Casinos and Political Corruption in the United States: a Granger causality analysis

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Abstract: The commercial casino industry experienced an unprecedented expansion in the United States during the 1990s. As the industry has grown, so has the anecdotal evidence that links the casino industry with political corruption. However, there have been no empirical analyses of the issue. We use state-level panel data from 1985-2000 to posit a Granger causality analysis of the relationship between corruption convictions of state public officials and the predicted adoptions of casinos at the state-level. We find evidence that predicted casino adoptions Granger cause corruption convictions. This finding is suggestive of a scenario of regulatory capture and may help explain why state-level gaming regulatory agencies have a history of softening gaming regulations after the initial introduction of casinos. Our study provides the first empirical evidence linking casinos to political corruption.

JEL codes: D73, Analysis of collective decision making; corruption
L83, Industry studies; services; gambling
H71, State and local government; state and local taxation, subsidies, revenues

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> 'We have an industry…that is growing rapidly. It is an industry…that [I think] has more of a history of involvement in corruption than any other industry.'
>
> - Illinois Senator Paul Simon (1997)

> 'Louisiana has a longstanding tradition of gambling. Unfortunately, it also has a longstanding tradition of public corruption. It could hardly be unexpected that a crisis would arise when the two traditions met. This is exactly what happened when legalized gaming was enacted…'
>
> - Hon. William J. Burris (2009)

I. Introduction

The casino industry is often associated with organized crime and political (or public) corruption, especially in Las Vegas as it was developing in the 1950s and 1960s. This reputation persisted with Vegas through most of the 1980s, until corporations began to buy existing casinos and build new ones. As mob influence over the casino industry declined, however, anecdotal evidence suggests that there may still be a link between the casino industry and political corruption. The anecdotal evidence is not limited to Nevada, however, as suggested by the quotations above by Simon (1997) and Burris (2009).

New Jersey is the second oldest US commercial casino market. Casinos were legalized in Atlantic City, NJ, in 1976, and opened in 1978. Teske and Sur (1991) argue New Jersey has a long tradition of political corruption. Even recently, corruption seems to be a problem. The Associated Press (2008), reporting on the resignation of the Atlantic City mayor in 2007, noted:

> four of his eight predecessors also had been arrested on corruption charges. Some council members haven't fared much better. As recently as 2006, one-third of the nine council members were either in prison or on their way… In 1989 and 1990, four council members and the mayor were indicted in a bribery case.

More recently 44 New Jersey officials suspected of corruption were arrested (Halbfinger, 2009), including a mayor who had been in office for just a few weeks. Although there appears to be no direct connection between the alleged corruption and casinos, perhaps states that allow casinos are, for various reasons, more corrupt.

The former president of the National Coalition Against Legalized Gambling[1] cites cases in a variety of states in which political corruption appears to have led to the introduction of casinos (Clark, n.d.). He argues,

> The expansion that has occurred in legalized gambling across the US in the past few decades has not been a result of a popular demand for more gambling. The expansion has occurred because the gambling 'industry' pays state legislators, governors and other public officials for their votes, either with campaign contributions or by bribery and extortion. The gambling 'industry' has pushed and pushed government at all levels, and passes out the money to buy friends and supporters. The gambling industry owns several state legislatures, and is an enormously corrupting influence in dozens of others.

There appears to be ample anecdotal evidence in numerous states to support Clark's allegations. Most recently, impeached Illinois Governor Rod Blagojevich was convicted of a variety of crimes, including wire fraud for a plot to shake-down a racetrack owner for $100,000 in return for Blagojevich's support of a 2008 Illinois law that taxes casinos 3% to subsidize racetracks (AP, 2011a).[2] In Alabama, eleven individuals, including four Alabama state senators, were indicted in 2010 for corruption charges related to gambling legislation (Palmer, 2010).

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[1] The NCALG is now called Stop Predatory Gambling (http://stoppredatorygambling.org).

[2] Four Illinois casinos sued over the law but recently lost in the Court of Appeals. The Court noted that the law was 'possibly of corrupt origin,' but that this does not affect the legality of the tax (Turner, 2011; AP, 2009). Blagojevich was sentenced to 14 years in prison for his convictions (AP, 2011b).

Burris (2009) describes corruption cases in Louisiana, and Palmer (2010) cites casino corruption cases dating back to the late 1980s in West Virginia, Arizona, South Carolina, Kentucky, and Missouri. Finally, Martz (1997) provides a lengthy discussion of anecdotal evidence on a link between legalized gambling and political corruption. The apparent link between casinos and corruption is perhaps not surprising, as casinos are cash businesses that require politicians' explicit approval to exist and expand. Potentially huge economic rents arise from this situation, which may fuel political corruption.

In this paper we analyse panel data from U.S. states for the years 1985-2000 to ascertain whether an empirical link between casinos and corruption can be established to support the anecdotal evidence. Our focus in this study is on commercial casinos, which are legalized by state legislatures, sometimes with secondary approval by local governments and/or voters.[3] Using a Granger causality methodology we examine various models to determine if a link between political corruption and casinos exists. To our knowledge, this is the first study to specifically examine an empirical relationship between the casino industry and political corruption, and it is the only study of which we are aware that examines the relationship between a particular industry and political corruption.

[3] Tribal casinos are excluded from this study because they are introduced through a different legal framework that requires the tribe and state government to sign a compact, according to the conditions laid out in the 1988 Indian Gaming Regulatory Act. Although the compact process may also be fertile grounds for corruption, data on tribal casinos are generally not publicly available and preclude the type of empirical analysis we perform here for commercial casinos.

II. Background

The casino industry has seen enormous growth in the last 20 years, and by late 2007, at least 460 commercial casinos were operating in twelve states and had total revenues of more than $34 billion. Table 1 shows state-level data on the industry for 2007, at its peak prior to the recession that began late that year.

[TABLE 1 HERE]

As illustrated by these data, the commercial casino industry is widespread and generates large revenues and tax revenues for host states. Indeed, the potential tax revenues from casinos may be the largest motivation for casino legalization. In 2007, the industry paid almost $5.8 billion to state governments in taxes (Table 1), which may have been helpful in dealing with the fiscal problems common among states.

The commercial casino industry literally cannot exist without the consent of politicians and, at least indirectly, voters. Perhaps unsurprisingly, the casino and gaming industry is a large contributor to politicians and political parties. Among all industries tracked, the gambling industry ranks 39th in the size of its contributions to US politicians, on average from 1990-2010. Table 2 lists gaming industry contributions to politicians and the political parties in recent election cycles. These data are based on contributions from political action committees (PACs) and individuals to federal politicians and political parties.

[TABLE 2 HERE]

These data confirm that casinos are willing to spend large amounts of money on lobbying efforts. These efforts have increased, at least in monetary value, as the casino industry has expanded beyond Nevada and Atlantic City. Of course, lobbying is a legal activity, and contributions are not evidence that the casino industry is a cause or effect of political corruption. Nevertheless, these contributions show the casino industry is an important participant in the political process. We next review the relevant corruption and casino adoption literatures to provide some guidance in developing our empirical analysis.

Corruption defined

The abuse of government power by politicians for their own private benefit is a topic that has been examined as long as there have been governments. Modern political economy or public choice theory provides a growing body of literature that theoretically and empirically analyses the causes and consequences of political corruption. There is some debate in the literature over the appropriate definition of 'corruption' (Heidenheimer, 1970; McChesney, 2010; Powell *et al.*, 2010; Kaufmann and Vicente, 2011), but we are particularly interested in criminal acts of corruption, as we rely on federal corruption conviction data as our corruption variable.

Corruption convictions are for such crimes as conflict of interest, fraud, campaign-finance violations, and obstruction of justice (Glaeser and Saks, 2006). There are obviously many potential catalysts for political corruption: campaign contributions, interest group agendas, lobbying, and the desire to win an election, to name a few. One definition we view to be particularly relevant for our study is explained by Meir and Holbrook (1992). They posit that Heidenheimer's (1970) definition of public office corruption 'as deviation from legal and public duty norms for the purposes of private gain' is the most appropriate definition. They explain,

> while this narrow definition of corruption excludes a great many interesting political phenomena, it has a major empirical advantage over broader definitions. Defining corruption as illegal actions for private gain provides a more precise, albeit limited, concept that is more amenable to reliable measurement (Meir and Holbrook, 1992, p. 136).

This definition seems appropriate for our study, as we are interested in whether public officials use their authority in illegal ways in making legislative or regulatory decisions on casinos primarily to benefit themselves, rather than their constituents.

Literature review

The economic analysis of corruption has resulted in a sizable literature. Rose-Ackerman (1978) is the classic paper on corruption; her follow-up article (1999) focuses more on international corruption. A significant portion of the recent corruption literature is international, using cross sections of countries to determine what types of macro variables tend to be consistent with corruption. We focus our review on a few papers that are particularly helpful for developing our analysis.

Ades and Di Tella (1999) examine the causes of corruption using an international sample of countries. They find that the lack of market competition fosters corruption, and that corruption is worse in countries where firms are shielded from foreign competition. This result is consistent with the idea that firms receiving artificially high rents are more likely to contribute to corruption, in order to maintain government protection from market competition. A similar situation may explain why a relationship between casinos and corruption might exist; the casino industry is both artificially restricted and highly regulated by government.

Several studies have focused on corruption in the US at a state-level, in particular, and we focus more on these studies in designing our own analysis. Fisman and Gatti (2002) find the rate of corruption prosecutions to be higher in states with higher levels of federal revenue transfers. Like permit fees and tax revenues taken from casinos, federal transfers represent large amounts of money over which politicians and bureaucrats may have significant discretion and this may create opportunities for political corruption.

Glaeser and Saks (2006) provide a recent, relatively comprehensive analysis of corruption in the United States. Similar to Fisman and Gatti (2002), they use federal corruption conviction data from the Department of Justice, which is perhaps the best measure of political corruption data available for empirical studies (Glaeser and Saks, 2006, p. 1054, 1058). Their analysis indicates that higher levels of education and income tend to reduce the level of corruption, as more educated and higher income voters are more effective at monitoring public officials. These individuals may also be more 'civic minded,' and care about public policy and the effectiveness of government. Income inequality is found to increase the prevalence of corruption, as is racial dissimilarity. Finally, Glaeser and Saks find weak evidence that economic development and regulation impact corruption. One important limitation of their analysis is that theirs is a cross-sectional study by state, and they use average convictions between 1976 and 2001. Thus, they have only 50 observations in each of their models. Nevertheless, their study is a key contribution to the corruption literature.

Leeson and Sobel (2008) focus specifically on the effect of large cash transfers (in the form of FEMA disaster relief payments) to state governments on corruption. They find that FEMA payments for disaster relief have a very strong impact on political corruption convictions after a lag of a year or more. This finding is intuitively appealing, as FEMA payments represent large amounts of money to be distributed at the state or local level. This represents a suitable opportunity for political corruption. Perhaps casino legalization, with the concomitant permit fees and sizable tax revenues, represents a similar opportunity for government officials to engage in corruption.

The paper by Aidt and Dutta (2008) is also relevant to our study, as it examines the theoretical relationship between 'industry entry' regulation and corruption. Government restrictions on entry to an industry may present the ideal circumstances through which corrupt politicians may elicit bribes or other consideration from firms or individuals hoping to enter the government-restricted industry. Commercial casinos would represent an extreme case of this situation, as the industry literally cannot exist without the complicity of state politicians. As Aidt and Dutta (2008) explain, entry regulation may result in a decrease in economic efficiency, as such regulation may stifle productivity and economic growth.[4]

Finally, one study that comes close to examining the relationship between a particular industry and political corruption is Fredriksson *et al.* (2009). They study changes in states' beer taxes and how corruption has impacted these taxes. Their primary finding is that corruption reduces the beer tax, but this effect declines with increased alcohol-related traffic deaths.

As noted in the introduction, there is a literature that addresses anecdotal evidence linking gambling and political corruption, but none that empirically analyses it. Although there have been several studies on casinos and crime (see Walker (2010) for a review), the crimes associated with casinos are typically committed by problem gamblers and are not related to the legalization, regulation or operation of casinos *per se*. Corruption and crime are distinct events, and the types of crime that have been examined in the literature are unique neither to casinos nor to the political process.

[4] Aidt and Dutta (2008, p. 337) explain that such regulations may nevertheless serve a social purpose. One could argue that government regulation and restriction of the casino industry is warranted since some people are likely to develop gambling problems. In this sense, the casino industry may be similar to other 'vice' industries such as tobacco and alcohol, and may warrant a high level of regulation. Psychology research suggests that the lifetime prevalence rate of pathological gambling is around 0.5% of the U.S. population (Shaffer and Martin, 2011, p. 486).

The literature contains few studies that examine casino adoptions by the states; see Furlong (1998), Calcagno *et al*. (2010), and Wenz (2008). These studies examine whether various state fiscal conditions are the motivation to legalize casino gambling, but they do not consider political corruption as a catalyst for adoption.

Theoretical considerations

If there is a link between corrupt public officials and the casino industry, we believe there are two likely scenarios under which such a link might operate. First, perhaps casinos are more likely to be adopted in states with a 'culture of corruption.' Since the casino industry is one that generates a large amount of revenues for the state, corrupt public officials may try to attract the industry to extract rents from it. In this case, corrupt politicians are the catalyst for casinos' existence. There is an obvious, strong political motivation for this scenario. Many states have seen serious fiscal crises in recent years (and decades), and politicians may be eager to reduce such pressure by introducing a new source of government revenue. States in which there is a culture of corruption may simply be more likely to introduce casinos because politicians identify the industry as a relatively easy new source for rents or bribes.

A second possible scenario is that once casinos are operating in a state, earning revenues and paying taxes and fees to government, the industry tries to alter casino regulations to benefit the industry, which potentially leads to political corruption (Pierce and Miller, 2004). In this case, existing casinos are the catalysts for political corruption. This scenario is consistent with Stigler's (1971) pioneering work on the economics of regulation, which argues that there is a supply and demand for regulation. Peltzman (1976) expanded the theory to a general framework arguing that there may be multiple interest groups that a regulatory agency will serve. This framework has been developed into what is commonly referred to as the capture theory of regulation, whereby the industry serves an interest group that is able to capture the regulators so that they can develop regulations that benefit the industry by restricting entry, imposing costs on competitors, and other barriers to entry. Such conditions may create situations that are ripe for corruption. Shleifer and Vishny (1994) build on the political models of Olson (1965) and Stigler (1971), describing a game between the public, politicians, and the enterprise managers in an environment where the public is disorganized. This leads politicians to cater to special interests rather than to the median voter, which may result in bribes to politicians, among other effects.

Leeson and Sobel (2008), Glaeser and Saks (2006), Fishman and Gatti (2002), and Goel and Nelson (1998) all suggest – either directly or indirectly – that the size of government (transfers, spending, or regulation) is correlated with political corruption. Since the casino industry is heavily regulated, provides significant tax and fee revenues to government, and requires the explicit approval of politicians to exist, it seems plausible that an empirical link could exist between the casino industry and political corruption.

III. Data and model

We develop our empirical analysis of the relationship between casinos and political corruption based on three facts: (1) casinos are initially legalized at the state level; (2) a relationship between corruption and casinos may run in either direction; and (3) any relationship between corruption and casinos would possibly develop and/or be maintained over time. We posit a variant on Granger causality to analyse our data on corruption convictions and casino activity because such a model accommodates all of the above facts.

Our analysis covers the period from 1985 to 2000. This period is chosen for several reasons. First, this period includes most of the new state full-scale casino legalization that has occurred since Nevada and New Jersey. Second, going through 2000 provides adequate data on convictions and the casino industry before and after the introduction of casinos in most of these states.[5] Third, we are primarily interested in large commercial casinos. This period omits from the analysis many of the cases of relatively minor gambling expansion, such as slot machines being allowed at racetracks, or small casinos with slot machines only.[6] Finally, not including the few casino adoptions since 2000 allow us to avoid any economic issues associated with the shock to tourism that occurred after the September 11, 2001 terrorist attacks and the recent and severe economic recession, which is the timeframe of the latest wave of casino adoptions.

Data

We have two variables of primary interest. The first is a measure of political corruption. The basis for this measure is federal convictions of state public officials. This is the same

[5] Extending the end period beyond 2000 would not enhance the analysis because there were no additional states to legalize full-scale casinos until Kansas and Ohio legalized casinos in 2007 and 2009, respectively. Including these states in the analysis would not be possible because they do not have enough full years of revenue data that could be included.

[6] Since the addition of gambling machines at racetracks is usually sought by the *racing industry*, including these cases in our analysis would confound the casino and racing industries. An analysis of racetrack casinos ('racinos') or casinos with slot machines only could warrant entirely separate studies. Since 2009 or 2010 the following states have introduced either racetrack gambling machines or small commercial casinos with slot machines only, or have begun offering table games: Delaware, Florida, Kansas, Maine, Maryland, New Mexico, New York, Oklahoma, Rhode Island, and West Virginia. The first stand-alone casino opened in Pennsylvania in 2007, but with machine gambling only. Table games were subsequently added beginning in mid-2010 (AGA, 2011).

corruption data used in other state-level studies such as Glaeser and Saks (2006), Meir and Holbrook (1992), Goel and Nelson (1998), and Fisman and Gatti (2002). The number of public officials convicted of corruption in a particular state is an indicator of the extent to which the state exhibits a 'culture of corruption.' At first blush, one might expect corruption convictions by *state* authorities would be a better indicator of corruption in a state. However, as Glaeser and Saks (2006, p. 1054) argue, convictions by state authorities would potentially be biased, as we might expect corruption in the state to have a direct impact on state-initiated legal proceedings against individuals.

It can also be argued that federal prosecutors may not enforce public corruption laws consistently over time or across states. Our Granger causality analysis accounts for time and state, which should control for any such variations in enforcement. Since larger states are likely to have more corruption convictions because of their larger populations, *ceteris paribus*, an adjustment for the size of state government is needed. For our basic model we use the annual number of federal corruption convictions per 1,000 state government employees, in each state i for each year t (called $Corruption_{i,t}$). This adjustment for size of state government follows other studies of corruption, such as Goel and Nelson (1998) and Fisman and Gatti (2002). Corruption data are provided by the US Department of Justice (DOJ, 1999, 2005) and Maxwell and Winters (2004); data on the number of state employees are from the Census Bureau's *Statistical Abstract*.

Our second variable is predicted commercial casino adoptions.[7] Legalization occurs at a moment in time and is therefore a discrete event. If we were to use a dummy variable where

[7] 'Commercial casinos' are defined as either land-based or riverboat casinos operated by commercial companies, which offer slot machines and table games. As noted earlier, we are not examining tribal casinos, which do not publicly provide data and do not go through the same legalization/regulation process as commercial casinos. Nor do we include racinos in our model. Racinos are horse racing or greyhound racing facilities which offer slot machines

‘casino adopted’ equals one, and zero otherwise, it would not fully capture the existence of casinos over time. A dichotomous variable would also have little variation, making it unsuitable as a dependent variable in a Granger causality model. The probability and timing of casino adoptions, however, is more relevant because such legislation is an issue over which politicians and casino industry representatives may interact. Calcagno *et al*. (2010) posit a random effects tobit model using fiscal, political, intra- and interstate competition and demographic variables to estimate the probability of casino adoption, as well as the estimated timing of adoption by states. We adapt the model of casino adoptions from Calcagno *et al*. (2010) to our sample period and use the predicted values from this regression as our data on predicted casino adoptions. This estimation produces a continuous variable, $Adoption_{i,t}$, the predicted number of years since adoption, for state i in year t. The *Adoption* variable includes positive values indicating past predicted adoption dates, and negative values indicating future predicted casino adoption dates. The casino adoption variable controls for other factors that can lead to adoption. Therefore, the estimated adoption variable accounts for these other factors. (See the appendix for the estimated equation and variable definitions.) Our estimated results for predicted casino adoptions are consistent with those from Calcagno *et al*. (2010).

Summary statistics for our variables of interest are presented in Table 3. In addition, we provide per capita data and data on casino revenues; these data are used for robustness checks and are discussed later in the paper. Since most states do not have commercial casinos there are

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or video poker machines, but not table games. These are a relatively new phenomenon, and are typically small and less controversial than the introduction of commercial casinos. More importantly, gambling machines introduced at racetracks represent legislation related to racetracks, not to commercial casinos *per se*.

many zero observations on casino revenues. Because of this, we also present mean values for the variables if the zero observations are excluded from the calculation.

[TABLE 3 HERE]

As one final piece of anecdotal evidence, Fig. 1 illustrates the average number of corruption convictions per state employee in each state during our sample period, arranged by rank, with the median value shown (0.156).

[FIG. 1 HERE]

What stands out in Fig. 1 is the cluster of casino states at the left: the four most corrupt states are casino states. Overall, six of the eleven casino states are above the median value of average corruption convictions. Thus, the data in Fig. 1 may be further anecdotal evidence of a link between casinos and corruption in at least some states.

Interestingly, when we examine the individual states' trends in per capita corruption convictions, we find the trends tend to be increasing both before and after casinos are legalized and begin operating. This suggests perhaps both a 'culture of corruption' scenario, in which casinos tend to be legalized in more corrupt states, as well as a 'regulatory capture' situation, in which the casino industry is able to capture regulators, yielding a more favourable regulatory atmosphere, but perhaps tainted by corruption.

Model

We are interested in whether political corruption leads to casino adoptions, or whether casino adoptions lead to political corruption. That is, we are interested in the 'incremental predictability' of these variables, and therefore a Granger causality model seems appropriate for our analysis (Kirchgässner and Wolters, 2008, p. 94). In explaining his causality model, Granger refers to Wold's theorem, which indicates that a stationary time series process can always be written as the sum of 'a self-deterministic component and a moving average of possibly infinite order' (Granger, 1989, p. 66).

The theory behind Granger causality testing is straightforward. A variable, X_t, Granger causes another variable, Y_t, if, with information on all factors affecting both X_t and Y_t, the current value of Y_t can be predicted more accurately by using past values of X_t than by not using them. The same can be said to test whether Y_t Granger causes X_t. In general terms, Granger causality can be modelled as in Equations 1 and 2:

(1) $Y_t = \sum \theta Y_{t-j} + \sum \varphi X_{t-j} + \varepsilon_t$

(2) $X_t = \sum \varphi X_{t-j} + \sum \theta Y_{t-j} + \varepsilon_t$

The analysis has four possible outcomes:

(i) X Granger causes Y, if, in Equation 1, $\sum \varphi \neq 0$,

(ii) Y Granger causes X, if, in Equation 2, $\sum \theta \neq 0$,

(iii) bi-directional Granger causality ('feedback'), if both (i) and (ii) hold, or

(iv) no Granger causal relationship between X and Y, if neither (i) nor (ii) is true.

It is important to emphasize that Granger causality only suggests that if one variable helps to predict another, then the first variable is somehow contributing to the process of the second variable. Although Granger causality does not tell us exactly how or why the variables are related, it has proven very useful in the literature for a variety of applications. For example, Sobel and Osoba (2007) examine whether youth gangs are a 'cause' or effect of violence, and find that gang membership is an effect of youth violence, rather than a cause.

Granger causality applied to panel data

Granger causality analysis is traditionally performed on time series data (Granger, 1969). Walker and Jackson (1998) outline a three-step process for applying the analysis to panel data, which has also been used by other researchers (e.g., Granderson and Linvill, 2002). We use this process because it was first applied to another casino-related issue and its application to our analysis is similar and relatively straightforward. The first step is to detrend the data and to test for stationary residuals. Second, we determine what autoregressive process generates each series. Third, we test for Granger causality.

As noted above, we are analysing data from all 50 states over the period 1985-2000. We begin the analysis by detrending our *Corruption* and *Adoption* variables of state specific and trend effects, as well as any other systematic information. We do this by regressing the dependent variable on a time trend, a set of state dummy variables to account for state-specific effects, and a series of interaction terms for the trend and each state dummy. An additional dummy variable is included and coded as 1 to identify the first observation on each state, and 0 otherwise. The purpose of this variable is to ensure continuity among the cross sections and to ensure the order in which the states are 'stacked' in the data set does not affect the results. (The inclusion of this variable does not substantially change the empirical results.) The detrending equations are shown below:

$$(3) \quad Corruption_{i,t} = \beta_1 + \beta_2 Trend_t + \sum_{i=3}^{51} \beta_i St_i + \sum_{i=52}^{101} \beta_{i,t} Int_{i,t} + \beta_{102} New_i + \varepsilon_{i,t}$$

$$(4) \quad Adoption_{i,t} = \beta_1 + \beta_2 Trend_t + \sum_{i=3}^{51} \beta_i St_i + \sum_{i=52}^{101} \beta_{i,t} Int_{i,t} + \beta_{102} New_i + \varepsilon_{i,t}$$

The dependent variables are defined above; $Trend_t$ is an annual time trend; St_i is a series of 49 state dummy variables; $Int_{i,t}$ is a group of 49 trend-state interaction variables ($Trend_t \bullet St_i$); and New_i is the dummy variable indicating the first observation on each state. The residuals from these two detrending regressions (the detrended series) are called *Corrupt* and *Adopt*. These residuals should be free of state specific, trend, and other idiosyncratic anomalies.

Granger causality testing, as an application of Wold's theorem, requires the data series to be stationary. We use the Phillips-Perron test for this because it is robust with respect to the number of lagged difference variables included in the test equation. If the detrended series has a unit-root, we must re-specify the detrending equation until we are able to reject the non-stationarity hypothesis on the residual series.

The detrending process serves three purposes. First, it should eliminate any concern about the order in which the states' data are stacked, particularly since the residual series are stationary. Second, removing trend effects should eliminate any concern that the results are attributable to a common trend between the corruption and predicted casino adoption variables. Third, stationarity of the detrended series ensures that any innovation in the series, whether state-specific or attributable to another time-independent factor, is of temporary duration. Taken together, these factors assure us that any Granger causality detected between the detrended series is not the result of exogenous forces. The residuals from the detrending equations are subject to unit-root tests and if stationary, the results can be used in the subsequent analysis.

In the second stage of the analysis we attempt to determine what autoregressive process generates each detrended series. The goal here is to specify the autoregressive process that results in white noise residuals. We use correlograms and partial correlograms in aiding us to specify the generating process on each detrended series, along with Box-Pierce *Q*-statistics to detect white noise residuals. With the identification of this process, we can be reasonably confident that we have extracted all possible information on the current value of the variable from its past values; there is no temporally systematic effect left to explain. This stage also helps ensure that any Granger causal relationship between the variables' residuals are not due to some third, confounding phenomenon. In addition to performing the tests using the lag-lengths indicated by this second stage of the analysis, as a robustness check we also test 3- and 4-year lag periods in each model, as it is reasonable to expect the most recent few years to significantly impact the present values of corruption convictions and predicted casino adoptions.[8] The final step in the analysis is to run the Granger causality test on the detrended residual series (*Adopt* and *Corrupt*) with the appropriate number of lag periods.

Event timing

Before we perform the Granger causality testing there is one additional concern about our model. It treats the corruption convictions and predicted casino adoptions as contemporaneous. However, we suspect that there are important timing issues that must be considered in modelling how convictions and adoptions may affect each other. Consider the fact that a corruption conviction may occur several years after the corrupt act occurs and the corruption charge is filed.

[8] Thornton and Batten (1985) note that a 4-4 lag structure is commonly used in Granger causality applications. Kang (1989) also discusses optimal lag length for Granger causality analysis.

Perhaps the average time lag between corrupt act and conviction is 2 years.[9] At the same time, casino adoption legislation may take several years to pass after it is initially proposed, and casinos will typically open a year or more after adoption legislation passes. For example, casino legalization proposals were introduced in Ohio several times over the course of several years before casinos were finally approved. Other states have had similar experiences. Based on the data in Table 1, the average lag between legalization and the first casino opening in a state averages 1.6 years.

Now consider a scenario where during the same year that casinos are proposed in a state (Year 1), some corrupt politicians attempt to secure bribes for their support for (or opposition to) casinos. Or perhaps the casino industry approaches politicians and 'encourages' their support of casinos in their state. After some debate perhaps the casino bill passes in Year 2, and investigations lead to federal corruption charges being filed against some politicians. Some corruption cases may be quick, and others may take several years, ending in Years 2 or 3. It typically takes at least a year to build a casino, so revenues may not begin to flow until Year 4, two years after the casino legislation has passed.

This scenario suggests that it may be appropriate to consider a 2-year lag – or 'shift' – of the explanatory or causal variable in the Granger causality tests.[10] (We tested other shift periods and found the results were fairly robust to different shift periods.) Then, for example, a 3-year lag Granger model to explain year 2000 *Adopt* will include *Corrupt* for years 1995-97, rather than 1997-99. (Since we 'shift' the model two periods, 1998 and 1999 are not included). This

[9] We contacted the Department of Justice to ascertain the average time from charge to conviction. These data are not readily available, as the time depends on the charge and other case-specific information.

[10] The technically appropriate term for this is 'lag,' but we use 'shift' to avoid confusion with the lags discussed up to this point and after.

'shifted' Granger causality model is shown below, for *m* lag periods on *Corrupt* and *n* periods for *Adopt*:

(5) $Adopt_{i,t} = \beta_1 + \sum_{j=1}^{n} \gamma_j \, Adopt_{i,t\text{-}j} + \sum_{j=1}^{m} \alpha_j \, Corrupt_{i,t\text{-}2\text{-}j} + \varepsilon_{i,t}$

(6) $Corrupt_{i,t} = \beta_1 + \sum_{j=1}^{m} \alpha_j \, Corrupt_{i,t\text{-}j} + \sum_{j=1}^{n} \gamma_j \, Adopt_{i,t\text{-}2\text{-}j} + \varepsilon_{i,t}$

An *F*-test on the coefficients of the 'other' variable and its lags determines whether Granger causality is present. In Equation 5, if $\Sigma\alpha_j \neq 0$ then *Corrupt* Granger causes *Adopt*; and *Adopt* Granger causes *Corrupt* if in Equation 6, $\Sigma\gamma_j \neq 0$.

IV. Results

We run the basic model discussed above using all 50 states, 11 of which have legal commercial casinos operating during at least one year in our sample period, 1985-2000. Our first step is to detrend the *Corruption* and *Adoption* variables data using the OLS Equations 3 and 4. We use the residuals from these models, *Corrupt* and *Adopt*, for the subsequent analysis. The residual series are tested for a unit-root using the Phillips-Perron test. The hypotheses that the series are not stationary are rejected in both cases at the 1% level. The adjusted *t*-statistic on the Phillips-Perron test on *Corrupt* is -34.02 (*p*-value=0.000); on *Adopt* it is -14.64 (*p*-value=0.000). Thus, we have two stationary series and our analysis may continue.

In the next step we regress the current-term observation on its past values using an iterative procedure, adding additional lag periods until the correlogram and *Q*-statistics indicate the residuals are white noise. Testing indicates that a 5-year lag is required for both series to result in white-noise residuals.[11]

The final step of running the Granger causality tests is shown in Equations 7 and 8, below, for the 5-year lag structure and 2-year shift of the causal variable:

(7) $Adopt_{i,t} = \beta_1 + \sum_{j=2}^{6} \gamma_j Adopt_{i,t-j} + \sum_{j=7}^{11} \alpha_j Corrupt_{i,t-2-j} + \varepsilon_{i,t}$

(8) $Corrupt_{i,t} = \beta_1 + \sum_{j=2}^{6} \alpha_j Corrupt_{i,t-j} + \sum_{j=7}^{11} \gamma_j Adopt_{i,t-2-j} + \varepsilon_{i,t}$

To test the null hypothesis that '*Corrupt* does not Granger cause *Adopt*' the *F*-test is for $\alpha_7=\alpha_8=\ldots=\alpha_{11}= 0$, from Equation 7. To test '*Adopt* does not Granger cause *Corrupt*,' we perform an *F*-test on the coefficient restriction $\gamma_7=\gamma_8=\ldots=\gamma_{11} = 0$, from Equation 8. The results are shown in Table 4, Panel A, column 1. We fail to reject the null hypothesis that 'corruption convictions do not Granger cause predicted casino adoptions.' This raises doubt about our culture of corruption explanation. However, the null hypothesis that 'predicted casino adoptions do not Granger cause corruption convictions' is rejected at the 0.10 level (*p*-value=0.084). This result supports the regulatory capture theory described above.

[TABLE 4 HERE]

Robustness checks

In order to test the robustness of our initial Granger causality model, we posit several different specifications. First, we re-test the model using 3- and 4-period lags. These results are

[11] For brevity we omit the output from the detrending equations and lag structure analysis; the tables are available from the authors on request.

shown in Table 4, Panel A, columns 2 and 3. These results also support our initial findings, although the 4-year lag model is not significant at the 0.10 level. To further test our hypothesis, we also run all of the models *without* the 2-period shift. These results are shown in columns 4-6 of Panel A. The results are fairly consistent with our initial results, with modestly stronger evidence that *Adopt* Granger causes *Corrupt*. In addition, one of the models indicates that *Corrupt* Granger causes *Adopt*. However, since this is the only model showing significant results of Granger causality in this direction, and since it is not a 'shifted' model, we do not focus on this result.

Although we believe the corruption conviction adjustment by number of state employees is the correct one, we test an alternative population adjustment. We re-run the models using corruption convictions adjusted by the voting-age population in the states (rather than the number of state employees). For this model, the optimal lag structure is a 5-year lag on *Adopt* and 3-year lag on *Corrupt*. As with our primary model we also test 3- and 4-year lag specifications, with and without the 2-year shift. The results of these models are presented in Panel B of Table 4. The results are similar to our initial results, but weaker overall. As we argued above, the per capita adjustment using state employees, rather than voting-age public, seems to be the appropriate one, so we emphasize the results in Panel A over those in Panel B.

Casino revenues

Our analysis thus far has focused on population-adjusted corruption convictions and predicted casino adoptions. However, if there is indeed a link between casinos and corruption, perhaps there is a relationship between corruption and casino activity, rather than just casino adoptions. Casino revenues are a good measure of casino activity or 'intensity,' which may be related to corruption. To consider this possibility, we posit a model that utilizes state-level casino revenues per voting-age public, rather than predicted casino adoptions.

Casino activity is measured by real per capita commercial casino revenues in state *i* during year *t* (called $Revenue_{i,t}$). Casino data are provided by each state's gaming commission and are adjusted for inflation using CPI data from the Bureau of Labour Statistics. We might expect that, if there is a relationship between casinos and political corruption, there would be greater opportunity for corruption the larger the casino industry is (or is likely to be, once legalized), simply because there are more cash revenues which may facilitate corrupt activities with public officials.

We repeat the analysis, again using corruption convictions per government employee, but now using *Revenue* instead of *Adoption* for the casino variable. The detrending model on *Revenue* results in a stationary residual series which we call *Rev*. (The adjusted *t*-statistic on the Phillips-Perron test is -20.12; *p*-value=0.000). The optimal lag length for this variable is indeterminate, but we know from above that the optimal lag length for *Corrupt* is 5 years. Therefore we test 3, 4, and 5-year lag structures on both variables, both shifted and un-shifted specifications. The results are shown in Table 4, Panel C. Only two of the twelve models have statistically significant results, both suggesting that *Corrupt* Granger causes *Rev*. The overall weakness of the results in Panel C may indicate that *Adopt* is the appropriate variable to use, not *Rev*. This is consistent with intuition, as the pivotal event for casinos is legalization; fluctuations in annual revenues are much less likely to be a crucial factor in the interaction between casinos and politicians.

Discussion

Having tested several different models of the relationship between casinos and political corruption, we found relatively weak evidence that corruption convictions Granger cause predicted casino adoptions or casino revenues. Our interpretation of these results is that we cannot completely rule out the 'culture of corruption' scenario, which suggests that casinos are more likely to be adopted in relatively corrupt states. However, our results are not strong with regard to this conclusion. Rather, the preponderance of empirical evidence indicates that predicted casino adoptions Granger cause corruption convictions. This finding is consistent with the regulatory capture scenario introduced earlier, which we now explore in more detail.

State governments typically create a limited number of casino permits as a part of the legalization process. These permits may be allocated by state-level politicians or by a newly created regulatory agency that oversees the casino industry. Currently, every state that has some form of legalized gambling has a regulatory gaming commission that oversees the activities of the industry. In the case of commercial casinos these agencies may set permit fees and tax rates, regulate the size and number of casinos that may be built, and control the games allowed in the casinos, to name a few of their typical responsibilities.[12] Acemoglu and Verdier (2000) argue that bureaucrats receive pecuniary and non-pecuniary rents for enforcing regulation, but since bureaucratic agencies are heterogeneous it will not be optimal to prevent all corruption. Thus, government intervention leads to some amount of corruption and opportunities for government employees to extract rents.

[12] A listing and webpage directory for the states' gaming regulatory agencies can be found at http://www.gambling-law-us.com/Useful-Sites/State-Gambling-Agencies.htm.

In each casino state with the possible exception of Nevada, the number of casino permits made available is lower than the perfectly competitive level. This situation creates artificially high rents and a prime opportunity for rent-seeking à la Krueger (1974) and corrupt activities to occur. For instance, Louisiana's Governor Edwards was convicted in 2000 of racketeering, conspiracy, and extortion related to the awarding of riverboat casino licenses (Sack, 2010). Casino-Free Philadelphia, an anti-casino organization in Pennsylvania, lists a number of other cases from the 1990s in which corruption charges and convictions stem from the casino permitting process.

State casino regulatory agencies are typically funded directly from casino taxes. This fact suggests that the regulators' interests and the casinos' interests may be closely tied. As Pierce and Miller (2004, p. 127) explain, 'If the state allows its casinos to fail (given the substantial tax revenue involved), it is tantamount to killing the goose that laid the golden egg.' When casinos are initially legalized the regulations are typically very strict, often including 'safeguards' for casino customers. Such safeguards may be included in the legislation to offset concerns about social problems that are often associated with casino gambling. The safeguards typically included maximum bets or loss limits. For example, casinos in Colorado, Iowa, and South Dakota initially had $5 maximum bets on games. Riverboat casinos in Missouri and Iowa were legalized with player loss limits of $500 and $200, respectively, per cruise.

These safeguard regulations intended to protect consumers also effectively limit casino revenues. Thus, as casinos spread to more states, the casino industry in a particular state can argue that the regulations it faces make it uncompetitive to casinos in neighbouring states. As Pierce and Miller (2004, p. 128) explain, 'the industry thus threatens the state with the prospect (not reality) of declining revenue through competitive federalism. To remedy the situation, the state may simply relieve the casinos of this undue regulation.'

There are numerous examples of casino regulations that limit revenue being relaxed after casinos were operating profitably in states. In Colorado and South Dakota the betting maximums were raised to $100; they were eliminated altogether in Iowa and Missouri. States with riverboat casinos no longer require the casinos to leave the dock and 'cruise.' All of these regulatory changes benefit the casino industry, and can be seen as possible examples of policy changes due to regulatory capture. Our empirical results suggest that debates over such regulatory changes may also have been tainted with instances of political corruption.[13]

V. Conclusion

The casino industry is unique in many ways. Although casino advocates argue that it is simply another form of entertainment, critics argue that social costs from problem gambling set it apart from other entertainment industries and justify the extensive government regulation of the industry. Commercial casinos are large cash businesses that operate in a highly regulated environment that includes prohibition unless they are explicitly legalized by state governments. Furthermore, the interests of the casino industry and state politicians and regulators may be closely aligned. This may represent a perfect scenario for political corruption, as a wealth of anecdotal evidence has suggested.

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[13] In May 2011, the Colorado Limited Gaming Commission voted to decrease casino taxes by 5%. The Governor responded by replacing all five members of the Commission (Hoover, 2011). There have been no allegations of corruption, but there has been criticism of casino taxes being reduced at a time of state fiscal crisis and when the casino industry has been making multi-million dollar investments in the state.

We have performed a variety of Granger causality tests for the 50 states over the period 1985-2000, examining corruption convictions adjusted for state employees, predicted casino adoptions and casino revenues per potential voter. We use different lag structures on these variables to account for the time difference between the passage of casino legislation and casinos opening and between corrupt actions and corruption convictions. Overall, our strongest results indicate that predicted casino adoptions Granger cause corruption convictions. These results are fairly robust with respect to lag structure and accounting for the timing of adoptions and corruption convictions. Thus, there does appear to be empirical support for the anecdotal link between political corruption and casinos.

Once casinos are operating, casino-supported state-level agencies continue oversight and regulation of the industry, controlling almost every aspect of the business. Thus, there are enormous rent seeking opportunities for public officials, and the potential for regulatory capture. The casino industry or sympathetic politicians push to ease the regulatory burden. In doing so, our empirical analysis suggests that there are some corrupt activities that occur in the process.

Our results and interpretation do not indicate whether politicians are proactive or reactive in their negotiations with and regulation of the casino industry. However, we do find weak evidence that casino adoptions may be more likely to occur in states with a culture of corruption. Our results do not point to any specific policy recommendations, but it could be argued that the extensive industry regulations allow for the capture of the regulators and for potential corruption. If the casino market becomes more competitive and casino regulations are relaxed, the potential for economic rents and corruption will decrease. In this case, the expansion of the casino market could lead to a reduction in the corruption associated with casinos.

With the recent recession and the resulting state fiscal crises, a new wave of casino legalization is underway in the United States. These adoptions may provide an opportunity for future research on the link between casinos and political corruption as more data become available from the latest wave of casino adoptions. Our study provides the first empirical evidence of a link between casino adoptions and political corruption. The model we develop here could be applied to other countries or specific casino markets.

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Table 1. Commercial casino states, 2007

State	Year Legalized	Date Casino(s) Opened	# Casinos Operating in 2007	2007 Revenues ($ millions)	2007 Taxes Paid ($ millions)
Colorado	1990	Oct. 1991	45	819	115
Illinois	1990	Sept. 1991	9	1,983	834
Indiana	1993	Dec. 1995	11	2,625	842
Iowa	1989	Apr. 1991	17	1,363	315
Louisiana	1991	Oct. 1993	18	2,566	559
Michigan	1996	July 1999	3	1,335	366
Mississippi	1990	Aug. 1992	29	2,891	350
Missouri	1993	May 1994	12	1,592	417
Nevada	1931	1931	270[a]	12,849	1,034
New Jersey	1976	1978	11	4,921	475
Pennsylvania	2004	Oct. 2007	6	1,090	473
South Dakota	1989	Nov. 1989	36	98	15
Totals			467	34,132	5,795

Source. American Gaming Association (2008).
Note. [a] The Nevada casino count includes only casinos with gaming revenues over $1 million per year.

Table 2. Gambling industry contributions to US politicians, 1990-2010

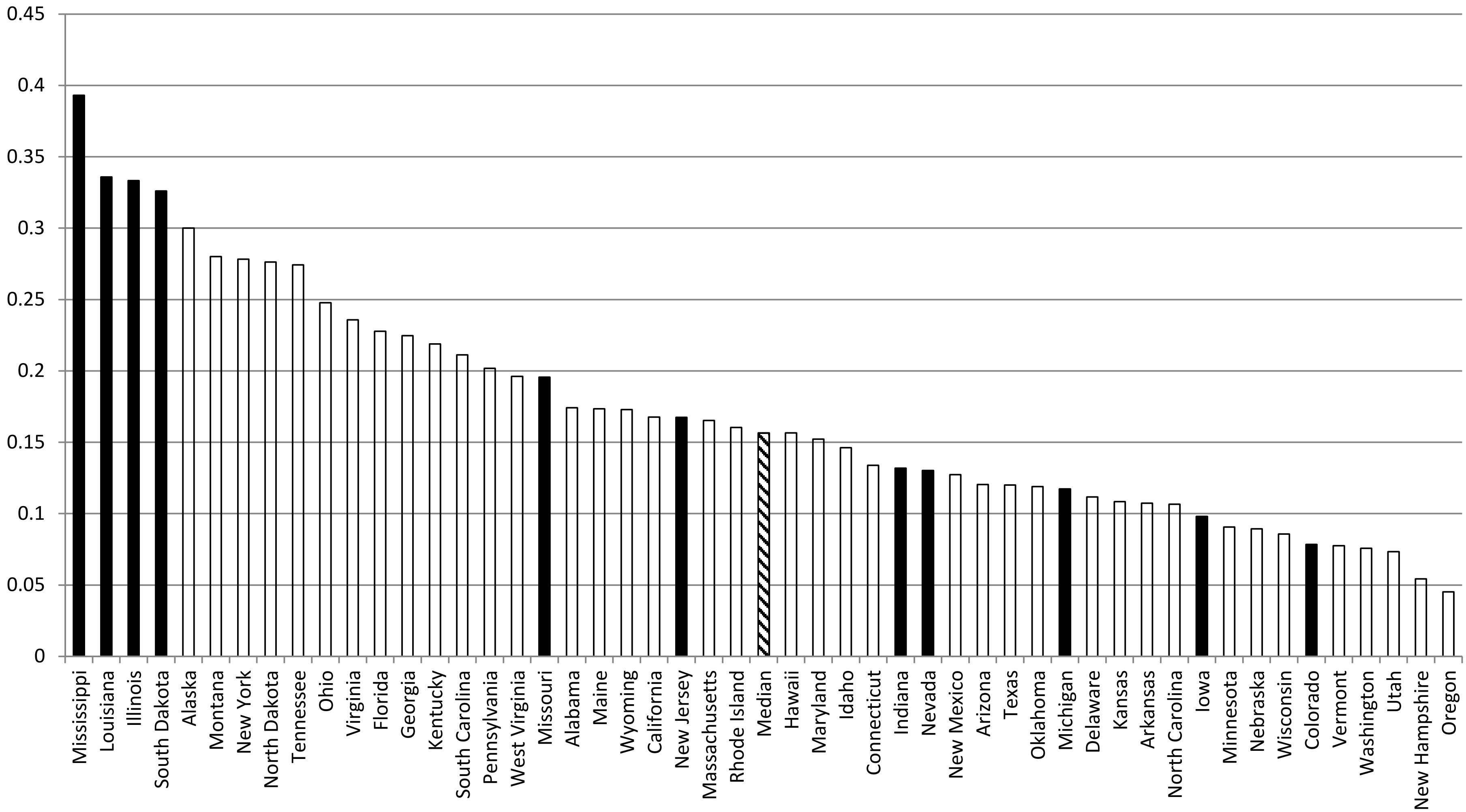
Election Cycle	Industry Rank	Total Contrib. ($ millions)	From Individuals ($ millions)	From PACs ($ millions)	Soft Money Contrib. ($ millions)	To Dems. ($ millions)	To Repubs. ($ millions)	% to Dems.	% to Repubs.
2010	35	12.6	11.3	1.3	n/a	8.0	3.8	68	32
2008	34	17.3	15.3	1.9	n/a	11.1	6.2	64	36
2006	30	11.9	10.1	1.8	n/a	6.3	5.5	54	46
2004	38	11.3	9.9	1.4	n/a	6.5	4.8	58	42
2002	26	15.0	5.5	1.0	8.6	7.5	7.5	50	50
2000	36	12.9	4.1	1.0	7.9	7.2	5.6	56	44
1998	39	6.4	1.5	1.1	3.9	2.5	3.8	40	60
1996	40	7.1	1.9	1.1	4.1	3.8	3.3	53	47
1994	49	3.1	1.2	0.4	1.5	1.7	1.4	54	46
1992	69	1.5	0.8	0.2	0.5	1.0	0.5	65	35
1990	75	0.5	0.2	0.2	n/a	0.3	0.1	71	29
Totals	39	99.6	61.8	11.4	26.4	56.0	42.6	57	43

Source. Center for Responsible Politics, http://www.opensecrets.org. Data accessed 11 March 2011.

Table 3. Summary statistics

	Mean	Mean, excluding zero values	Maximum	Minimum
Corruption Convictions	16.72	18.60	155	0
Corruption Convictions per 1,000 State Government Employees	0.171	0.190	1.266	0
Predicted Casino Adoption (years)	2.073	--	53.55	-17.48
Real Casino Revenues ($ Millions)	172.5	1,314	5,576	0
Real Casino Revenues per Voter ($)	109.77	836.33	4,763.56	0

Fig. 1. Average annual corruption convictions per 1,000 state government employees, 1985-2000



Legend: Casino States ■ Non-Casino States □ Median (0.156)

Sources. Corruption convictions: Department of Justice (1999; 2005) and Maxwell and Winters (2004); State employees: Census Bureau, *Statistical Abstract.*

Table 4. Granger causality test results

Panel A: Corruption convictions per government employee and predicted casino adoptions

	(1)	(2)	(3)	(4)	(5)	(6)
Adopt and Corrupt lag periods and shift	5 yr. lag; 2 yr. shift	4 yr. lag; 2 yr. shift	3 yr. lag; 2 yr. shift	5 yr. lag ; no shift	4 yr. lag; no shift	3 yr. lag; no shift
Corruption Convictions do not Granger cause Predicted Casino Adoptions	0.743 (0.592)	0.351 (0.844)	0.401 (0.752)	1.167 (0.324)	1.400 (0.233)	2.339+ (0.072)
Predicted Casino Adoptions do not Granger cause Corruption Convictions	1.954+ (0.084)	1.875 (0.114)	2.33+ (0.074)	1.905+ (0.092)	2.462** (0.044)	1.119 (0.341)

Panel B: Corruption convictions per voting age public and predicted casino adoptions

	(1)	(2)	(3)	(4)	(5)	(6)
Adopt and Corrupt lag periods and shift	Adopt 5 yr. lag; Corrupt 3 yr. lag; 2 yr. shift	4 yr. lag; 2 yr. shift	3 yr. lag; 2 yr. shift	Adopt 5 yr. lag; Corrupt 3 yr. lag; no shift	4 yr. lag; no shift	3 yr. lag; no shift
Corruption Convictions do not Granger cause Predicted Casino Adoptions	0.524 (0.666)	0.334 (0.855)	0.237 (0.871)	1.740 (0.158)	1.536 (0.190)	2.646** (0.048)
Predicted Casino Adoptions do not Granger cause Corruption Convictions	1.910+ (0.091)	1.597 (0.174)	2.046 (0.106)	2.024+ (0.074)	2.855** (0.023)	1.583 (0.192)

Panel C: Corruption convictions per government employee and casino revenues per voting age public

	(1)	(2)	(3)	(4)	(5)	(6)
Revenue and Corrupt lag periods and shift	5 yr. lag; 2 yr. shift	4 yr. lag; 2 yr. shift	3 yr. lag; 2 yr. shift	5 yr. lag; no shift	4 yr. lag; no shift	3 yr. lag; no shift
Corruption Convictions do not Granger cause Casino Revenues	0.858 (0.510)	1.205 (0.308)	2.467+ (0.061)	1.658 (0.143)	2.006+ (0.092)	1.404 (0.241)
Casino Revenues do not Granger cause Corruption Convictions	1.267 (0.277)	0.523 (0.719)	0.902 (0.440)	0.627 (0.679)	0.814 (0.516)	0.129 (0.943)

Notes. - F-tests, p-values shown in parentheses
+ $p < .10$
** $p < .05$

Appendix

The equation used to estimate predicted casino adoptions is shown below in Equation.

A.1, with variables defined as in Table A.1.

$$\text{(A.1)} \quad YSA_{it} = \beta_0 + \beta_1 Fiscal_{it} + \beta_2 PoliticalParty_{it} + \beta_3 IntrastateCompetition_{it} + \beta_4 InterstateCompetition_{it} + \beta_5 Demographic_{it} + \alpha_i + \varepsilon_{it}$$

Table A.1 Variable descriptions for casino adoption equation

Variable Type	*Variable*	*Description*
Dependent Variable	*Yrs. since adoption* (dep. variable)	Number of years since casino legislation passed
Fiscal	*Debt-long term*	Log of state govt. long term debt
	Debt-short term	Log of state govt. short term debt
	Tax/expend. limit	State has tax and expenditure limit, 1=yes; 0=no
	State revenue	Real state govt. revenue per capita
	Fed. transfers	Real intergovernmental transfers per capita
Political Party	*Party of governor*	Party of governor, 1=Democrat; 0, otherwise
	Dem.-unified govt.	Democrat governor/legisl. majority=1; 0, otherwise
	Rep.-unified govt.	Republican governor/legisl. majority=1; 0, otherwise
Intrastate Competition	*Dog bets*	Greyhound racing bets per capita
	Horse bets	Horse racing bets per capita
	Lottery sales	Lottery ticket sales per capita
	Indian casino sq ft	Indian casino square footage per capita
Interstate Competition	*River border*	State has a river on its border, 1=yes, 0=no
	Adj. state w/casino	Percent of adjacent states that have casino(s)
	Adj state w/Indian casino	Percent of adjacent states that have Indian casino(s)
	Square mileage	State total area (square miles, excluding bodies of water)
Demographic	*Baptists*	Percent of population that are Baptists
	Hotel employees	Percent of state workers employed by hotels
	Income	Real per capita income
	Population density	Population divided by square mileage
	Population over 65	Percent of population 65 or older
	Poverty	Percent of population below poverty line
	Unemployment	State unemployment rate