results of the two previous steps. Our goal is to analyze whether there is a causal relationship between casino revenue and economic growth (per capita income) at the state level.

The first step involves "filtering" the casino revenue and per capita income data. The basic goal is to extract from the data any systematic information associated with state specific factors (laws, institutions, etc.), time trend factors, and any idiosyncrasies of the data or data collection. The filtered variables, i.e., the residuals from these filtering equations, should be

stationary series. This is tested using a unit root test such as Phillips-Perron. Once the filtered series are confirmed to be stationary we move to the next step.

Step (ii) involves determining the time series (autoregressive or ARMA) process that generates each variable. In other words, we are trying to determine how many lagged periods of each variable have a significant predictive power for current observations of the filtered data. The goal is to use the shortest possible lag length for each series such that no systematic relationship remains among the residuals of the estimated process. Once the proper lag length has been determined the Granger causality test is set-up. This is step (iii) in the testing procedure. It involves estimating a two-equation vector autoregressive (VAR) system in which the current value of each filtered variable is regressed on the appropriate number of past values for both variables. Then a set of *F*-tests are performed to test whether the filtered residuals have a Granger causal relationship.

Results

The results of the two studies (Walker and Jackson 1998, 2007) suggest that there is a short-term positive impact of casino gambling on economic growth, but that the effect dies out in the longer term. The 1998 study used quarterly data from 1991-96. Our results in this paper showed that there was a Granger causal relationship for casino revenue on per capita income. These results are perhaps not surprising. The effects of capital expansion and increased demand on the labor market that would come with the new casino industry in a state could be expected to have a positive impact on income. Schumpeter (1934) indicated that one possible source of economic growth is the introduction of a new good/service to an economy. Our results are suggestive of such an effect.

When we repeated the analysis recently (2007), we used annual data from 1991-2005. Annual data are preferred to quarterly data, especially since we had to interpolate the quarterly per capita income data from annual observations. The longer-term analysis indicated no Granger causality relationship between casino revenues and per capita income. Hence, we argue that the introduction of casino gambling has a short-run stimulus effect, but that it eventually dies out. Perhaps this can be explained by competition for the gambling dollar with other legal gambling industries within the state itself, or through direct competition with gambling opportunities online or in neighboring states. Or perhaps casinos simply replace or cannibalize other non-gambling industries within the state. These issues are discussed in more detail in Section 3.

An extension: Hurricane Katrina

As a further application of the theory that casinos cause economic growth, in two recent studies we examined the effect the casino industry had on the economic recoveries in Mississippi and Louisiana from Hurricane Katrina in 2005 (Walker and Jackson 2008a, 2009). The hurricane completely devastated the casino industry in those states, but shortly after the hurricane, the industry began to rebuild. Using quarterly personal income and casino revenue data, we tested the impact the casinos had on personal income in Katrina-affected states. Our model included variables to account for the hurricane and casino activity after the hurricane. The results suggest that the commercial casino industry has had a significantly positive impact on state-level personal income, and that after the hurricane the effect was larger than the "normal" casino effect. Consistent with our earlier papers, the Katrina study suggests casinos can indeed have a positive impact on state-level economic growth, at least in the short-term. Presumably, these

effects come about from an amalgamation of capital and labor effects and the attraction of tourism.

The available empirical evidence suggests that, indeed casinos do have a positive economic growth effect, although it may be short-lived. Obviously, the effect will vary depending on specifics of the jurisdiction and market.

3. Relationships among gambling industries

Whether an economic growth impact exists may be of less concern to politicians than the amount of tax revenues that casino or other gambling activities create for the government. Of course, the various gambling industries often point to the taxes they pay as a measure of the tax relief provided by the industry to the state's (or local) citizens. For example, Missouri taxpayers and politicians may assume that the $742 million in lottery sales or the $403 million in taxes paid by the casino industry represent net increases in tax revenues (or reductions to the citizens' tax burdens). This may be the case, but it is more likely that government spending has increased, or that the taxes raised by gambling are offset by tax losses from other types of consumer expenditures. The tax revenue effect is not as simple as it might at first seem.

There have been a number of studies that have examined the impact of one gambling industry on other gambling or non-gambling industries. Other papers have examined the impact of gambling on state tax revenues.[2] Overall, these studies find that one industry either harms another industry or does not affect it. No study has found that different gambling industries help each other. In addition, the effect of gambling on state tax revenues is mixed. Some of the published findings are summarized in Table 1. There are several limitations of these studies, in terms of understanding general relationships among gambling industries and their overall impact on state government revenues in the U.S. First, for the most part these studies examine a single industry's effect on another industry, but not vice versa. Second, most of the studies examine a single state or county. Third, there are some limitations to the types of models used. For example, many of the studies account for the gambling industry only through a dummy variable. Accounting for the mere existence of a casino, for example, is much less enlightening than accounting for the size of the industry.

In a recent paper Jackson and I provide a general analysis on the relationships among the different gambling industries in the U.S. (Walker and Jackson 2008b). We have also examined the overall impact of legalized gambling on state government revenues (Walker and Jackson 2010). Our findings are described below.

Since no paper had analyzed the general inter-industry relationships for gambling in the U.S., we attempted to model the revenue for each type of gambling industry in each state as a function of other in-state gambling industries, adjacent state gambling industries, and a variety of demographic criteria. We collected annual data on the volume of each type of gambling, for 1985-2000: lottery, horse racing, greyhound racing, commercial casino, and Indian casinos.[3] Using the data that were available, we have 816 observations.

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[2] These studies include Anderson (2005), Anders, Siegel, and Yacoub (1998), Elliott and Navin (2002), Fink, Marco, and Rork (2004), Kearney (2005), Mobilia (1992), Popp and Stehwien (2002), Ray (2001), Siegel and Anders (1999, 2001), and Thalheimer and Ali (1995).

[3] Unfortunately, "volume" is not measured or reported the same in each industry. Volume for lotteries is total ticket sales; for commercial casinos it is net revenue; and for horse and greyhound racing it is handle (the total dollar amount of bets placed). Because Indian casinos are not required to publicly disclose casino data, there is no obvious or easy way to measure their volume. Instead, we collected data on the total square footage of Indian casino floor

Table 1. Studies of the relationships among gambling industries

Paper	Years	States/Counties	Findings
Anders, Siegel, and Yacoub (1998)	1990-96	1 county (AZ)	Indian casinos cause a reduction in tax rev.
Borg, Mason, and Shapiro (1993)	1953-87	10 states	Lotteries cause a decline in some other tax rev., but total tax rev. increases
Elliot and Navin (2002)	1989-95	All states	Casinos and pari-mutuels harm lotteries
Fink, Marco, and Rork (2004)	1967-99	All states	Net increase in lottery rev. causes a decrease in state aggregate tax rev.
Kearney (2005)	1982-98	All states	Lotteries do not harm other forms of gambling
Popp and Stehwien (2002)	1990-97	33 counties (NM)	Indian casinos reduce county tax rev.
Siegel and Anders (1999)	1994-96	1 state (MO)	A 10% increase in gambling tax rev. leads to a 4% decline in other tax rev.
Siegel and Anders (2001)	1993-98	1 state (AZ)	Slots harm lottery; horse and dog racing do not affect lottery
Thalheimer and Ali (1995)	1960-87	3 tracks (OH,KY)	Having both lottery and horse racing increases tax rev.

Source: Walker and Jackson (2008b)

We are attempting to explain gambling revenue. Of course, states elect whether to offer particular types of gambling or not. Therefore, there is a self-selection issue that must be dealt with. The dependent variables (industry volume) in our model are left-censored, especially in the cases of casino gambling and horse racing, as fewer of these states offer these forms of gambling. To deal with the left-censoring, we follow Heckman (1979) and obtain the inverse Mills ratio from a probit and include it in the model of gambling revenue as an additional explanatory variable.

We wanted to model state-level volume of casino gambling, lottery revenue, and dog and horse racing handle. (We did not attempt to model Indian casino square footage.) Because of the nature of the data, we elected to use a seemingly unrelated regression (SUR) analysis. This procedure allows us to estimate our four-equation model jointly as a system of equations, rather than applying OLS to each equation independently. A summary of the results for the inter-

space for each state. The casino industry uses a basic formula for casino layout, and revenues would be expected to vary directly with square footage. Obviously this is not a perfect measure, but it perhaps the best proxy for Indian casino volume that has been developed in the literature.

industry relationships is provided in Table 2. A positive sign indicates a positive and statistically significant coefficient; a minus sign indicates a negative and significant coefficient. As shown, the results are mixed. Some industries appear to help each other (complements), such as casinos and horse racing, lotteries and dog racing, and horse racing and lotteries. Others are apparently substitutes, such as lotteries and casinos, and dog and horse racing.

Table 2. Summary of intrastate industry relationships

Model / **Variable**	Casino	Dog racing	Horse racing	Lottery
Casino		–	+	–
Dog racing	(–)		–	+
Horse racing	+	–		+
Lottery	–	+	+	
Indian square foot	+	(+)	+	–

Source: Walker and Jackson (2008b)
Note: ( ) indicates statistically insignificant at normal levels.

These results supplement the existing literature by providing a more general analysis on the inter-industry relationships. Obviously the relationships among industries may vary by state, as each state has unique laws, demographics, etc. But the evidence provided by Walker and Jackson (2008b) may be helpful to policymakers and voters currently considering the legalization of new types of gambling. One thing that our analysis suggests quite clearly is that the relationships among gambling industries are not straightforward or obvious.

Tax revenues

The inter-industry relationships among gambling industries will obviously have an impact on the effect of legalized gambling on overall state tax revenues. For example, if a state that currently has horse racing wishes to increase tax revenues and is considering legalizing a new type of gambling, it may wish to consider a lottery but not greyhound racing, as Walker and Jackson (2008b) found that lotteries and racing tend to be complements but horse and greyhound racing act as substitutes. But just knowing the relationships among the industries is not enough. Whether a new type of gambling will increase or decrease overall state tax revenues depends on the inter-industry gambling relationships, the relationships between gambling and non-gambling industries, the taxes applied to gambling and non-gambling industry expenditures by consumers, and possibly other factors.

If one considers the level of taxes that are typically levied on gambling industries, it would seem obvious that legalized gambling will tend to increase state government revenues. Consider, for example, that the average state sales tax rate is somewhere around 5%. This tax applies to most consumer goods and often to services.[4] The state lottery typically represents about a 30% tax. That is, for each $1 ticket, approximately 50¢ is returned as prizes, 20¢ goes toward administrative costs, and roughly 30¢ are kept as government revenue – effectively tax

[4] State sales taxes are obviously more complicated then this statement implies. The complexities of state sales taxes are not important for the argument being made here, so they are ignored.

revenue. This breakdown for each lottery ticket is moderately consistent across different states with lotteries. Casinos, on the other hand, are taxed at rates that vary by state. Typically the gross casino revenues are taxed, and then the casino also pays standard income taxes on any remaining profit, as required in most states. The gross gaming taxes range from a low of around 6% in Nevada to a high in Illinois of around 50%.[5] Whatever the state, it is safe to assume that the taxes applied to lotteries or casinos are higher than the regular sales tax. Then it would seem that, even if 100% of casino and lottery revenues in a state come at the expense of other non-gambling expenditures, casino and lotteries should increase net state revenue.

In a forthcoming paper (Walker and Jackson 2010) we test this proposition. We use the same 1985-2000 state-level data as in the inter-industry study (2008b), and perform an econometric analysis to get an idea of whether there are some *general* relationships between gambling industries and tax receipts across states. After controlling for a variety of gambling industry metrics and demographic variables, we find mixed results. In particular, we find that lotteries and horse racing have statistically significant positive effects on state government revenues, while casinos and greyhound racing seem to reduce net government revenues. While the lottery finding was expected, the negative casino result is a bit surprising. Our gambling industry variables included a dummy variable for the existence of each type of gambling in the state, as well as a "marginal impact" variable, to measure the effect on state revenue from each additional dollar of handle in each industry. The results are summarized below in Table 3.

Table 3. Summary of gambling industries on net state government revenue

Industry / **Variable**	Casino	Dog racing	Horse racing	Lottery
Presence of Industry	-$90m.	-$157m.	$671m.	$315m.
Marginal Impact of $1 Handle	-$0.07	-$7.61	-$1.46	-$0.30*

Source: Walker and Jackson (2010)
Notes: * indicates statistical *insignificance*. "m." represents millions.

As Table 3 shows, the existence of the casino industry in a state corresponds to a reduction in state government revenues, for the average casino state, of $90 million. Each additional dollar of handle has a relatively small negative impact on state revenue of only 7¢.[6] The lottery results show a large positive "presence" effect, with a relatively small decline in state revenue from the marginal dollar from ticket sales. Oddly, horse and dog racing seem to have

[5] Casino taxes are complex in some states, with graduated marginal tax rates, various fees, etc.
[6] See the paper for an explanation of how we estimated handle from the revenue data, in light of the problem discussed above in note 3.

different effects – horse racing has, on net, a positive impact on state revenue, while greyhound racing appears to have a significantly negative impact.[7]

Overall, our results suggest that lotteries and horse racing have a positive impact on state government revenues, but that casinos and greyhound racing actually have a negative impact. The negative result on casinos may indicate that casino expenditures come at the expense of non-casino expenditures to such a large extent that, despite the high tax rates applied to casino revenues, the reductions in non-casino spending lead to declines in sales tax revenues that are even larger. This result surprises us, and should be considered by states that are currently considering the expansion of existing casinos or the legalization of new ones.

The Walker and Jackson (2010) paper provides a more general analysis than previous studies on the tax impacts of legalized gambling.[8] While state-specific studies often show a positive impact from casinos, our results suggest that, on average, casino gambling probably does not have a positive effect on state revenues. Obviously, there will be exceptions. Las Vegas is a prime example of a city in which the casino industry obviously has a positive impact on state government revenues. But the casino industry in other states may not attract as many tourists and may therefore not have a positive impact on state revenues. More study at the market- or state-level is probably warranted on the tax issue. But our evidence suggests states should at least be aware that the casino effect is not always necessarily positive with respect to net tax revenues.

4. The social costs of gambling

Whatever economic benefits casinos provide, be it growth, additional tax revenues, or simply an additional choice of entertainment for consumers, there is a potential downside of legalized gambling. In particular, about 1% of the general population is believed to be "pathological gamblers." These individuals are believed to cause an enormous amount of "social costs" which at least partially offset any economic benefits from gambling.[9]

The gambling literature is fascinating, in part because it is the product of researchers from very different academic perspectives. For example, published papers on "the social costs of gambling" have come from researchers with backgrounds in psychology, sociology, law, political science, public administration, and even landscape architecture. One consequence of having researchers with different areas of expertise discussing a particular issue, such as social costs, is that they often come to very different conclusions – even more so than economists do.

When economists discuss "social cost," they generally have something very particular in mind. As a result, a traditional economic analysis of social cost leads to startlingly different conclusions than are otherwise found in the gambling literature. For example, one early social cost analysis performed Thompson, Gazel, and Rickman (1997) estimated the annual social costs of gambling per pathological gambler at US$9,469. A more recent study by Thompson and

[7] It should be noted that we are not confident in the validity of the large negative marginal impact from greyhound racing. Nor can we explain it. Yet, we get similarly large and negative results whatever model specification is used.

[8] For examples of studies that examine particular states' or localities' tax impacts from legalized gambling, see Anders et al. (1998), Borg et al. (1993), Fink et al. (2004), Siegel and Anders (1999), and Thalheimer and Ali (1995).

[9] There are different degrees of "pathological gambling," and corresponding different terms. We ignore these details here. It is not clear the extent to which legalizing gambling causes an increase in the prevalence of pathological gambling. However, it seems reasonable that we would see an increased prevalence closer to casinos, for example. This does not necessarily imply, however, that eliminating casinos or other forms of gambling would decrease the prevalence rate markedly, since individuals could still gamble illegally or travel to nearby legal establishments.

Schwer (2005) estimated the social costs of pathological gambling in Las Vegas at US$19,711. Grinols (2004) averages a variety of (mostly unpublished and flawed) studies to arrive at a cost estimate of US$10,330. Such diversity in cost estimates indicates that the different studies have not measured social costs in the same way.

Questions about research quality/legitimacy have been raised in comprehensive analyses (Australian Productivity Commission 1999; National Gambling Impact Study Commission 1999; National Research Council 1999), as well as in more narrow critiques. For example, the National Research Council (1999, p. 186) explains, "most [cost studies] have appeared as reports, chapters in books, or proceedings at conferences, and those few that have been subject to peer review have…been descriptive pieces." The result has been questionable, if not counter-productive, research: "In most impact analyses…the methods used are so inadequate as to invalidate the conclusions. Researchers…have struggled with the absence of systematic data that could inform their analysis and consequently have substituted assumptions for their missing data" (National Research Council 1999, p. 185).

To illustrate the problems with social cost estimates, consider the work by Thompson and Schwer (2005), summarized in Table 4. The cost estimate is based on a survey of 99 Gamblers Anonymous members in Las Vegas. The fundamental problem with this study, and others in the literature, is that the authors have failed to define "social cost."[10] Instead, they attempt to estimate monetary values for any negative effects that they can identify, measure, and somehow

Table 4. A typical estimate of the social costs of gambling (in US$)

Employment		$ 5,125
missed work	2,364	
productivity losses (quit jobs)	1,092	
fired from work (productivity lost)	1,582	
unemployment compensation	87	
Bad Debts and Civil Court		$10,271
bankruptcy debt loss	9,494	
civil court costs (bankruptcy/debt/divorce)	777	
Criminal Justice System		$ 3,809
theft	3,379	
arrests	95	
trials	85	
incarceration	80	
probation	170	
Treatment and Social Services		$ 506
treatment costs	372	
welfare	84	
food stamps	50	
Total estimated annual social cost per pathological gambler		**$19,711**

Source: Thompson and Schwer (2005, p. 83)

[10] For this discussion we will ignore the potentially serious problems of using survey data from Gamblers Anonymous members to generate an estimate of social costs for the representative pathological gambler.

attribute to gambling. To be sure, there is a lot of jargon in the gambling literature that may be confusing to researchers. All of the following terms describing "costs" have been used in recent papers: private, social; internal, external; direct, indirect; harms, costs; intangible, tangible; external costs, externalities; and pecuniary externalities, technological externalities.

Walker and Barnett (1999) and Walker (2003) explained why the definition of social cost is important, and why we should be skeptical of cost estimates that do not explicitly define what they are trying to measure. We give a detailed explanation of the welfare economics (utilitarian) perspective on social costs. Essentially, we argue that a social cost requires that an action reduces the total "wealth" in society. This implies that wealth transfers (gambling losses, bad debts, etc.) cannot be considered to be social costs.[11] This follows from Tullock's (1967) classic discussion of theft. In addition, internalized costs would not qualify as "social" in nature. Many of the so-called "social costs" estimated by Thompson et al. (1997), Thompson and Schwer (2005), and Grinols (2004) turn out to be wealth transfers or internalized costs. As a result, we argue that the social cost estimates in the literature seriously overstate the actual social costs of gambling.

If the Thompson and Schwer (2005) estimate is reviewed from an economic perspective, many of the "costs" drop out from the social cost estimate. For example, all of the employment costs of $5,125 would either be internalized by the employer or employee, or they represent transfers of wealth. The bankruptcy debt losses, monetary value of theft, and welfare/food stamps would be transfers. The actual social costs, as defined by Walker and Barnett (1999) would include civil court costs, criminal justice costs, and treatment of pathological gambling. These costs are estimated at about $1,600 (Walker 2008a), significantly different than the $19,711 estimate by Thompson and Schwer.[12] This "economic perspective" is upsetting to many social scientists because it seems to ignore some potentially significant harms. This exercise demonstrates that the definition of social cost *does* matter, especially considering that social cost studies have had a real impact on government policy toward gambling.

Casinos and crime

One specific "social cost" issue that has received recent attention in the literature is the potential relationship between casinos and crime. In probably each jurisdiction in which casinos are being considered there is debate over whether casinos will create or attract crime. For example, the fact that casinos will attract tourists carrying cash might be a catalyst for criminals to flock to casinos – customers may represent easy prey. Alternatively, people who develop problem gambling may turn to crime to get money for gambling. There are any number of situations which might suggest a relationship between casinos and crime.

A recent study by Grinols and Mustard (2006) purported to show through a county-level analysis that casinos have, in fact, contributed to crime in the U.S. The authors use an exhaustive data set in an econometric analysis of how casinos tend, with some time lag, to contribute to increases in crime rates. Yet, as I explain in recent work (Walker 2008b) the empirical analysis by Grinols and Mustard (2006), and other studies in the literature, is suspect because they often mis-measure the crime rate.[13]

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[11] This is not a generally a controversial statement for economists. For example, the Federal Reserve Bank of Minneapolis' gambling issue of *Fedgazette* (2003) cited the Walker and Barnett paper in discussing transfers.

[12] This estimate excludes other legitimate social costs that have been ignored in the literature. For example, lobbying on the part of the casino industry and casino opponents could be classified as social costs related to gambling.

[13] Relatively good crime-related studies include Albanese (1985), Curran and Scarpitti (1991), and Stitt, Giacopassi, and Nichols (2003). For a review of the "casinos and crime" literature, see Walker (2010).

To explain, consider a community in which there is relatively little tourism, so that crimes are committed by residents and the victims are also residents of the community. Then the crime rate is represented as the number of crimes committed divided by the population:

$$\text{Crime rate} = \frac{\text{\# of crimes committed}}{\text{population at risk}}$$

This rate is often expressed per 100,000 people. Let's use C to represent criminal acts and P to represent population at risk of being victimized. Then the crime rate above is C/P. Now to apply the crime rate to a case in which casinos are introduced, we must recognize that there will likely be an inflow of tourists into the jurisdiction that introduces casinos. Simply because the number of people in the area has increased, we would normally expect an increase in the raw number of crimes committed. But the actual risk of being a crime victim may rise *or fall*; it depends on whether the amount of crime increases by a larger or smaller amount than the increase in the population at risk.

More formally, if we now distinguish between criminal acts perpetrated by residents (C_R) and those perpetrated by visitors (C_V); and separate the population at risk into the resident population (P_R) and the visiting population (P_V), then we can see how the crime rate would be represented in a case where there is a substantial amount of tourism. Such is the case with many casino jurisdictions. The crime rate in this case can be written as $(C_R + C_V) / (P_R + P_V)$. As I emphasized in my critique of Grinols and Mustard's paper (Walker 2008b), it is important that the crime rate accurately reflect the risk of being victimized. When the jurisdiction sees a large number of tourists, both residents and visitors may commit and/or be victimized by crime.

In the analysis by Grinols and Mustard (2006), the authors count the crimes committed by visitors (C_V) in the denominator, but omit the visitors from their measure of the population at risk, in the numerator. So the crime rate measure they use is $(C_R + C_V) / (P_R)$. This rate will necessarily be larger than $(C_R + C_V) / (P_R + P_V)$. For this reason, I argued that the Grinols and Mustard study may significantly overstate the casino effect on crime. There are several other problems with the Grinols and Mustard analysis. For example, their empirical work does not enable them to differentiate between tourism-related crime, in general, and casino tourism-related crime, in particular. Furthermore, their variable accounting for casinos is a simple dummy variable; they do not distinguish among different sizes of casino industries or casino volume. So in their model Clark County, Nevada (Las Vegas), would be treated the same as a county in Colorado with a single small casino. Taken together, these issues raise serious questions as to whether the crime effect Grinols and Mustard attribute to casinos can be believed.

A forthcoming study by Reece (2010) helps to alleviate some of the concerns with the Grinols and Mustard study. Although Reece studies only one state (Indiana), he posits a more careful model. First, he attempts to control for casino volume by including casino turnstile count as an explanatory variable. Reece also includes the number of hotel rooms as a variable; this helps to control for tourism in general. Reece's results indicate that increased casino activity reduces crime rates, except for burglary. He specifically indicates that leaving out a measure of casino activity creates a "serious specification error." Finally, the results indicate that the building of hotel rooms subsequent to casinos opening tends to reduce crime. Overall, Reece's study provides important evidence that counters the claims by Grinols and Mustard (2006) that casinos cause crime.

There is clearly good reason to expect some relationship between casinos and criminal activity. However, based on an overview of the literature, there is no conclusive evidence on the relationship between casinos and crime. More careful econometric analyses are needed.

5. Measurement problems in cost-benefit analysis[14]

It is doubtful that researchers will adopt a pure economic conception of social cost such as that described by Walker and Barnett (1999). Even if the proper definition of social cost was clear, there are other obstacles to actually measuring the social costs of gambling. Of course, the inability to measure costs does not mean that the costs do not exist. Rather, it simply means that researchers and policymakers must be careful in interpreting social cost studies.

Perhaps the most serious obstacle in performing valid social cost estimates is the issue of comorbidity. That is, pathological gamblers may have other problems that contribute to their socially costly behavior, so the costly behavior is the result of multiple disorders. A recent study (Petry, Stinson, and Grant 2005) found that almost 75% of pathological gamblers also have alcohol use disorders and almost 40% have drug problems. Consider a problem gambler who is also an alcoholic. Suppose his behavior results in social costs of $1,000. Most gambling researchers, including Thompson et al. (1997), Thompson and Schwer (2005), and Grinols (2004) would simply attribute the entire $1,000 cost to gambling, even though the drinking may be responsible for some (or even most) of the total cost. How should comorbidity be handled, in terms of estimating the costs due to a particular affliction? This question has not been addressed by researchers, but it is critical to creating valid social cost estimates.

A second issue is the *counterfactual scenario*. What if casinos were not legal? Would pathological gambling and the associated social costs disappear? Probably not. A valid estimate of the costs of pathological gambling, as it relates to government policy, is not the total cost of pathological gambling behaviors. Rather, the relevant cost is the difference between the costs when casinos are legal and when they are not. Unfortunately, it is very difficult to know with accuracy the counterfactual scenario. Since most social cost estimates do not consider this, they must be viewed with skepticism.

A third problem with estimating the social costs of gambling is that many of the published estimates have been based on unreliable survey data. In some studies authors have based their cost estimates on diagnostic tools like the DSM-IV or SOGS.[15] Some papers use original surveys in which problem gamblers are asked about the extent of their gambling losses or the sources of their money used for gambling. A recent study (Blaszczynski, Ladouceur, Goulet, and Savard 2006) found that many survey respondents are unable to estimate their gambling losses, even if they are given instructions on how to do so. This evidence suggests that it would be difficult for the same individuals to reliably report the *source* of their gambling losses. This is because budgets are fungible (Walker 2007a, p. 121). Yes, a person may gamble too much. But she may also have a very high car payment. How confident are we that this person (or the researcher, for that matter) could accurately identify what source of income – paycheck, bank loan, cash gifts, theft, etc. – was used to finance a specific expenditure? A person taking a

[14] This section is adapted from Walker (2007c).

[15] The DSM-IV is American Psychiatric Association's *Diagnostic and statistical manual of mental disorders* 4e. The SOGS is the South Oaks Gambling Screen developed by Lesieur and Blume (1987). Both instruments indicate likely pathological gamblers based on their responses to a variety of questions about their gambling-related behavior.

survey on problem gambling may be predisposed to blame all their problems on gambling even when there are other problems present. This suggests that estimated "costs" for bad debts, theft, etc., are invalid.

The fourth and final problem discussed here relates to how government expenditures are handled. A large portion of the social costs of gambling may be related to government expenditures. For example, suppose government-provided treatment is available, and many pathological gamblers commit crimes that create legal costs. Most social cost estimates simply take the value of these government expenditures and call them "social costs." It would seem obvious that, since government spending requires taxes, these expenditures should be considered social costs. Indeed, most people would agree that lower spending on these sorts of things would be preferred to higher spending. But the same is not necessarily true of, say education. People often vote for more public education spending. The point is that government expenditures are *not* equivalent to social costs. If they were, then we could reduce the social costs of gambling by simply reducing spending on gambling-related problems! Unfortunately, this does not leave us with a clear and appropriate way to classify gambling-related government expenditures. Yes, such expenditures may be a reflection of social costs, but they may also represent social costs of our *policy decisions*. This issue was addressed by Browning (1999). As with the previous issues discussed here, there is no ideal way to deal with this one.

Finally, since the above problems (among others) make it very difficult to obtain credible data on the social costs of gambling, many researchers rely on a variety of wildly arbitrary assumptions in performing their analyses. The result is sometimes completely meaningless cost estimates.

There are other problems in the gambling literature that make cost-benefit analyses unreliable. In this section we have discussed only cost-side issues, but there are benefit-side problems too. Until researchers can adequately deal with some of these problems, policymakers and voters must be cautious in how they interpret and use cost-benefit of gambling studies. In many ways, the problem gambling literature parallels the substance abuse literature, which essentially reflects a "cost-of-illness" approach. That work provides a possible path for gambling researchers to follow. But even the better-established substance abuse literature has its critics (e.g., Reuter 1999 and Kleiman 1999).

6. Conclusion

This paper summarizes my previous research on the economic and social impacts of casino gambling in the U.S. Empirical studies have demonstrated a short-term positive economic growth effect from casinos, at least using state-level data. Subsequent studies have confirmed that, in the case of the recovery from Hurricane Katrina, casinos seem to have made significant positive contributions to state-level personal income. This is likely due to straightforward economic development effects resulting from capital investment and the employment provided by casinos.

What is less clear is whether casinos make a net positive contribution to state-level revenues. Our empirical analysis indicates that casinos actually detract from state revenues, perhaps due to a large substitution away from other types of spending. Evidence on lotteries appears to be consistent with the common sense notion that lotteries enhance state revenue. These contradictory results suggest that legalized gambling is not always a positive contributor

to state governments. It likely depends on what types of gambling the jurisdiction has, as well as the specifics of the tax policies.

One of the primary arguments used to oppose the introduction of casinos is that they may be the catalyst for significant social costs. Most of these costs are attributable to "pathological gambling" behaviors, such as criminal activities and required treatment. There is much debate over the magnitude of such costs, and I have argued that most of the empirical estimates of the social costs are largely arbitrary. When we focus on the specific issue of crime, we find that many of the studies from the literature may have overstated the crime effect from casinos. This is because studies often use a flawed measure of the crime rate in their analyses. The best evidence suggests an unclear crime effect from casinos. Although there are certainly social costs attributable to pathological gambling, most published estimates are wildly inaccurate.

Finally, I have identified some fundamental problems with the nature of social costs and data availability that make a significant improvement in such estimates unlikely to happen soon.

"The economics of gambling" is a fascinating area of research. It is a young field with countless potential research topics. Several economists from a variety of countries have published economic papers on the effects of casinos. More developed casino markets such as Australia, Canada, the U.K., and the U.S. have received most of the research attention. A few researchers have analyzed the market in Macao. But all casino jurisdictions deserve more attention from economists. It is my hope that economic research on casino gambling will continue to expand as data availability improves, covering more markets around the world. Only with more attention from researchers can we develop a better understanding of the economic and social effects of casino gambling. Obviously casinos represent an important policy issue, and more research will help to enlighten policymakers and voters.

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