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# Determinants of the probability and timing of commercial casino legalization in the United States

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**Abstract** The adoption of lotteries by state governments has received significant attention in the economics literature, but the issue of casino adoption has been neglected by researchers. Casino gambling is a relatively new industry in the United States, outside Nevada and New Jersey. As of 2007, 11 states had established commercial casinos; several more states are considering legalization. We analyze the factors that determine a state's decision to legalize commercial casinos, using data from 1985 to 2000, a period which covers the majority of states that have adopted commercial casinos. We use a tobit model to examine states' fiscal conditions, political alignments, intrastate and interstate competitive environments, and demographic characteristics, which yields information on the probability and timing of adoptions. The results suggest a public choice explanation that casino legalization is due to state fiscal stress, to efforts to keep gambling revenues (and the concomitant gambling taxes) within the state, and to attract tourism or "export taxes."

**Keywords** Casinos · Casino adoption · Legalized gambling · Fiscal stress · Tax revenues

**JEL Classification** D72 · L83 · H7

## 1 Introduction

Prior to 1989 commercial casino gambling was legal only in Nevada and New Jersey. Nevada legalized casinos in 1931, and casinos opened in Atlantic City, NJ, in 1978. With the U.S.

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**Table 1** Commercial casino states, 2007

| State | Year legalized | Order legalized | Date casino(s) opened | # Casinos operating in 2007 | 2007 revenues (millions $) | 2007 taxes paid (millions $) |
|---|---|---|---|---|---|---|
| Colorado | 1990 | 4 | Oct. 1991 | 45 | 819 | 115 |
| Illinois | 1990 | 4 | Sept. 1991 | 9 | 1983 | 834 |
| Indiana | 1993 | 6 | Dec. 1995 | 11 | 2625 | 842 |
| Iowa | 1989 | 3 | Apr. 1991 | 17 | 1363 | 315 |
| Louisiana | 1991 | 5 | Oct. 1993 | 18 | 2566 | 559 |
| Michigan | 1996 | 7 | July 1999 | 3 | 1335 | 366 |
| Mississippi | 1990 | 4 | Aug. 1992 | 29 | 2891 | 350 |
| Missouri | 1993 | 6 | May 1994 | 12 | 1592 | 417 |
| Nevada | 1931 | 1 | 1931 | 270[a] | 12849 | 1034 |
| New Jersey | 1976 | 2 | 1978 | 11 | 4921 | 475 |
| Pennsylvania | 2004 | 8 | Oct. 2007 | 6 | 1090 | 473 |
| S. Dakota | 1989 | 3 | Nov. 1989 | 36 | 98 | 15 |
| **Totals** | – | – | – | **467** | **34132** | **5795** |

Source: AGA (2008)

[a]The Nevada casino count includes only casinos with gaming revenues over $1 million per year

Supreme Court's 1987 decision in *California v. Cabazon Band of Mission Indians* and the subsequent passage of the Indian Gaming Regulatory Act (IGRA) in 1988, the stage was set for a new wave of casino legalization.

In *California v. Cabazon*, the Court ruled that states lacked the authority to regulate tribal gambling, but with the IGRA the federal government effectively delegated regulatory powers over Indian casinos to state governments. Furthermore, the IGRA laid out conditions under which tribal gaming could be offered. In practice, the legislation has meant that federally recognized Indian tribes can offer a particular form of gambling on their reservations, so long as that type of gambling is not banned under state law. However, because the IGRA delegated regulatory powers to the states, tribes wishing to offer gambling must negotiate the terms under which gambling will be offered in a tribal-state compact. The IGRA outlines the general terms of such agreements, and the states are expected to negotiate with the tribes in good faith in developing compacts.[1]

As the states negotiated compacts with Indian tribes, some state governments also began considering the legalization of commercial casinos, often with a stated goal of attracting tourism and new tax revenue, and stimulating economic development. Beginning in 1989 with Iowa and South Dakota, a new wave of commercial casino legalization spread across the United States through the mid-1990s.

No fewer than 460 commercial casinos were operating in 11 states as of 2007, with revenues of over $34 billion. Taxes paid to state governments in that year were $5.8 billion (American Gaming Association 2008). Table 1 shows the dates commercial casino gambling was legalized in different states, as well as revenue and tax data for 2007.

Aside from commercial casinos, Indian tribes operate over 420 tribal casinos in 29 states, with 2007 revenues estimated at over $26 billion (National Indian Gaming Commission

[1]See Light and Rand (2005) for a detailed discussion of tribal gambling law.

2008). Casino gambling has become one of the most popular forms of entertainment, and is among the fastest growing service industries in the United States. Yet, its growth is tightly controlled by state governments.[2] Concerns about the current U.S. recession, as well as state-level fiscal crises, may explain why more than 14 states are considering proposals to allow or expand slot machines or casinos (Bluestein 2009). If economic conditions in the United States continue to worsen, this list of states is likely to grow.[3]

While it may seem obvious why so many states have legalized, or are considering legalizing casinos, there have been very few analyses of the casino adoption decision. There are many reasons and questions associated with casino adoption by state governments. Is it simply fiscal stress or a desire for alternative revenue sources that explains the adoption of casinos? Is it an effort to keep casino customers—and the tax revenues—within the state? Are casinos adopted to spur economic development and job growth? Or are casinos legalized simply to provide consumers with another entertainment option? Our purpose in this paper is to examine the different factors that lead to casino adoption at the state level. The analysis utilizes a random effects tobit model estimated with panel data from 1985 to 2000, a period that covers the era during which all casino legalization has occurred outside Nevada and New Jersey.[4] We consider a number of fiscal, political party, gambling competition, and demographic variables in an attempt to determine which factors affect the timing and probability of casino adoption. The paper is organized as follows. Section 2 is a review of the literature. In Sect. 3 we discuss the data and the model. Section 4 presents the results and discussion, and Sect. 5 concludes.

## 2 Review of the gambling adoption literature

Little research attention has been paid to decisions to adopt casino gambling. This is surprising considering the size of the industry and the intensity of debate over casino expansion. Researchers have examined economic development effects from casinos in particular jurisdictions, the relationships between different forms of gambling, and the social costs attributable to legalized gambling. To be sure, there is a large and growing body of gambling research.[5] However, the factors affecting the decision to adopt casinos have almost completely been ignored in the economics literature.

[2]Our focus in this paper is on the decision to legalize *commercial* casinos, because this is an autonomous decision on the part of the state governments. Hereafter, when we refer to "casinos," we mean commercial casinos, unless otherwise indicated. It is important to note that not all casinos are created equal. The mega-casino resorts in Nevada and Atlantic City are very different from casinos in many other states. For example, casinos in Colorado are very small and have strict betting limits ($5). Casinos in Kansas City, Missouri tend to cater to "day-trippers," and are not destination resorts. States regulate almost every aspect of casinos: the number to be allowed, their size, the types of games allowed, maximum bets, entry fees, etc. Casino legalization proposals are specific on these criteria, and passage is surely dependent on them. Although beyond the scope of this paper, these issues would be interesting topics for future research.

[3]Richburg (2008) reports that "at least 13 states are facing huge shortfalls for the next fiscal year, and about half a dozen others are in serious financial difficulty."

[4]The only exception is very recent: Pennsylvania opened its first stand-alone casino in late 2007. However, it only offers slot machines.

[5]See Walker (2007) for a comprehensive overview of the gambling literature.

### 2.1 Casino adoption

Furlong (1998) is the one paper of which we are aware that examines the casino adoption question.[6] He lists four general motivations for the legalization of casinos: (1) "The revenue rationale"—legalize to raise tax revenues; (2) "The political rationale"—gambling taxes may be preferred to other types of taxes or decreased government spending; (3) "The competitive rationale"—states adopt in order to compete for tax revenues with nearby states; and (4) "The economic development rationale"—casinos may stimulate local and state-level growth.

Furlong performs a cross-sectional analysis of adoption, with a dichotomous variable to indicate whether a state has legalized casinos. His analysis excludes Alaska and Hawaii because of missing data, and Nevada and New Jersey are excluded because they adopted casinos much earlier than other states. As a result, there are seven "adopting" states, and 39 "non-adopting" states. In order to test which variables explain adoption, Furlong uses bivariate logistic regressions. He then posits a multivariate model based on the bivariate results that appeared promising. Furlong finds that the political and economic development rationales are supported by the empirical results, but he finds no evidence for the revenue and competitive rationales.

The analysis by Furlong has a number of limitations. First, it utilizes cross-sectional but not time-series data, so the model ignores the timing of the adoption decision as it relates to changes in the explanatory variables.[7] Second, much of the data used by Furlong are outdated; his most recent observation on explanatory variables are from 1990, prior to the legalization decision by most of the states in his model. Third, Furlong uses only four explanatory variables in his full model; clearly, there is a concern about omitted variable bias. Despite these limitations, Furlong's discussion and results are informative.

### 2.2 Lottery adoption

Although there has been little research attention on casino adoption, lotteries have received much attention. New Hampshire was the first state of the modern gambling era to adopt a lottery, in 1964. Currently 44 states have lotteries, with total sales exceeding $60 billion in 2008,[8] about 50% of which is retained by the state governments to cover expenses and supplement state coffers (Garrett 2001).

Many facets of lotteries have been examined by economists, from the regressivity of the lottery "tax," to the contributions of lottery taxes to ear-marked programs (e.g., college tuition subsidies). Another key area of inquiry has been the states' decisions to adopt lotteries and the timing of adoption. As lotteries and casinos have the potential to raise significant tax revenues, the lottery literature has an obvious parallel to our study. Since there has been very little published on the casino adoption question, we use the relevant papers from the lottery literature as a guide.

[6] Sirakaya et al. (2005) focus on predicting outcomes of county referenda on casino legalization using an artificial neural network. Their focus is primarily on the demographic factors that explain individuals' support for casinos at the community level. In contrast, our concern in this paper is with legislative preferences and state-level casino adoption decisions.

[7] Some of Furlong's variables can be seen as measuring change through time. However, dividing a variable's 1990 value by its 1970 value, as Furlong does to calculate the change in per capita taxes, does not give much detail on how the variable has changed through time, especially as such changes relate to the timing of casino adoptions.

[8] Source: North American Association of Provincial Lotteries (http://www.naspl.org).

Among the papers that have examined lottery adoptions, the papers by Alm et al. (1993) and Jackson et al. (1994) are the most relevant to our study. Many of the other published studies adopt methodologies similar to those laid out in the Alm et al. and Jackson et al. papers; our review therefore focuses mainly on those two papers.[9]

The study by Alm et al. (1993) examines the factors that explain lottery adoption from 1964, when New Hampshire adopted the lottery, through 1988. They use a discrete-time hazard function. This model uses a dichotomous dependent variable for whether the state adopts a lottery in a particular year. Once a state adopts the lottery, it drops out of the model. The Alm et al. study includes a number of fiscal, political, and demographic variables. Among their interesting results, Alm et al. find that fiscal stress appears to be an important factor in explaining early lottery adoptions, but not later ones. The later adoptions appear to be more the result of an effort to compete with neighboring states for lottery revenues.

The other major study that is useful for us to consider is by Jackson et al. (1994). This study addresses the same fundamental question as the Alm et al. paper, except Jackson et al. frame their question in the more general terms of legal change. Similar to the Alm et al. study, the Jackson et al. study employs an array of fiscal, political, and demographic variables to analyze the determinants of lottery adoption.[10] Jackson et al. utilize cross-sectional data in a tobit model, which allows them to analyze both the adoption and timing of the decision.

Jackson et al. find that expected lottery revenues have a positive impact on lottery adoption and timing (i.e., earlier adoption). A variety of demographic variables and political variables are also found to be significant. Interestingly, the variable with the largest impact on the probability and timing of adoption is whether the state already has some form of legal gambling. Therefore, Jackson et al. conclude that voter preferences for gambling overpower interest groups working against the lottery. For example, existing gambling industries may be expected to oppose the introduction of the lottery. The efforts by such lobbyists appear to be overpowered by consumers' (voters') preferences in favor of the lottery. This finding, among others, helps to support the Jackson et al. "legislature-as-interest-group" hypothesis for explaining policy changes. In fact, Jackson et al. (1994) and Filer et al. (1988) both argue that state legislators benefited from the adoption of lotteries. This assumption seems a reasonable starting point for explaining the adoption of commercial casinos.

The lottery literature provides two key insights for our study. First, it provides a helpful menu of explanatory variables for consideration. Second, the studies by Alm et al. and Jackson et al. highlight important considerations for choosing our empirical model. These studies have clearly been influential in the lottery literature, and are the two studies that we most closely emulate in positing our model of casino adoption.

There are obvious parallels between the lottery and casino adoption issues. But the two industries are not identical. For example:

- Casinos are geographically limited—built in specific locations; lottery tickets are available at retail stores state-wide.

[9] Studies of lottery adoption include Filer et al. (1988), Berry and Berry (1990), Caudill et al. (1995), Mixon et al. (1997), Erekson et al. (1999), Glickman and Painter (2004), and Giacopassi et al. (2006). Many of these studies are compared in the review by Coughlin et al. (2006). More comprehensive studies of lotteries include Clotfelter and Cook (1991), Borg et al. (1991), and von Herrmann (2002).

[10] We do not give a detailed discussion of the differences between the variables used in the two studies, since our interest is more in their empirical frameworks.

- Casinos are often built to be "destination resorts," while lotteries may attract only modest cross-border purchases. Casinos arguably have a large positive tourism effect for a state, whereas lotteries do not.
- The tax rates applied to casino revenues (6% to 50%) are typically lower than the 50% average "tax" on lottery ticket sales.
- The supply side of the market is different for the two industries. Lottery tickets are supplied to retailers throughout the state directly by the state itself. Casinos are typically privately owned and managed, but licensed, regulated, and taxed by the state. This aspect of the supply side raises opportunities for rent seeking behavior on the part of suppliers and potential suppliers of casino gambling.

These and other differences between casinos and lotteries are important. From the legislators' perspective, however, the motivations for adopting lotteries and casinos may be similar. The lottery adoption literature is therefore a valuable resource for us in developing our model.

## 3 Model and data

We posit a panel data model to explain the adoption of commercial casinos in the United States. Our analysis covers the period from 1985 to 2000, a period which encompasses most of the casino expansion following the IGRA. We collected data on all 50 states, which provide us 800 observations.[11] An important econometric issue for us to consider is whether to use a hazard model or a tobit model to explain casino adoptions at the state level. As noted above, the primary difference between the Alm et al. and Jackson et al. studies is the choice of empirical framework. The Alm et al. study uses a hazard model and the Jackson et al. study uses a tobit model.

The hazard model only estimates a conditional probability that an event will occur, in our case casino legalization. Jackson et al. (1994) and Filer et al. (1988) demonstrate that the question of adoption is more than just the probability that a state legislature will adopt. These authors posit a theoretical model of the legislators as an interest group. Thus, they argue that a legislative decision to legalize casinos is only the first of two questions that needs to be addressed. The second question is whether states will adopt casinos earlier or later. In order to answer both of these questions, a tobit analysis is the more appropriate specification for the theoretical analysis.[12] Therefore, we follow Jackson et al. (1994) and use a tobit model.

### 3.1 Model

Filer et al. (1988) estimate separate probit and tobit equations to address the issues of probability and timing of adoption. They argue that the probit model provides information on the probability of adoption in a particular year, while the tobit provides information on the

[11] Washington, DC, is excluded from the analysis because much of its administration is handled by the federal government.

[12] This is not to say that hazard models cannot address the timing question; they can, via the duration dependence of the hazard. Specifically they address the question, "What determines the probability of adoption, given that the state has not adopted up until this point in time?" The more interesting timing question, it seems to us, is, "What determines when a state will adopt casinos, given that it will adopt at some point?" This version of the timing question is appropriately addressed by tobit analysis.

timing of adoption. Jackson et al. (1994) demonstrate that two separate estimations are not necessary; more efficient probit coefficient estimates can be derived from tobit estimates.[13] Thus, only the tobit equation has to be estimated.

Let the propensity of state legislators to legalize casinos be given by the random variable $Y$. Assume some critical value of $Y$, denoted as $Y^*$, such that the $i$th state legislature will legalize casinos if $Y_i > Y^*$ and will not if $Y_i \leq Y^*$. The tendency of a legislature to adopt a casino is not observable, but at any point in time whether the $i$th legislature has legalized casinos, $Y_i > Y^*$ is observable. Legislatures with stronger propensities toward casinos would tend to adopt earlier than those with weaker propensities. The number of years since adoption, $YSA_{it}$, provides a measure of the intensity of preference of the legislature in state $i$ for casino adoption at time $t$. Clearly, if state $i$ has not adopted by time $t$, its preference for adoption is below the threshold preference so $YSA_{it}$ will be entered as 0. We can then postulate a general tobit model:

$$y_{it} = X_{it}\underline{\beta} + \varepsilon_{it} \tag{1}$$

where $y_{it} = YSA_{it}$ if $Y_{it} > Y^*$, and $y_{it} = 0$ if $Y_{it} \leq Y^*$. $X_{it}$ is a vector of fiscal, political party, gambling competition, and demographic variables affecting the tendency to adopt casinos for state $i$ in time period $t$; $\underline{\beta}$ is a vector of unknown parameters measuring the response of this tendency, *ceteris paribus*, to the changes in the independent variables; and $\varepsilon_{it}$ is a stochastic error term.

Our model uses panel data. As a result, we view our model as providing better information on the adoption and timing decisions than other tobit models which rely only on cross-sectional data during the year of adoption.[14] As such, our study represents an improvement over the cross sectional methodologies used in past lottery or casino adoption studies. Our dependent variable is "years since casino adoption," $YSA_{it}$.[15] If a state has not legalized casinos, then $YSA_{it}$ carries a value of 0. Lottery adoption studies have included a number of different explanatory variables. Our model extends the lottery studies by including similar variables, as well as new and unique variables to explain casino adoption. We argue that casino adoption is a function of five general factors. Our model can be written as

$$\begin{aligned} YSA_{it} = {} & \beta_0 + \beta_1 Fiscal_{it} + \beta_2 PoliticalParty_{it} + \beta_3 IntrastateCompetition_{it} \\ & + \beta_4 InterstateCompetition_{it} + \beta_5 Demographic_{it} + \alpha_i + \varepsilon_{it} \end{aligned} \tag{2}$$

where $YSA_{it}$ is the number years since state $i$ in year $t$ legalized casinos; $Fiscal_{it}$ is a vector of various debt, tax and revenue measures; $PoliticalParty_{it}$ is a vector identifying the political party controlling state government; $IntrastateCompetition_{it}$ and $InterstateCompetition_{it}$ measure the amount of gambling within the state and opportunities for gambling in adjacent states; and $Demographic_{it}$ is a vector of demographic variables. $\beta_j$ $(j = 1, \ldots, 5)$ are vectors of unknown parameters associated with each of the five classes of explanatory variables;

[13] Stranahan and Borg (1998) also show this in their analysis of the consumer's lottery ticket behavior. They analyze both the decision to purchase tickets and the quantity of tickets purchased, simultaneously, using a similar tobit approach.

[14] For example, Jackson et al. (1994) use a model that includes only 49 observations. Arguably, legislators will make casino (or lottery) adoption decisions based on how variables change through time, rather than their values in only one particular year.

[15] We opt to explain *YSA* rather than the first year revenues were received (as was tested by Alm et al. for lotteries) because we are concerned with explaining the act of commercial casino legalization. Bureaucratic delays and building the casinos may take several years after legalization. This time lag varies across states.

$\alpha_i$ represents individual state-level random effects, allowing us to capture variation in any unobserved state heterogeneity over time; and $\varepsilon_{it}$ are the normally distributed disturbance terms associated with the casino industry *per se* (in any state). These individual variables are described in more detail below. We employ this random effects specification based on the results of a likelihood ratio test which revealed the relative efficiency of the random effects model as compared to both a fixed effects model (one including state level dummy variables) and a simple pooled tobit specification ignoring both fixed and random cross state effects.[16]

Considered in the context of our tobit model, a positive sign on a coefficient (i.e., positive effect) implies that increases in the variable cause the "years since casino adoption" (*YSA*) to be larger. Hence, a positive coefficient increases the likelihood of adoption, and implies an *earlier* adoption of casinos relative to other states. A negative sign on a coefficient (a negative effect) implies that a state is less likely to adopt casinos and, if it does adopt, it is likely to adopt later, relative to other states.

## 3.2 Data

We have 800 observations: annual data from 1985 to 2000, for all 50 states. Table 2 lists the variables in our model, along with brief definitions, data sources, and descriptive statistics.[17] We are particularly interested in the fiscal and gambling competition variables because they are the most common issues that arise in casino adoption debates.

### *3.2.1 Fiscal variables*

The fiscal variables are meant to account for state specific fiscal conditions and institutional constraints that might push legislators toward casino legalization. Inclusion of these variables follows earlier papers on gambling adoption, such as Alm et al. (1993). Our fiscal variables include the log of short-term state debt (*Debt-short term*), the log of long-term state debt (*Debt-long term*),[18] a dummy variable to indicate whether a state has a tax and expenditure limit (TEL, *Tax/expend. limit*),[19] state tax revenue per capita (*State revenue*), and per capita federal government transfers to the state (*Fed. transfers*).

Fiscal pressure or stress may serve as a motivation for state governments to legalize casinos. There are a number of ways one can conceive of "fiscal stress": taxpayers want more government services, or they want lower taxes; increasing existing taxes is politically infeasible; ever-increasing budget deficits; etc. Thus, these variables could indicate that politicians are reacting to fiscal pressure such as increasing budget deficits. Alternatively, they may indicate that politicians, acting as an interest group, merely want to maximize revenue to expand the size and scope of government.

[16] Models using panel data typically include either fixed or random effects. In earlier specifications of our model we incorporated state and/or regional dummies. However, these were not significant and did not appreciably affect the results associated with the basic variables in our model, so they were omitted. The likelihood ratio test for random effect versus pooled time series tobit produces a $\chi^2 = 658.7$, rejecting the null hypothesis that $\sigma_\alpha$, the cross-state variance $= 0$. We are grateful to an anonymous referee for suggesting the random effects tobit model.

[17] As we are using panel data, it is unclear how useful descriptive statistics can be, but they are included for interested readers.

[18] We also tested per capita debt and found similar results.

[19] There is a large variety of such rules, among which our variable does not distinguish. For a concise discussion of TELs, see http://www.ncsl.org/programs/fiscal/telsabout.htm.

**Table 2** Variable descriptions, descriptive statistics, and data sources

| Variable | Description | Mean | Std. Dev. | Data source |
|---|---|---|---|---|
| Fiscal | | | | |
| *Yrs. since adoption* (dep. variable) | Number of years since casino legislation passed | 2.21 | 9.069 | Calculated by authors, with opening year data from state gambling commissions |
| *Debt-long term* | Log of state govt. long term debt | 6.86 | 0.784 | U.S. Census Bureau, Government Finance |
| *Debt-short term* | Log of state govt. short term debt | 0.35 | 2.003 | U.S. Census Bureau, Government Finance |
| *Tax/expend. limit* | State has tax and expenditure limit, 1 = yes; 0 = no | 0.48 | 0.500 | *Book of the States* |
| *State revenue* | Real state govt. revenue per capita | 8985.91 | 1019.17 | *Statistical Abstract of the U.S.* |
| *Fed. transfers* | Real intergovernmental transfers per capita | 2353.91 | 2907.91 | *Statistical Abstract of the U.S.* |
| Political party | | | | |
| *Party of governor* | Party of governor, 1 = Democrat; 0, otherwise | 0.51 | 0.500 | *Book of the States* |
| *Dem.-unified govt.* | Democrat governor/legisl. majority = 1; 0, otherwise | 0.24 | 0.428 | *Book of the States* |
| *Rep.-unified govt.* | Republican governor/legisl. majority = 1; 0, otherwise | 0.43 | 0.495 | *Book of the States* |
| Intrastate competition | | | | |
| *Dog bets* | Greyhound racing bets per capita | 11.43 | 22.438 | Assoc. of Racing Commissioners Intl., Inc. |
| *Horse bets* | Horse racing bets per capita | 32.06 | 38.900 | Assoc. of Racing Commissioners Intl., Inc. |
| *Lottery sales* | Lottery ticket sales per capita | 56.41 | 75.366 | *LaFleur's 2001 World Lottery Almanac*, 9e |
| *Indian casino sq ft* | Indian casino square footage per capita | 0.02 | 0.061 | Calculated by the authors with data from www.casinocity.com and calls to casinos |
| Interstate competition | | | | |
| *River border* | State has a river on its border, 1 = yes, 0 = no | 0.58 | 0.494 | Calculated by the authors |
| *Adj. state w/casino* | Percent of adjacent states that have casino(s) | 0.14 | 0.174 | Calculated by the authors |
| *Adj state w/Indian casino* | Percent of adjacent states that have Indian casino(s) | 0.28 | 0.263 | Calculated by the authors |
| *Square mileage* | State total area (square miles, excluding bodies of water) | 70745.4 | 85176.5 | U.S. Census Bureau, American Fact-Finder |

*Debt-short term* and *Debt-long term* are thought to indicate whether the state is experiencing fiscal stress or pressure. Long-term debt is usually associated with off-budget capital expenses, while short-term debt is usually an indication of a shortfall in revenues or a grow-

**Table 2** (*Continued*)

| Variable | Description | Mean | Std. Dev. | Data source |
|---|---|---|---|---|
| Demographic | | | | |
| *Baptists* | Percent of population that are Baptists | 12.31 | 13.526 | *New Book of American Rankings* |
| *Hotel employees* | Percent of state workers employed by hotels | 2.21 | 3.245 | Bureau of Economic Analysis |
| *Income* | Real per capita income | 14506.75 | 2331.07 | Bureau of Economic Analysis |
| *Population density* | Population divided by square mileage | 170.73 | 236.94 | U.S. Census Bureau |
| *Population over 65* | Percent of population 65 or older | 12.54 | 2.066 | U.S. Census Bureau |
| *Poverty* | Percent of population below poverty line | 13.95 | 4.124 | U.S. Census Bureau |
| *Unemployment* | State unemployment rate | 5.57 | 1.763 | Bureau of Labor Statistics |

ing budget deficit. If state legislatures adopt casinos to collect additional tax revenue in order to address these fiscal pressures, then we would expect the signs on *Debt-short term* and *Debt-long term* to be positive.

Tax and expenditure limits (TELs) indicate the ease with which state legislatures can address changes in fiscal conditions within the state. The existence of a *Tax/expend. limit* might increase the probability and timing of casino adoption as politicians attempt to circumvent these restrictions. *State revenue* measures the current revenue being collected by the state government. As revenues decline we can expect that legislatures would be more inclined to legalize casinos to address revenue shortfalls, *ceteris paribus*. Finally, *Fed. transfers* is the amount of money received through inter-governmental transfers. If the amount of funds from the federal government increases, we argue state legislatures would be less likely to adopt casinos, as they do not perceive as strong a need for additional tax revenue.

### *3.2.2 Political party variables*

Proposals to legalize casino gambling always stir lively debate. Yet, it is unclear whether one political party is consistently pro-casino and the other is anti-casino. The political party variables are included to examine whether casino legalization is more likely to occur when one political party or the other holds power in state government. *Party of governor* is a dummy variable with a value of 1 indicating the governor is a Democrat and 0 otherwise. *Dem.-unified govt.* is a dummy to indicate when the governor and legislative majority in the state are Democratic, and *Rep.-unified govt.* indicates when the governor and legislative majority are Republican.

Our purpose here is not to exhaustively explain why Democrats or Republicans vote for the policies they do; there may be any number of explanations as to why one party or the other might support or oppose casinos. However, we believe the party variables may shed some light on two political positions that are particularly relevant to casino legalization. The first is a "social liberal" effect. Democrats are typically seen as being more socially liberal, and may be more likely than Republicans to support gambling as an acceptable activity. Some Republicans (i.e., the "religious right" or "Christian conservatives") vocalize a strong moral opposition to gambling. To the extent that socially liberal values explain

casino adoption, we would expect positive coefficients on *Party of governor* and *Dem.-unified govt.*, and a negative coefficient on *Rep.-unified govt*.[20]

Alternatively, the political party variables may also reflect an "economic conservatism" effect. Republicans are often reputed to be more economically conservative than Democrats.[21] If this is the case, Republicans may be more motivated to legalize casinos in order to lower budget deficits, or as an alterative to raising income or property taxes in the state. (This is similar to Furlong's "political" effect.) If "economic conservatism" helps to explain casino adoption, then we would expect *Party of governor* to be negative and *Rep.-unified govt.* to have a positive coefficient. Similarly, a negative coefficient on *Dem.-unified* might be viewed as consistent with a lack of economic conservatism by Democrats.

### *3.2.3 Intrastate competition variables*

The next set of variables relates to intrastate competition among gambling industries. *Dog bets*, *Horse bets*, and *Lottery sales* measure the dollar amounts of bets per capita in the state, for the respective industries. *Indian casino sq ft* measures the total floor space of tribal casinos in the state, as a proxy for the volume of tribal casino gambling (Walker and Jackson 2008). That variable is entered, rather than revenues, because most tribal casinos do not disclose their revenue data.

We might expect that the larger these gambling industries are within a state, the less likely is casino adoption. One reason for this is that casinos may be expected to "cannibalize" other gambling industries in the state.[22] Owners and workers in those competing industries may lobby politicians to vote against casinos.[23] In addition, politicians may be concerned that casino legalization will have a negative impact on tax revenues from other gambling industries, especially the lottery. To the extent that these competitive concerns influence casino adoptions, we would expect the coefficients on these variables to be negative.

### *3.2.4 Interstate competition variables*

The next four variables listed in Table 2 relate to competition with gambling industries in adjacent states. This is an important issue that has often been overlooked in previous adoption studies. *River border* is a dummy variable taking the value of 1 if the state has a river on its state border, and 0 if not. The adjacent state casino variables (*Adj. state w/casino* and

[20] It is stylized fact in the voting literature that Southern states tend to hold unique ideological positions, such that Southern and Northern Democrats are different; Southerners tend to be more socially conservative. To account for this difference we created an interaction term between party of the governor and a Southern regional dummy. When this variable is added to the model it is not statistically significant and does not markedly change the other results.

[21] This is a long-standing public perception, although one could argue whether recent evidence supports it.

[22] Walker and Jackson (2008) report that the different gambling industries do not all compete with one another. They found that casinos harm lotteries and greyhound racing, but help horse racing.

[23] In one preliminary specification of the model we included lobbying expenditures related to gambling industries. The variable was not statistically significant. An interesting example of incumbent industry lobbying efforts was described in a recent article (Javers 2008), reporting that MGM Mirage, one of the world's largest casino companies, was financing anti-casino mailings in Michigan, with the text, "Washington Poised to Force Two New Casinos on Michigan Families. Only You Can Stop the Special Interests." While the mailing appeared to be from an anti-gambling group called "Gambling Watch," it turns out that MGM was sending the mailings in an attempt to create grassroots opposition to new tribal casinos in the state that would compete with MGM's commercial casinos.

*Adj. state w/Indian casino*) are the percentage of adjacent states that offer that type of casino gambling. These variables represent the degree of availability of casinos in nearby states. Finally, *Square mileage* is the total land area of the state, which may affect the likelihood that residents will travel to adjacent-state casinos, and conversely, how many tourists the state is likely to attract from adjacent states.

There are at least three reasons why having a river on the state's border might make casino adoption more likely. First, and most importantly, allowing riverboat casinos on rivers/state borders may represent an aggressive attempt to attract tourists (and tax revenues) from neighboring states. Second, one could argue that river borders have a political significance. Voters or politicians with "moral" objections to casinos on state land may be appeased if casinos are allowed only on riverboats, since technically the gambling would not be occurring within the state. Third, riverboat casinos could be promoted on historical grounds. If such boats were legal at an earlier time, perhaps the argument for legalizing casinos can be made stronger by citing an historical precedent. As most of the early-adopting states (IA, IL, IN, MS, MO, and LA) border the Mississippi River, we expect this variable to have a positive coefficient.

If a nontrivial portion of a state's population travels out-of-state in order to visit casinos, politicians can make an argument that casinos should be adopted within the state to keep its citizens—and tax money—within the state. Furlong (1998) calls this the "competitive rationale" for legalizing casinos; it is also called "defensive legalization" in the gambling literature. A current example of this argument can be seen in Massachusetts, whose residents spent an estimated $876 million at Connecticut casinos in 2006 (Barrow 2007). The governor is seeking to legalize casinos in Massachusetts, in part, to allow residents to gamble at casinos within the state.

Lottery adoption studies have typically used rather blunt variables for measuring interstate competition, if they consider it at all. For example, Alm et al. (1993) use a dummy variable to indicate whether any neighboring state has a lottery.[24] A variable that is more sensitive to the extent to which state residents have options in neighboring states would be preferred to a simple dummy. Therefore, following Davis et al. (1992) and Walker and Jackson (2008), our variables measure the percentage of adjacent states with commercial casinos or Indian casinos.[25] To the extent that politicians are motivated to adopt casinos in order to keep tax revenues in-state (defensive legalization), we would expect the coefficients on *Adj. state w/casino* and *Adj. state w/Indian casino* to be positive.

The last variable in the interstate competition category is the size of the state, *Square mileage*. We view the size of the state as potentially affecting the extent to which consumers within the state are likely to travel outside to neighboring states in order to gamble. The larger the state, the less likely a person may be to travel out-of-state, simply because the larger the state, the longer and costlier the drive is likely to be.[26] The size of the state could

[24]Neither Jackson et al. (1994) nor Filer et al. (1988) include a variable to account for neighboring state lotteries.

[25]Walker and Jackson (2008) explain that this type of measure is preferable to a dummy because it is more sensitive to the degree to which residents have access to casino gambling in neighboring states. Using the sum of adjacent states' revenues would be problematic because larger totals could result from larger populations, more tourism, or a combination of the two. A per capita measure of adjacent total revenues is similarly problematic, because higher total per capita revenues in adjacent states may reflect more gambling, more neighboring states, or fewer residents in those states. Overall, these measures are less effective than the percentage of adjacent states at measuring simple gambling *availability* in neighboring states.

[26]This effect obviously would depend on a number of factors, including the distribution of population relative to the state's border. But consider two states, one large and one small, and each having identical uniformly

have an analogous effect on neighboring states' tourists. The larger a particular state, the less likely it is that people from neighboring states will visit it, *ceteris paribus*.

### *3.2.5 Demographic variables*

Finally, we turn to the demographic variables in the model. These variables can be seen as gauging constituents' characteristics, but they also could be indicators for the casino industry as to the extent to which the state's residents are likely to be consumers of its product. Previous papers have included a variable to represent potential religious opposition to gambling.[27] We include as a variable the percentage of the state's population that is Baptist (*Baptists*), as this group is an organized, well-known opponent of legalized gambling. We would expect *Baptists* to have a negative coefficient.

Clearly, legislators can garner significant rents from the voting public if they can design revenue strategies to induce non-residents to pay part of the state's tax bill. One such strategy is to attract out-of-state tourist and then tax them, thereby "exporting" part of the state's tax bill to the tourists' states of origin. Popular examples of this include accommodations taxes and taxes on rental cars, which are largely paid by tourists. We include a variable that measures the percentage of the state's total employment that works in the hotel industry (*Hotel employees*) as a proxy for the tourism industry. The larger this number, the larger the state's tourism sector, *ceteris paribus*. We expect this variable to have a positive effect on casino adoption and timing, as this would be consistent with efforts to expand tourism and tax exporting.

In states with higher income per capita, we expect consumers to spend more money on leisure activities. We include per capita income in the model (*Income*), with the expectation that it will carry a positive sign. This would suggest that casino gambling is a normal good, or perhaps that the residents prefer taxes on casinos to income, sales, property, or other universally applied taxes.

We include the state's population density as an explanatory variable (*Population density*). Casinos may be more likely to be built if there are significant population centers that could support such businesses. If the industry requires a minimum threshold of people to survive and if the state's residents are the primary consumers of casino services, then we might expect this variable to have a positive effect on adoption.

The proportion of the state's population age 65 or over is included as a variable (*Population over 65*). Casino opponents have argued that older people are taken advantage of by casinos. On the other hand, retirees may favor more entertainment choices and have lower opportunity costs of time. Also, since the older population is an influential block of voters, we include it in the model. Given that casinos are often popular with the older population, due perhaps to their lower opportunity cost of time, we could expect this variable to have a positive effect on casino adoption.

One of the major concerns over gambling is whether poor people over-consume such services. The regressivity of the lottery "tax" has received enormous attention in the litera-

distributed population with transportation equally difficult in all directions. Now randomly pick a person from each state; the person in the small state is more likely to reside closer to a border than the person picked from the large state, *ceteris paribus*. It follows that the person in the small state is more likely to travel to a neighboring state, *ceteris paribus*, since the cost of doing so would be lower.

[27] For example, Alm et al. (1993) use the percentage of population that is Catholic and Jackson et al. (1994) and Elliott and Navin (2002) use Baptists as variables to explain lottery adoption.

ture.[28] If taxes on casino gambling represent a similarly regressive tax, then we may expect the proportion of poor people in the state (*Poverty*) to have a negative impact on casino adoption, to the extent politicians and voters share a concern for the poor. Of course, the fact that most states have lotteries suggests that politicians have other concerns greater than gambling tax regressivity. Our last demographic variable is the unemployment rate in the state (*Unemployment*). We might expect a state to be more likely to adopt casinos if they are expected to stimulate employment and economic growth. This motivation to adopt may be greater in states with slower economies and more unemployment.

## 4 Results

We present results of the random effects model in Table 3. The coefficients shown represent the decomposition of the tobit coefficient, as utilized by Jackson et al. (1994). Specifically, the tobit coefficient represents the "timing" effect, while the "probability of adoption" effect is shown in the implied probit coefficient.[29] Note that the probability and timing effects are jointly estimated, so that the $z$-statistics on the variables shown in Table 3 measure the significance of both the tobit regression coefficient and the implied probit coefficient for each variable.

### 4.1 Random effects tobit model

As indicated in Table 3, two of the five fiscal variables, *Debt-long term* and *Tax/expend. limit*, are statistically significant at the 1% level. *Debt-long term* is positive and significant suggesting that states with higher long term debt are more likely to adopt casinos, and to do it sooner. *Tax/expend. limit* is also positive, which suggests that legislatures perceive tax revenues from casino gambling as a way to increase revenues and spending where they may otherwise face constraints. While our results provide some evidence that fiscal variables influence the decision to adopt casinos, these results are largely consistent with those by Furlong (1998), Alm et al. (1993), and Jackson et al. (1994), who found little support for fiscal pressure as a motivation for adopting casinos or lotteries.[30]

Among the political party variables, *Rep.-unified govt.* and *Party of governor* are statistically significant (1% level). *Dem.-unified govt.* is insignificant. The combination of a positive coefficient on *Rep-unified govt.* and negative coefficient on *Party of governor* are most consistent with our "economic conservatism" motivation for adoption. These results may indicate that the "social liberal" motivation discussed earlier may not be as important as fiscal motivations, with respect to casino adoption.

[28] See Clotfelter and Cook (1991), Hansen (1995), Miyazaki et al. (1998), and Stranahan and Borg (1998) for examples. Even when the expenditure of lottery revenue is considered, for example, to subsidize college education, many lotteries remain regressive, as benefits are often paid disproportionately to higher-income recipients (Rubensetin and Scafidi 2002).

[29] The probability effect is the marginal effect from the probit coefficient. It is calculated, for a given variable (say the $j$th), as the estimated tobit coefficient ($\beta_j$) divided by the estimated standard error of the regression ($\sigma$), calculated as the square root of the overall variance ($\sigma_e^2$) and the panel-level variance ($\sigma_\alpha^2$), where $\sigma = \sqrt{\sigma_e^2 + \sigma_\alpha^2}$. This implied probit coefficient is multiplied by the ordinate of the standard normal distribution, evaluated at the predicted $z$ value of the implied probit equation ($f(\bar{z})$); that is, $(\beta_j/\sigma) * f(\bar{z})$.

[30] The exception, as noted previously, is Alm et al. (1993), who found that fiscal stress did explain early (but not later) lottery adoptions.

**Table 3** Random effects tobit on casino adoption (Dependent variable: *Yrs. since adoption*)

| Variable | Timing effect (Tobit) | Probability effect[a] (Probit) | $z$-stat. |
|---|---|---|---|
| Fiscal | | | |
| *Debt-long term* | 1.604 | 0.020 | 2.66*** |
| *Debt-short term* | −0.022 | −0.0003 | −0.37 |
| *Tax/expend. limit* | 3.076 | 0.039 | 7.64*** |
| *State revenue* | −8.5e−5 | −1.1e−6 | −0.70 |
| *Fed. transfers* | 0.0004 | 5.1e−6 | 0.76 |
| Political Party | | | |
| *Party of governor* | −0.898 | −0.012 | −2.52** |
| *Dem.-unified govt.* | 0.556 | 0.007 | 1.17 |
| *Rep.-unified govt.* | 0.784 | 0.010 | 2.53*** |
| Intra-state competition | | | |
| *Dog bets* | −0.041 | −0.001 | −2.85*** |
| *Horse bets* | 0.012 | 0.0002 | 4.13*** |
| *Lottery sales* | 0.006 | 8.0e−5 | 3.25*** |
| *Indian casino sq ft* | −18.50 | −0.236 | −5.15*** |
| Inter-state competition | | | |
| *River border* | 5.340 | 0.068 | 5.29*** |
| *Adj. state w/casino* | 0.923 | 0.012 | 0.99 |
| *Adj. state w/Indian casino* | 8.682 | 0.111 | 8.43*** |
| *Square mileage* | −3.1e−7 | −3.9e−9 | −0.05 |
| Demographic | | | |
| *Baptists* | 0.211 | 0.003 | 6.68*** |
| *Hotel employees* | 1.724 | 0.022 | 42.96*** |
| *Income* | 0.001 | 1.6e−5 | 7.80*** |
| *Population density* | −0.003 | −3.3e−5 | −2.25** |
| *Population over 65* | −0.369 | −0.005 | −1.88* |
| *Poverty* | −0.657 | −0.008 | −6.59*** |
| *Unemployment* | −0.209 | −0.003 | −1.91* |
| *Constant* | −26.02 | −0.332 | −4.61*** |
| $N = 800$; $\sigma_e = 0.817$; $\sigma_\alpha = 31.23$; $\chi^2 = 29694.6$ | | | |

Notes: *indicates significance at the 0.10 level, **at the 0.05 level, and ***at the 0.01 level. $\sigma_e$ is the overall standard error of the estimate and $\sigma_\alpha$ is the panel level standard error. $\chi^2$ tests the joint significance of all explanatory variables

[a]The probit coefficient is calculated as described in footnote 29

We next turn to the intrastate competition variables. All of the tested variables on in-state gambling are significant at standard levels. However, the results are mixed. *Dog bets* and *Indian casino sq ft* are consistent with the in-state competition effect discussed earlier. However, this result is somewhat surprising; we would have thought that if the state already has Indian casinos, politicians would be interested in capturing some of the potential tax revenues through commercial casinos. Perhaps our result simply reflects reluctance by voters to increase the number of casinos in a state, once Indian casinos are already present. Alter-

natively, it is conceivable that companies managing tribal casinos lobby to prevent further competition, or to ensure that tribal-state compacts prevent further competition.[31]

Both *Horse bets* and *Lottery sales* have a positive and significant impact on casino adoption.[32] These results may reflect a general attitude toward gambling, rather than a large concern over inter-industry competition. That is, if the state's citizens or legislators are already amenable to gambling—or if they simply appreciate the tax revenues it brings—casino adoption is more likely. One may find, for example, that the standard arguments against gambling are considered to be inconsequential if the state already has legalized gambling in some form and is satisfied with it.

Next we consider the interstate variables, which are generally very supportive of the interstate competition motivation for casino legalization. The *River border* variable is positive and significant at the 1% level. States with rivers bordering them may find it relatively easy to adopt casinos because of loopholes regarding gambling on water. This result may also reflect the historical or moral issues discussed earlier. Most importantly, the positive river effect is consistent with the argument that states attempt to export taxes by attracting tourism from neighboring states.

The results on the adjacent state casino variables also support interstate competition as a motivation for casino adoption. We find *Adj. state w/Indian casino* is significant at the 1% level, indicating that states with a larger proportion of neighboring Indian casino states are more likely to adopt commercial casinos. The coefficient on *Adj. state w/casino* while positive, is insignificant. This insignificance may simply be due to the fact that still relatively few states have legal commercial casinos.

Finally *Square mileage* is negative and insignificant, indicating that state size does not affect casino adoptions. The sign itself implies that larger states may be less likely to draw border-crossing tourists due to their size, and they are less likely to have their own residents travel to adjacent states with casinos. For this reason there is less motivation, based on interstate competition, to legalize casinos.

The results of our demographic variables are, in some cases, unexpected. However, we view these variables as being secondary in importance for our study; our main interests are the fiscal and gambling competition variables. We find that *Baptists* has a significant and *positive* (1% level) effect on casino adoption. Clearly, this result is contrary to our expectations. However, since Mississippi and Louisiana were among the first states to adopt casinos, perhaps *Baptists* is picking up a "Southern" effect in our model.[33]

*Population density* is negative and significant (1% level) in the model. This result may indicate that adopting legislatures view the potential casino market to arise from out-of-state

[31] An example of this would be the compact in Connecticut, where the state receives 25% of slot revenues from the tribal casinos in exchange for a guarantee that additional casinos will not be permitted in the state. As noted previously, lobbying expenditures related to gambling industries was not statistically significant in a preliminary specification of the model.

[32] See footnote 22. The negative sign of *Dog bets* and the positive sign on *Horse bets* is consistent with the findings of Walker and Jackson (2008).

[33] Another possibility is raised by the Mississippi case. Prior to casinos being legalized there, a proposal for a state-run lottery was defeated soundly in a referendum against which Baptists lobbied heavily. Casino gambling subsequently passed in Mississippi with virtually no public debate, and the legislature did not put it to a popular vote. Casinos were sold as a way of funding K-12 education, but the promise was arguably not fulfilled. This raises an important issue: To what extent does casino legalization depend on its revenues being earmarked for particularly "good" purposes? Only three states with commercial casinos (Michigan, Missouri, and Pennsylvania) advertise the fact that casino tax revenues are earmarked. This would be an important issue for future research: What attributes of casino *legislation* affect passage? However, this issue is beyond the scope of this paper.

tourists, rather than local residents. Clearly, most casino markets have developed outside of urban settings; this is consistent with our findings. As we expected, *Hotel employees* is significant and positive. This gives further support to the argument that casinos are adopted with the intent of attracting tourism and/or exporting taxes. *Income* is also found to have a positive impact on adoption. This suggests that states with higher-income citizens may prefer having additional leisure options and/or prefer having alternatives to higher income or property taxes; it may also suggest that gambling is a normal good, or simply that individuals with relatively high incomes support shifting the tax burden to casino customers. The *Population over 65* in a state has a negative and significant impact on the likelihood or timing of casino adoption. As expected, this group has an effect on the outcome of most political issues, including the adoption of casinos. States with relatively larger elderly populations are not as likely to legalize casinos. As anecdotal support for this finding, consider Florida, which has by far the largest proportion of citizens over 65 years old. Casino legalization proposals have repeatedly been defeated there. This finding conflicts with our expectations, which were that individuals with more spare time would support additional entertainment options. Perhaps casinos are not needed in Florida, as individuals who wish to gamble have ready access to cruise ships with casinos.

The more *Poverty*, the less likely is casino adoption. This result is consistent with the tax-shifting motivation from above, and with the argument that politicians (and voters) tend to shy away from perceived regressive forms of taxation. (Perhaps the regressivity issue has become more important as the effects of the lottery "tax" have become better understood.) Finally, *Unemployment* has a statistically significant and negative effect on adoption. Contrary to the public debates over casino gambling, our results suggest that politicians do not, in fact, pursue legalized casinos as a means of dealing with high unemployment, or more generally, bad economic conditions.

### 4.2 Random effects tobit model with simultaneity

One can argue that states adopt casinos, as least in part, to have a revenue source in order to finance long-term debt. This argument suggests that endogeneity might exist between *YSA* and *Debt-long term*. To test for this simultaneous relationship we use a version of the Hausman omitted variable test. We regress *Debt-long term* on the same set of explanatory variables as noted in (2), along with two additional variables (real capital outlays per capita, and a dummy for a balanced budget rule) to identify the implied system of equations. Both of these new variables may affect long-term debt, but should not be predictors of casino adoption.[34] We estimate a random effects tobit model to test for simultaneity by including the residuals from the long term debt equation, along with *Debt-long term* in the *YSA* model. Both *Debt-long term* and the residuals of *Debt-long term* prove to be statistically significant, suggesting that endogeneity does exist between *YSA* and *Debt-long term*.[35]

While we do not know the direction of causality between adoption and long term debt, the existence of simultaneity is consistent with the legislator-as-interest-group theory. We have argued earlier that long term debt should positively affect casino adoption, but the possibility that adoption also affects long term debt suggests that legislatures may be looking for revenue sources to provide largess in the form of capital expenditures, or other spending

[34] We tested balanced budget rules in a preliminary model of casino adoption and it was insignificant.

[35] See Gujarati (2003: 754–755) or Pindyck and Rubinfeld (1991: 303–305). For an analysis involving more than two endogenous variables, see Kennedy (2003: 197–198). It is worth noting that the previous literature on lottery adoption does not address the issue of a simultaneous system.

**Table 4** Random effects tobit on casino adoption: corrected for simultaneity (Dependent variable: *Yrs. since adoption*)

| Variable | Timing effect (Tobit) | Probability effect[a] (Probit) | $z$-stat. |
|---|---|---|---|
| Fiscal | | | |
| *Debt-long term* | 2.141 | 0.028 | 2.15** |
| *Debt-short term* | −0.077 | −0.001 | −1.26 |
| *Tax/expend. limit* | 3.222 | 0.042 | 9.45*** |
| *State revenue* | −0.0002 | −2.79e−6 | −1.9* |
| *Fed. transfers* | 0.0008 | 1.06e−5 | 1.85* |
| Political Party | | | |
| *Party of governor* | −1.484 | −0.019 | −3.65*** |
| *Dem.-unified govt.* | 1.333 | 0.017 | 2.71*** |
| *Rep.-unified govt.* | 1.119 | 0.015 | 3.34*** |
| Intra-state competition | | | |
| *Dog bets* | −0.030 | −0.0004 | −2.27** |
| *Horse bets* | 0.003 | 4.45e−5 | 0.73 |
| *Lottery sales* | 0.002 | 2.43e−5 | 0.78 |
| *Indian casino sq ft* | −21.49 | −0.279 | −5.61*** |
| Inter-state competition | | | |
| *River border* | 5.291 | 0.069 | 7.46*** |
| *Adj. state w/casino* | 1.866 | 0.024 | 1.97** |
| *Adj. state w/Indian casino* | 8.90 | 0.115 | 7.84*** |
| *Square mileage* | −5.7e−5 | −7.3e−7 | −6.8*** |
| Demographic | | | |
| *Baptists* | 0.168 | 0.002 | 4.79*** |
| *Hotel employees* | 1.863 | 0.024 | 59.76*** |
| *Income* | 0.001 | 1.66e−5 | 8.85*** |
| *Population density* | −0.006 | −8.3e−5 | −5.59*** |
| *Population over 65* | −0.368 | −0.005 | −1.79* |
| *Poverty* | −0.069 | −0.009 | −6.83*** |
| *Unemployment* | −0.272 | −0.004 | −2.53*** |
| *Constant* | −23.75 | −0.308 | −3.36*** |
| $N = 800$; $\sigma_e = 0.829$; $\sigma_\alpha = 30.71$; $\chi^2 = 29601.24$ | | | |

Notes: *indicates significance at the 0.10 level, **at the 0.05 level, and ***at the 0.01 level. $\sigma_e$ is the overall standard error of the estimate and $\sigma_\alpha$ is the panel level standard error. $\chi^2$ tests the joint significance of all explanatory variables

[a]The probit coefficient is calculated as described in footnote 29

that requires long term debt. The random effects tobit model corrected for endogeneity uses the predicted value of long term debt (*Debt-long term**) as an instrument for *Debt-long term*. The results of the model corrected for endogeneity are shown in Table 4.

Overall, the results of this model are consistent with the initial random effects model. None of the signs on the explanatory variables change, and the levels of significance gener-

ally improve. Our discussion of these results will focus on the few differences between the two sets of results.

The fiscal variables perform better when (2) is corrected for endogeneity. *Debt-long term** and *Tax/expend. limit* continue to be statistically significant. *State revenue* is negative and becomes significant on the probability and timing of adoption, as anticipated. This reinforces the short-sighted time horizon view of political decision making. Since revenues correspond to current spending ability, legislators are less likely to adopt casinos if tax revenues increase. *Fed. transfers* are positive and significant (10% level). Receiving greater amounts of inter-governmental transfers encourages states to adopt casinos.

Overall, our fiscal variables are mixed with regards to fiscal pressure being a motivation for adoption. *Debt-long term** suggests that legislatures are more likely to adopt and adopt sooner when long term debt increases, but *Debt-short term* is insignificant. The positive signs on *Tax/expend. limit* and *Fed. transfers* both suggest that legislators are adopting casinos as additional sources of revenue, but not because of fiscal stress or pressure. The fiscal variables seem to matter only when politicians have either already incurred the debt, when they are looking for ways to raise revenue outside of the normal tax structure, or when revenues from the federal government are increasing. These results appear to support the "legislature-as-interest-group" theory.

The only change in the political variables is that *Dem.-unified* is now significant (1% level). A Democratic-controlled government, similar to a Republican-controlled government, is more likely to adopt casinos and adopt them sooner than divided governments. This combination of political variable results (*Dem.-unified* and *Rep.-unified* positive, with *Party of governor* negative) is inconsistent with both our "social liberal" and "economic conservative" hypotheses introduced earlier. Perhaps the best explanation of our political variable results is akin to that offered by Jackson et al. (1994: 252–253). In the context of lottery adoption, they suggest that legislative majorities may be able to pass legislation more quickly because less negotiation, logrolling, and fewer revisions to legislation may be necessary when the other party has little power. A similar explanation may apply to our results, where political party appears not to affect casino adoption, but having a unified government does have a significantly positive impact on casino adoption and timing.

Intrastate competition variables represent the greatest change between the two models. *Horse bets* and *Lottery sales* are still positive, but no longer are statistically significant. This result is more consistent with our initial expectations that the existence of these gaming industries might discourage adoption, or in this case have no effect. More specifically, the change in significance suggests that *Horse bets* and *Lottery sales* affect *YSA* through an indirect route that is transmitted through *Debt-long term**.[36]

The results on the adjacent state competition variables also improve and further support interstate competition as a motivation for casino adoption. We find that states with a larger

[36]Both *Horse bets* and *Lottery sales* are positive and significant (1% level) in the regression equation used to estimate *Debt-long term*$^*$. These results might imply that the presence of these gambling outlets increases long-term debt, which would also be consistent with the legislator-as-interest-group hypothesis. The "indirectness" of the effect of these variables on *YSA* can be seen by comparing their results in Table 3 with those in Table 4. In the first case, their respective effects on *YSA* are statistically significant but *ceteris paribus*, i.e., holding constant the long term debt effects on *YSA*. In Table 4, however, the significant positive effects of *Horse bets* and *Lottery sales* on long term debt have been incorporated in the instrument *Debt-long term**, so that these variables' *ceteris paribus* effects on *YSA* are now insignificant. Thus, it appears that, rather than acting independently, *Horse bets* and *Lottery sales* increase *Debt-long term* which in turn increases the probability of casino adoption, and induces adopting states to adopt earlier. One explanation for this relationship is that politicians may commit to new capital projects once they have obtained a new source of state revenues that they expect to provide a long-run stream of revenues.

proportion of neighboring Indian and/or commercial casino states are more likely to adopt casinos themselves. *Adj. state w/Indian casino* and *Adj. state w/casino* are significant at the 1% and 5% level, respectively. In addition, *Square mileage* while still negative is now significant (1% level), which means that larger states may be less likely to draw border-crossing tourists and to see their own residents travel to adjacent states with casinos. For this reason there is less motivation to legalize casinos. This result meets our *a priori* expectations and is further support for the interstate competition argument for casino adoption.

### 4.3 Summary

Accounting for both random effects across states and the issue of simultaneity improves our econometric analysis.[37] The evidence supporting fiscal stress as a motivation to legalize casinos is mixed. The interstate competition motivation for casino legalization improves when we account for simultaneity and this is our strongest group of variables in the model. Our results suggest that any concerns over intrastate competition tend to be outweighed by other considerations, perhaps the prospect of additional or alternative tax revenues, or the potential for exporting taxes and increased tourism.

## 5 Conclusion

The present study illuminates and expands the empirical analysis of gambling adoption. We use a random effects tobit model with panel data for the 50 states from 1985 to 2000. Our explanatory variables include fiscal, political party, intra- and interstate gambling competition, and demographic characteristics.

Media reports typically suggest that tax revenues are the primary motivation for legalizing casinos, and this is reflected in public discourse over casinos. Our results find some support of this notion. We find evidence that casinos are adopted as a means of reducing fiscal stress with regards to long term debt and current state revenue, but not with regard to short tem debt. The signs and significance on these variables are generally consistent with Alm et al. (1993).

The variables *Debt-short term, Tax/expend. limit*, and *State revenue* all support the theory of state legislatures as an interest group. We also find compelling evidence to suggest that states legalize casinos as a means of attracting tourism and of keeping citizens who wish to gamble in-state. This is consistent with the goal of increasing intrastate tax revenues and exporting some taxes to other states. These findings also support the Jackson et al. (1994) and Filer et al. (1988) theory of the legislature as an interest group.

Our study can be viewed as an extension of the lottery adoption literature to a new industry. We are aware of only one other empirical analysis of casino adoptions in the United States (Furlong 1998). Our study expands on and enhances Furlong's limited study, as we test many more variables and use more recent data. In addition, ours is the only study on gambling that suggests that a simultaneous relationship exists between long term debt and legalization of gambling. Although our results provide interesting information on a number

[37] We attempted a number of alternative specifications. Other variables we tested included: (i) whether the state approves casinos by referendum or voter initiative; (ii) a dummy to account for the 1988 IGRA; (iii) state and regional dummies; (iv) balanced budget rules, and (v) *Southern Democrat*, an interaction term between *Party of governor* and a Southern regional dummy. None of these variables proved to be significant, nor did they markedly affect our other results.

of variables, there are clearly still other interesting questions yet to be resolved. For example, why have more states not already adopted casinos? After all, most state governments have given their implicit approval to gambling, generally, by sponsoring lotteries. Over half of the states already have tribal casinos. Why not allow commercial casinos and generate even more tax revenues? Perhaps politicians and voters are cognizant of the potential that casinos compete with lotteries and they are not confident about the net effects of casinos on tax receipts. Maybe vocal anti-casino grassroots organizations have been particularly effective in convincing voters to oppose the expansion of casinos. Perhaps there are concerns about the potential social harms that may accompany casino gambling. Or maybe citizens have NIMBY ("not in my back yard") concerns about casinos that do not apply to lotteries. All of these issues represent opportunities for future economic research on the commercial casino industry in the United States.

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