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MPIfG Discussion Paper 11/4

**The Adoption of Lotteries in the United States, 1964–2007**  
A Model of Conditional and Time-Dynamical Diffusion

Mark Lutter



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MPIfG Discussion Paper 11/4  
Max-Planck-Institut für Gesellschaftsforschung, Köln  
Max Planck Institute for the Study of Societies, Cologne  
April 2011

MPIfG Discussion Paper  
ISSN 0944-2073 (Print)  
ISSN 1864-4325 (Internet)

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## **Abstract**

The paper examines the determinants of the diffusion of state lotteries as a process of policy innovation. After more than 100 years of prohibition, U.S. states began to establish lotteries in the 1960s. The article uses statistical event history analysis to show that the adoption and diffusion of state lotteries depends on fiscal, political, and regional factors of competition as well as on normative factors of social legitimization. The article develops two further arguments, first by discussing an advanced model of regional diffusion that views the regional effect as being dependent on the ideological-institutional context and second by analyzing time dynamics in the diffusion process to show how initial explanatory factors change over time. In general, the findings point to the institutional environment as a factor influencing the diffusion of organizations.

## **Zusammenfassung**

Der Aufsatz beschäftigt sich mit den Determinanten der Diffusion staatlicher Lotterien als Beispiel einer politischen Innovation. Nach einer Verbotszeit von mehr als einhundert Jahren führten US-Bundesstaaten Lotterien ab den 1960er-Jahren schrittweise wieder ein. Anhand von statistischen Ereignisdatenanalysen zeigt der Beitrag, dass der Diffusionsprozess von fiskalischen, politischen und regionalen Faktoren ebenso wie von normativen Faktoren der sozialen Legitimierung abhängt. Der Aufsatz stellt zwei weitere Aspekte heraus, die empirisch demonstriert werden: Zum einen wird ein erweitertes regionales Diffusionsmodell diskutiert, das die räumliche Ausbreitung in Abhängigkeit zur ideologischen Struktur angrenzender Staaten erfasst; zum anderen wird die zeitliche Dynamik des Prozesses modelliert. Hierfür ist der soziologische Neo-Institutionalismus der theoretische Bezugspunkt, und es wird angenommen, dass mit zunehmender Dauer des Diffusionsprozesses die ursprünglichen Kausalfaktoren ihre Erklärungskraft zugunsten eines Bedeutungsgewinns von Legitimitätsaspekten verlieren. Die Ergebnisse dokumentieren isomorphe Adaptionprozesse und in organisationsökologischer Hinsicht die Bedeutung institutioneller Umwelten für die Ausbreitung von Organisationen.

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# The Adoption of Lotteries in the United States, 1964–2007: A Model of Conditional and Time-Dynamical Diffusion

## 1 Introduction

Research on the diffusion of innovations between individuals, networks, organizations, societies, and states has been a vibrant area in the social sciences (Dobbin/Simmons/Garrett 2007; Djelic 2008; Strang/Soule 1998; Rogers 2003). The diffusion of innovations refers to the spread of abstract ideas and concepts as well as practices, structures, and organizations within social systems. Diffusion studies play an important role, particularly in the fields of economic sociology and organizational sciences. Such studies include those that deal with the rise of CFOs (Zorn 2004), the spreading of the multidivisional firm (Fligstein 1985), the causes of corporate downsizing (Budros 2004), or the diffusion of small, specialized players in markets (Carroll/Swaminathan 2000).

Using event history modeling on data for U.S. states for the period from 1964 to 2007, this paper examines the diffusion of a certain organizational form: state lotteries. With a few exceptions, lotteries were banned in the Western world for a period of more than 100 years starting in the mid-nineteenth century. In the United States, they continued to be prohibited until the middle third of the twentieth century. The ban was gradually removed when several U.S. states introduced lotteries as state-run events. New Hampshire was the first to introduce a state lottery in 1964, followed by New York in 1967 and New Jersey in 1970. Almost every consecutive year after this, other states began to establish their own lottery. By 1975, thirteen states had a state lottery; in the mid–1980s this expanded to twenty; the mid–1990s saw a total of thirty-six states with a state lottery; and when North Carolina joined these ranks in 2006, the total number of states running a lottery reached forty-two. Lotteries continue to be prohibited in the remaining states. For states operating a lottery, they form an important source of fiscal revenue. Why are they still prohibited in some states? What factors explain their diffusion?

The present study follows up on a classic diffusion study by Berry and Berry (1990) on the adoption of U.S. state lotteries. From this and other studies, we can distinguish between four approaches that explain the diffusion process: (1) economic causes, (2) political factors, (3) social conditions of the normative legitimacy of gambling, and (4) factors of tax competition and the regional influence of neighboring state lotteries. In general, these four approaches also explain diffusion processes for other policy innovations, such as political reforms, new laws, or the adoption of new taxes (Berry 1988; Walker 1969).

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I thank Juan J. Fernández, Lothar Krempel, and Jan Sauermann for helpful comments. Versions of the paper were presented at the 22nd Annual Meeting of the Society for the Advancement of Socio-Economics (SASE), Philadelphia 2010, and the 35th Congress of the German Society for Sociology (DGS), Frankfurt 2010.

This study examines these approaches on the basis of recent data and adds two further aspects. The first involves the use of a model of conditional diffusion based on Martin (2009a, 2009b). It will be argued that processes of regional policy diffusion can be better explained if we account for differences in the government ideology of the adopting states. A regional influence by neighboring states on policy adoption is especially strong when it interacts with an ideological environment that intensifies the neighborhood effect. In demonstrating this effect empirically through modeling interaction effects between regional and ideological factors, this paper will contribute to the present literature on the effects of regional policy diffusion.

The second aspect relates to changes over time in the explanation of the diffusion process. Drawing on the literature on convergence and isomorphism of the new sociological institutionalism and on organizational ecology (Scott 1995; Hannan/Freeman 1993; Powell/DiMaggio 1991), the paper analyzes how lotteries have come to be taken for granted over the course of time. It shows that the factors driving the adoption of lotteries are becoming increasingly independent of the early factors that drove the initial adoption and diffusion. Therefore, with an increasing duration of the diffusion process, lotteries have become a legitimate organization. Jensen (2003) attempted to demonstrate this by analyzing how causal factors change over different time periods. The approach presented here is more sophisticated because it uses interaction models. The models demonstrate how and with what statistical precision the effects in explaining the diffusion process change over time with increasing exposure to the diffusion process itself.

With these explanations, the paper provides a more complex approach to the understanding of the adoption and diffusion of state lotteries as a political and organizational innovation. Furthermore, this study expands the diffusion literature to include two additional aspects that can be seen as important explanatory factors of diffusion processes per se. The interdependence between regional diffusion effects and political ideology as well as the changing influence of initial introductory factors over the course of time demonstrates the role that institutional factors play in explaining the spread of organizational forms. The diffusion of legitimate organizations is a central focus in institutional theory. Within this research, the increased legitimation of an organizational form is traced back to an increase in the number of that form (Carroll 1985; Carroll/Swaminathan 2000). The diffusion model in this paper addresses this literature, as it demonstrates how the diffusion of a legitimate form is dependent on the local institutional context that enables or prevents diffusion. In addition, it illustrates which initial diffusion factors are displaced by the growth of a legitimate order.

In the following section, the article describes the history of the adoption process of state lotteries in the United States and presents basic information on their structure and organization. Section three provides a discussion of the state of research on the diffusion of lotteries as a policy innovation. From this, hypotheses will be derived which will be empirically tested in the ensuing section. The final section summarizes the main findings of the study.



and New York experienced direct competition, which became evident in revenue losses. Competition was aggravated as more states in the Northeast adopted a lottery from 1972 onwards. The third phase is characterized by intensified marketing and efforts to increase revenues. New variants of the game were introduced, such as the appearance in the mid–1980s of lotto, a more attractive game scheme enabling players to pick their own numbers. The first lotteries were passive forms where players bought tickets with a pre-defined number (numbers game). The game of lotto was already a successful scheme in Europe and soon became the main factor in the U.S. lottery market. In 1985, it accounted for 40 percent of total sales (Mikesell 1990: 316). Lottery operators made use of the jackpot system in order to increase payouts and the popularity of the game (Hansen 2007: 5). They started to merge into a multistate lottery system, which is now known as Powerball. This game offers mega-jackpots that regularly amount to several hundred million dollars.

With their growing popularity and increase in sales, lotteries produced revenues that the states increasingly began to rely on (Blakey 1979: 80). Revenues were no longer regarded as a welcome surplus for the state treasury but as a constant item in the budget. Lottery revenues became a significant source of fiscal revenue. In the fiscal year of 2005, revenues from lotteries totaled \$47 billion, of which approximately \$16 billion went towards state budgets (La Fleur/La Fleur 2006: 249). This sum equals around 0.15 percent of the state's gross state product. Revenues from lotteries are approximately 110-times higher than the total of tax revenues from tobacco sales.<sup>1</sup> Nevertheless, eight states still outlaw lotteries. Why do lotteries remain banned there despite their fiscal importance? Which factors have determined the diffusion of lotteries in the United States from 1964 to the present?

### 3 Explaining the diffusion of lotteries

Diffusion processes in all kinds of empirical areas have been generally described as a non-monotonic, bell-shaped “Gaussian” curve, where the y-axis is the number of adopters and the x-axis represents the length of the process (Rogers 2003; Diekmann 1989; Granovetter 1978). This unimodal frequency distribution corresponds to a typically S-shaped cumulative distribution: at the beginning of the process, there is only a small group of “radical” innovators who proceed to adopt an innovation. These innovators act under uncertain conditions because no prior model of the innovation exists, and therefore there is no information as to whether it will be successful or not. Inspired by the first innovators, a group of early adopters follow. These initial adopters pave the way for the masses: adoption rates increase rapidly at this point. Finally, after the innovation is adopted by the majority of the population, a small number of laggards follow at a relatively slow pace.

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1 Tax revenues from cigarette sales make up around 0.00133 percent of the gross state product for all states (Martin 2009a).



In order to explain the diffusion of political and organizational innovations, external and internal conditions have been discussed as causal factors driving the process (Berry 1988). With regard to policy innovations, economic factors, as well as political and social conditions of a state, are usually referred to as internal factors. External factors refer to conditions outside of the adopting state, usually regional diffusion effects, which can be conditions of neighboring states that influence the adoption of a political innovation or the structural position of a state within a network of others.

In addition, according to the sociological neoinstitutionalism literature, the mechanisms of diffusion can be perceived as a process that structurally homogenizes organizational forms (Powell/DiMaggio 1991; Scott 1995; Jensen 2003; Zucker 1987, 1977; Meyer/Rowan 1977). Several studies interpret diffusion processes in conjunction with sociological neoinstitutionalism, such as the Neil Fligstein study on the spread of managerial capitalism (Fligstein 1990) or Tolbert und Zucker (1983) on civil service reforms (see also Boxenbaum/Jonsson 2008: 83ff.).

In order to explain the diffusion of lotteries, four approaches have been discussed in the literature. Firstly, economic factors play a role, in particular on the fiscal situation of the adopting state (Jackson/Saurman/Shughart 1994; Furlong 1998; Alm/McKee/Skidmore 1993; Berry/Berry 1990; Filer/Moak/Uze 1988). Secondly, political factors impact the diffusion of lotteries, such as the party holding the majority in the respective state (Furlong 1998: 372; Filer/Moak/Uze 1988; Jackson/Saurman/Shughart 1994; Martin/Yandle 1990). Thirdly, social values affect the normative approval or disapproval of gambling (Ellison/Nybrotten 1999; Olson/Guth/Guth 2003). In particular, religious values, such as those found in Protestantism, morally reject any form of gambling. Therefore, states with a higher proportion of conservative Protestants are more likely to oppose the introduction of a state lottery. Fourthly, regional diffusion effects play a role. Lotteries diffuse via neighborhood states (Mikesell 1989, 1990; Mikesell/Zorn 1986; Wohlenberg 1992). The adoption of a lottery creates tax competition between bordering states, which leads to increased pressure on each state to introduce a lottery. However, as will be demonstrated here, this regional diffusion effect varies in conjunction with the government ideology of a state. The effect should be especially strong if the pressure caused by the existence of neighborhood lotteries meets an ideological base advocating the adoption of a lottery. A weak effect ensues if it is faced with an ideology that opposes the adoption of a lottery (Martin 2009a).

In addition, with the new sociological institutionalism and organizational ecology literature (Scott 1995; Hannan/Freeman 1993), it will be argued that lotteries become a legitimate organization as the number of newly established lotteries increases over the course of time. Therefore, a significant change in the effects explaining the diffusion process over time should arise. Factors that initially resulted in the adoption of a lottery in the early periods, such as the fiscal situation of a state, should no longer have an effect on the later stages of the diffusion process. The reason for this is that lotteries have become a socially accepted organization and are now taken for granted. The spread of lot-

teries corresponds to the spread of a gradual legitimization process of the innovation. Therefore, lotteries are no longer adopted because of concrete fiscal or political matters, but because they are now culturally legitimate. In the next section, these approaches will be discussed in more detail and hypotheses will be derived.

### (Fiscal) Economic factors: State lotteries to cover revenue

The first approach justifies the introduction of lotteries within the budgetary position of each state. Lotteries provide a means to generate government revenue. If a state experiences increased fiscal requirements, the implementation of lotteries is probable (Jackson/Saurman/Shughart 1994; Furlong 1998; Berry/Berry 1990; Filer/Moak/Uze 1988). Generally, it has been demonstrated that states with budget deficits tend to seek new tax revenue sources or further exploit existing taxes by increasing them (Hansen 1983).

The significance of fiscal motives in adopting lotteries is rather clear if one looks at the history of lotteries (Blanche 1950). Until the first third of the nineteenth century, countless public facilities such as orphanages, churches, gates, lighthouses, bridges, ports, canals, roads, town halls, and public places were financed through lotteries. Lottery revenue also funded schools and libraries. The establishment of some of the most prestigious American universities, including Harvard, Yale, Dartmouth, Williams, Brown, Princeton, Columbia, North Carolina, and Pennsylvania, were financially supported by specifically organized lottery events. The sponsors of these lotteries were initially private investors and later included cities or municipalities, schools or other public bodies, as well as the states. By 1750, all lotteries were under state control, and it was illegal to hold private lotteries without a relevant permit. The prohibition of private lotteries strengthened their fiscal character: a greater competition between many private individual lotteries would have resulted in the reduction of government revenue generated by them.

Does this also apply to the twentieth century, in which modern systems of taxation exist? In particular, the early introductory states of the Northeast were afflicted with fiscal deficits. Many of the New England states had an inadequate fiscal system (Weinstein/Deitch 1974). For example, New Hampshire had neither income nor value-added tax. More than half of all revenues resulted from consumption taxes. In addition, the New England states experienced an economic depression during the seventies, which was more profound than in the western or southern states (Wohlenberg 1992: 170). The second introductory wave increasingly affected more western states such as California, Colorado, and Washington, in which the fiscal situation was relatively stable. According to Wohlenberg (1992: 170), it was not only the actual economic situation that played a role in the introduction of lotteries, but also the anticipation of a possibly imminent "crisis." The lottery was introduced not with the intention to rectify specific deficiencies, but to safeguard pre-emptively against a potential crisis. Wohlenberg's thesis alludes to

an isomorphic adaptation process, as lotteries prevail as a legitimate model for generating tax, without the existence of actual demands. There are two verifiable hypotheses stemming from this discussion.

*H1a: States with fiscal deficits are more likely to introduce lotteries.*

*H1b: The connection between fiscal needs and the introduction of lotteries can be confirmed for the early lottery states, but not for the later ones. Over time, processes of institutional isomorphism lead to the adaptation of the lottery model, regardless of the fiscal situation.*

### Political factors: Lottery as a politically attractive tool

The second explanatory approach takes political factors into account. These factors include “innovation-friendly” government constellations as well as the general political appeal of lotteries. The introduction of a lottery is politically appealing as a form of taxation. Lotteries as a fiscal instrument have been described as *painless tax* (Clotfelter/Cook 1991) – the state can increase revenues through lotteries without having to specifically introduce a new tax or increase existing taxes. The taxation character of lotteries is generally overlooked by the population. The generation of tax revenue can occur without loss of political sympathy. On the contrary: lotteries are popular, their introduction can acquire votes (Filer/Moak/Uze 1988; Jackson/Saurman/Shughart 1994). Some lotteries in the United States were introduced by a referendum, which added to their political attractiveness (La Fleur/La Fleur 2006: 17). Not all U.S. states have this form of direct democracy. One hypothesis is that those states which allow for a referendum have a higher probability of introduction.

*H2a: States that have a referendum as a means of direct democracy have a higher probability of introducing lotteries.*

In addition, it can be presumed that states with more liberal than conservative government majorities are more likely to implement a lottery. As indicated above, an introduction requires a constitutional change to lift a gambling ban. Such a “radical” change is an innovation that may be less compatible with conservative, traditional ways of thinking (Mannheim [1925]1986). In addition, lottery players tend to come from the lower middle-class, which corresponds to the constituency of the Democrats (Brown/Kaldenberg/Browne 1992). Further, liberals in the United States favor state intervention and higher taxes, while conservatives tend to favor lower taxes and less state interventionism. Therefore, lotteries, which are also a means of taxation, would be ideologically welcome for the liberals.

In accordance with the hypothesis of institutional isomorphism, the connection between state-interventionist ideology and lottery introduction is expected to be stronger

in the early phase of the diffusion process. The longer the diffusion process lasts, the more lotteries should be regarded as a legitimate means of national financing, even within the conservative spectrum. Moreover, it is plausible that in later phases liberal governments might oppose the introduction of lotteries, since they represent a regressive form of taxation and indirectly contribute to the reinforcement of social inequalities (Beckert/Lutter 2009). The establishment of lotteries leads to lottery-critical articles and scientific publications on the regressivity of lotteries, which in turn creates oppositional opinions.<sup>2</sup> From this, the following hypotheses are postulated.

*H2b: In the early introductory phase, the government's political ideology plays a role in explaining the diffusion of lotteries. State-interventionist ideologies have a positive effect on the probability on the introductory rate of lotteries.*

*H2c: In later phases, the political ideology effect fades away because lotteries are taken for granted on all sides of the political spectrum.*

### Social factors: Religiously motivated gambling opposition

The third explanation attributes the introduction of lotteries to factors of normative legitimacy. These include changes in the social acceptance of gambling and the strength of the influence of fundamentalist Protestant religious groups, who are opposed to gambling. The change in the social acceptance of gambling in the United States can be explained by the establishment of other forms of gambling. Since the 1930s, the game 'Bingo' began to become popular as a church event. In the early urban centers, illegal lottery markets were widespread (Light 1977; Devereux [1949]1980). At the beginning of the twentieth century, Las Vegas became the gambling center of the world. From this point on, gambling is regarded more as a legitimate leisure activity, even as a market, which serves tourism (casinos) and creates jobs, for example, in the hotel industry (Sallaz 2006; Chafetz 1960).

This development triggered a trend to gradually end any moralization of gambling. However, in line with their beliefs and standards, conservative Protestant groups still objected to gambling. These groups were instrumental in the opposition movements, which resulted in the prohibition of lotteries in the mid-eighteenth century (Devereux [1949]1980; Findlay 1986). With the re-introduction of lotteries in the 1960s, these groups remained opposed to gambling. One of the largest U.S. conservative Protestant groups is the *Southern Baptist Convention* (SBC). Between 1938 and 1997, the SBC pub-

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2 These studies find that lotteries pose a higher tax burden on the lower middle classes. The earliest studies on the regressivity were published in the mid-1970s and thus immediately following the first introductory wave (among the first studies are: Spiro 1974; Brinner/Clotfelter 1975; Clotfelter 1979). Curry (1996) is an example of a lottery-critical publication. Beckert and Lutter (2009) provide an overview on studies dealing with the regressivity of lotteries.

lished thirteen resolutions directed against gambling and lotteries.<sup>3</sup> In a resolution from 1985, it was stated: “Lotteries – like all forms of gambling – are socially, economically, and morally destructive, being rooted in greed and violating the biblical work ethic” (Southern Baptist Convention 1985).

Evangelicals consider the Bible the written word of God, from which their gambling opposition is derived. Lotteries are thus thought to encourage sinful behavior, including greed and avarice, the waste of resources, and risky, irresponsible behavior (Ellison/Nybrotten 1999: 358f.). Lotteries and gambling entice people to rely on chance and destiny, instead of taking their luck “into their own hands.” Moreover, the drawing of lots is considered as a profanation of an otherwise sacred act, because “fortune” embodies God’s will; man, however, should be bound to work (Binde 2007).

Protestant ethics proclaim the virtues of diligence, thriftiness, efficiency and profitability, as well as productivity (Weber [1920]1988). From a work-ethic perspective, gambling is a waste of time and money. The defining element of the emotional thrill of gambling that occurs when one bets on money undermines the Protestant values of self-discipline, prudence, and sober rationality. With gambling, the laws of cause and effect are switched off; only the principle of randomness is dominant. The player’s reliance on chance moves gambling close to fatalism, superstition, and magic.

This leads to the hypothesis that states will more likely adopt a lottery if the structure of the population comprises of a smaller proportion of conservative Protestant denominations (Evangelists) as an indicator of gambling opposition. Conversely, the introduction is even more unlikely, the larger the proportion within the population is. In accordance to a study published in 2008 in the *Pew Forum on Religion and Public Policy*, the percentage of Evangelicals in the U.S. population is approximated to be one-third, thus forming the largest group, followed by Catholics (23.9 percent) and moderate mainline Protestants (18.1 percent).<sup>4</sup> The percentage of Evangelicals varies significantly in accordance to region. While the numbers are often less than 15 percent in the northeastern states, over 50 percent has been recorded in southern states.

*H3: The smaller the population of conservative Protestant denominations within a state, the greater is the probability that a lottery will be introduced.*

### Regional factors: Lottery diffusion across neighboring states

The diffusion of innovations via social networks or spatial proximity is one of the most important explanatory mechanisms of this area of research. Mohr (1969) argues that the spread of political innovations occurs over states with regional proximity. Shipan/

3 See all resolutions here: <http://www.sbc.net/resolutions/default.asp> (accessed March 17, 2011).

4 Compare with <http://religions.pewforum.org> (accessed March 17, 2011).

Volden (2008: 842) claim that neighborhood effects are likely with economic spillovers. With lottery introductions, such a regional effect is presumed to exist amongst neighboring states because of fiscal competition. The explanation is that the fear of losing tax revenue increases when a lottery is introduced in a neighboring state. If a state introduces a lottery, it also publicizes this in neighboring states. In reaction to this, the concerned neighbor state may move to introduce its own lottery, in order to exploit its own fiscal potential. Empirical evidence demonstrates that citizens from non-lottery states tend to buy tickets for neighboring state lotteries (Mikesell 1991). With the introduction of their own lottery, states therefore aim to prevent the exodus of potential revenue to adjacent state lotteries (Mikesell 1989; Mikesell/Zorn 1986; Stover 1990).

However, the “mercantile” argument of revenue loss through adjacent lotteries is perhaps less likely to be based on actual losses than on overrated collective ideas concerning potential revenue losses. Neighbor states are regarded as a model for the potentiality of a state’s own institutional arrangements (Meyer/Rowan 1977). The introduction of a lottery in the neighboring state exerts a form of institutional pressure on policy makers, which results in the introduction of a lottery. The political expectation is generated that if a state does not have its own lottery, it will miss out on tax revenues. Lotteries, therefore, are adopted through normative pressures (DiMaggio/Powell 1983). In this manner, the introduction can be explained by the theory of institutional isomorphism. Furthermore, it must be assumed that the diffusion effect on adjacent regional lotteries is dependent on the number of surrounding neighbor states. The more neighbors a state has, the greater the institutional pressure to imitate is more likely to be. From this discussion, the following two hypotheses are derived.

*H4a: With the rising number of neighboring state lotteries, the probability increases that a state will introduce a lottery.*

*H4b: The effect adjacent lotteries have on the introduction of a lottery increases with the number of neighboring states.*

These hypotheses unconditionally model a process of regional diffusion. Martin (2009a) suggests bringing the interdependent effects of political decisions in neighboring states in relation to the ideological position of a state. The study demonstrates for the case of cigarette taxation in the United States that the level of taxation in a state depends on the taxation level of its neighboring states, but that this regional effect is stronger for liberal states than for conservative ones. Therefore, the success of a policy depends on the surrounding environment, which enables or prevents the diffusion process. In the case of lottery diffusion, it can be assumed that the regional diffusion effect is particularly effective when it encounters an appropriate political ideological environment. Liberal governments should endorse lottery introductions because of their more state-interventionist ideology. Therefore, the regional diffusion effect is particularly strong when it is enforced by a state-interventionist ideology.

*H4c: The effect of adjacent lotteries on the probability of adoption varies with the state's degree of government ideology. The effect should be strong for liberal governments and weak for conservative governments.*

## 4 Empirical analysis

### Data and methods

Event history modeling allows us to estimate the effects of both time-variant and time-invariant covariates on the likelihood of the occurrence of a specific event (Blossfeld/Hamerle/Mayer 1989; Box-Steffensmeier/Jones 2004). The event examined here is the introduction of a state lottery in U.S. federal states for the period from 1964 to 2007. The parameter has the value 0 until a state introduces a lottery, then it receives the value 1. The data for the introduction of lotteries are taken from the World Lottery Almanac (La Fleur/La Fleur 2006). All U.S. states, including Hawaii and Alaska, are the units of analysis. I employ probit models for discrete time data (Box-Steffensmeier/Jones 2004: 69ff.). To account for duration dependence (Beck/Katz/Tucker 1998), all models include time (measured in years) and rely on Hubert/White robust standard errors with clustering by state to account for problems of heteroscedasticity and non-independence of observations.<sup>5</sup>

In order to analyze changes over time in the proposed effects, I examine two strategies. First, I divide the diffusion period into three significant episodes: an “early,” a “middle,” and a “late” adoption phase. I then estimate the specified probit model for each episode separately. The three phases are defined in accordance with the discussion in the second section. The early phase covers the period from 1964 to 1974, and represents the pioneering phase of lottery introductions. During this period, eleven northeastern states introduced lotteries. The second time interval refers to the period between 1975 and 1984, during which a total of ten mostly western or northwestern states introduced a lottery. The third and final period includes the late introductory wave between 1985 and 2007. During that period, twenty-three states established lotteries, most of which were in the South or the Midwest. This approach makes it possible to recognize temporal changes in model coefficients between the periods. However, it requires that “significant” time intervals are chosen a priori, so that they can represent the hypothesized form of temporal change. Therefore, in a second specification, I specify interaction effects between the duration variable and the substantive predictors. By depicting the entire range of values of these temporal interaction effects in a diagram, the time-related hypotheses can be analyzed in detail.

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5 This approach to panel data is common sense, as diffusion studies from other areas show (Shipan/Volden 2006: 832; Brooks 2007: 710; Soule 2004: 466; Barclay/Fisher 2003: 346). Alternative specifications and sensitive analyses including logit and Cox models were explored prior to this analysis. Results revealed no substantive differences to the findings presented below.

## Predictors

Table 1 shows the predictors that were used in this study. The data has been taken from multiple sources, including statistical archives (e.g. the *U.S. Census Bureau* or the *Statistical Abstracts of the United States*), my own calculations, and other literature (Berry/Berry 1990; Berry et al. 1998; Breunig/Koski 2009). To test the hypotheses 1a and 1b, which associate the introduction of lotteries with the fiscal requirements of a state, an indicator will be used that provides information on the fiscal situation of a state at the time point  $t$ . This indicator is calculated from the difference between total state revenue and total state spending, divided by total state spending. The index has been lagged by one year in order to correct for simultaneity bias, meaning the revenue from recently established lotteries that flows into the calculation of the index and thus distorts the results of the analysis. The indicator takes on positive values in the case of fiscal surpluses and negative values with fiscal deficits.

Political factors are operationalized by a parameter that measures whether a referendum exists in a state as means of direct democracy through which lotteries may be introduced. Furthermore, I use an index which provides information on the level of political liberalism of the government for all states. This one-dimensional index stems from Berry et al. (1998) and captures the political and ideological orientation of the governor, the two major parties, and the state legislatures for each year between 1960 and 2008.<sup>6</sup> It measures the political ideology of a state in which several indicators are weighed together (this includes, in addition to the party affiliation of the governor, the ideological orientation of all members of Congress measured on the basis of various indicators or on estimates by lobby groups). Thus, it embraces the special ideological structure of the United States in which the same party label can have rather different meaning in different states and at different times. The range of values of this index lies between 0 (most conservative) to 100 (most liberal).

Hypothesis 3 postulates influences of religiously motivated opposition to gambling. In order to test this, I use the percentage of the population which stands in the evangelical, conservative tradition of Protestantism. This information stems from *U.S. Religion Landscape Survey of the Pew Forum on Religion and Public Policy*.<sup>7</sup>

To test the hypotheses 4a to 4c, two indicators are specified: the number of directly adjacent states and the total number of established neighboring lotteries at time  $t$ . I have constructed an interaction term between both parameters on the basis of the assumption that the probability of adoption increases as the number of directly adjacent states rises. To investigate the proposed conditional effect of region and ideology, an interac-

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6 This is the latest version of the index which was updated in August 2010. The index and additional information can be accessed at <http://www.uky.edu/~rford/stateideology.html> (accessed March 17, 2011).

7 See the website <http://religions.pewforum.org/affiliations> (accessed March 17, 2011) for information on the methodology of this indicator.



Table 1 Origin and descriptives of the model predictors

Predictor	Mean	Std.dev.	Minimum	Maximum	Origin
Fiscal surplus, $t-1$ , 1963–2006	–0.048	0.129	–0.630	1.248	Berry & Berry (1990); Statistical Abstracts of the United States
Government Ideology (100=liberal; 0=conservative), 1964–2007	45.14	22.519	0	97.218	Berry et al. (1998); <a href="http://www.uky.edu/~rford/stateideology.html">http://www.uky.edu/~rford/stateideology.html</a> (accessed March 17, 2011)
Referendum (1 = yes)	0.474	0.499	0	1	Breunig & Koski (2009)
% of evangelical Protestants, 2007	32.843	13.365	10	65	U.S. Religion Landscapes Survey; <a href="http://religions.pewforum.org">http://religions.pewforum.org</a> (accessed March 17, 2011)
No. of bordering states	4.223	1.880	0	8	Own calculation
No. of neighboring lotteries, at time $t$ , 1964–2007	0.871	1.361	0	5	Own calculation
Population in 1000s, 1964–2007	3766.594	3907.013	370	25776	Statistical Abstracts of the United States
No. of casinos, 2007	37.783	74.992	0	369	<a href="http://us.casinocity.com">http://us.casinocity.com</a> (accessed March 17, 2011)
Duration, in years, 1964–2007	16.215	11.233	1	44	Own calculation

tion term between the number of neighboring state lotteries and the political ideology of a federal state is specified. The assumption is that the influence of the regional surroundings on the spread of lotteries varies with the political ideology of a state.

In addition, in every model the impact of legalized gambling in the casino industry is examined in order to control for the importance of this sector and its lobby groups. For this, a measure is included which counts the number of operated, state-licensed casinos for each state. Since lottery introductions also depend on the population size, all models control the number of residents per state. All indicators, with which interaction terms are modeled, are centered at their mean for the analysis. In addition, I specify several predictors in a squared relationship, in order to achieve a better model fit.

## Results

Table 2 presents the results of the estimated probit models. The first column shows the baseline model; it covers all substantive characteristics and control variables. Model 2 additionally contains the interaction terms to investigate the conditional regional dif-

fusion processes. Both model specifications refer to the entire diffusion period (1964–2007). In order to analyze the direction and validity of the postulated time-varying effects, the above-mentioned time episodes – an early or pioneer period, a middle period, and a late period – are examined in columns 3 to 5. Model 6 finally estimates the temporal change by the specification of interaction terms. Here, the duration of the diffusion process is interacted with the substantial variables: fiscal surplus, political ideology, share of the evangelical population, and the number of neighboring state lotteries.

Hypothesis 1a tests fiscal-economic causes of the introduction of lotteries. As can be observed in Table 2, such a correlation is clearly recognizable. The inclusion of the entire period in the first two models results in a statistically significant point estimate, indicating that states with lower fiscal conditions are more willing to introduce lotteries. Moreover, an inverse U-shaped relationship can be presumed because of the significant negative quadratic term. This result clearly speaks for the argument that the higher the fiscal surplus, the more rapidly the probability of adopting decreases. This finding, however, does not reveal anything about the time dependency of this parameter postulated by hypothesis 1b, but refers to the general trend for the entire period. The time dynamic can be noticed in the following columns 3 to 5. From these results, it becomes clear that the fiscal situation of a state is primarily relevant due to the *initial* introduction of lotteries, and affects less strongly the introduction at later stages. During the early phase, the effect is particularly pronounced (see Model 3) and loses its conciseness in the middle and late phases. The time-dependent interaction in Model 6 confirms the hypothesis that the progressive introduction of lotteries is entirely independent of the fiscal situation of a state.

The change in effect over time can be observed in Figure 2. The y-axis represents point estimates of the regression coefficients from Model 6 for fiscal surplus as a function of the duration of the diffusion process since 1964 (x-axis). The figure also shows the upper and lower limit of the 95 percent confidence interval. When the interval range lies outside of the zero line, the coefficient is significant at 95 percent. The results demonstrate that a negative significant effect exists at the beginning of the diffusion process – fiscal deficit affects the introduction – while in later stages the effect becomes insignificant. Lotteries are then introduced independently of the fiscal-economic situation of a state.

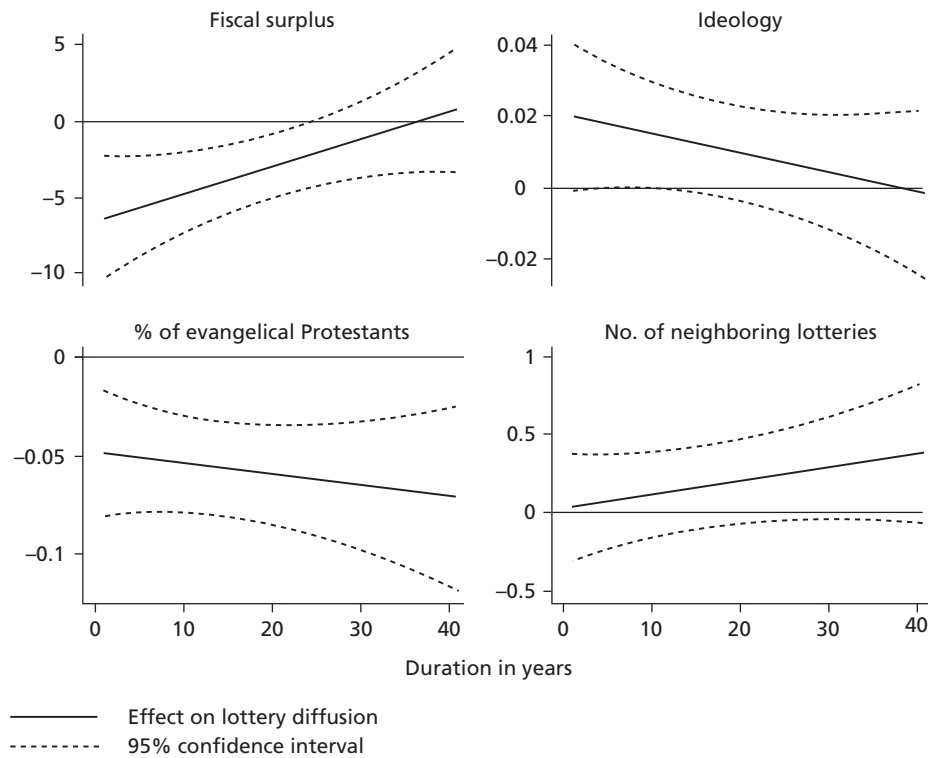
With regard to the second approach, which postulates the influence of liberal or conservative government ideology on lottery introductions, the findings support the plausibility of the assumptions. The results indicate a positive, significant influence in favor of an ideologically liberal government. If one looks at the individual periods, liberal states exhibit a higher introduction chance in the early phase, while in the middle and late phases, the ideology no longer corresponds with introduction. The upper right panel in Figure 2 demonstrates the change of the effect over time and shows that the ideological influence at the beginning of the diffusion process is statistically significant and decreases with increasing duration. After approximately fifteen years, the liberal ideology no longer affects the introduction of lotteries.

Table 2 Determinants of lottery diffusion, 1964–2007

	Model 1 1964–2007	Model 2 1964–2007	Model 3 <i>Period I</i> 1964–1974	Model 4 <i>Period II</i> 1975–1984	Model 5 <i>Period III</i> 1985–2007	Model 6 1964–2007
Fiscal surplus	–2.413*** (–2.804)	–2.342*** (–2.853)	–24.293** (–2.439)	–5.808* (–1.766)	–1.790 (–1.484)	–3.659*** (–3.238)
Fiscal surplus (squ)	–8.265** (–2.118)	–8.208** (–2.016)	–113.524** (–2.351)	–9.346 (–0.595)	–6.852*** (–2.585)	–19.392** (–2.553)
Ideology	0.012** (2.306)	0.008 (1.349)	0.022*** (2.586)	0.007 (0.547)	0.009 (1.187)	0.012* (1.841)
Ideology (squ)	–0.000*** (–2.681)	–0.001*** (–2.759)	–0.001* (–1.777)	–0.001 (–1.311)	–0.000 (–1.291)	–0.001*** (–3.050)
Referendum	0.183 (1.025)	0.244 (1.355)	–0.211 (–0.822)	1.860*** (4.049)	0.070 (0.197)	0.223 (1.289)
% Evangelical Protestants	–0.051*** (–5.200)	–0.054*** (–4.771)	–0.106*** (–4.483)	–0.061*** (–3.213)	–0.053*** (–2.820)	–0.054*** (–4.880)
No. of bordering states	0.109** (2.381)	0.102** (2.161)	–0.098 (–1.128)	–0.019 (–0.150)	0.237* (1.916)	0.103** (2.247)
No. of neighboring Lotteries	0.280** (2.556)	0.233** (2.122)	–0.617* (–1.727)	0.266 (0.704)	0.082 (0.418)	0.165 (1.228)
No. of neighboring lotteries (squ)	–0.084* (–1.880)	–0.089* (–1.658)	–0.089 (–0.548)	0.405 (1.525)	–0.057 (–0.906)	–0.128* (–1.703)
Population	0.000*** (3.046)	0.000*** (3.027)	0.000* (1.829)	0.000 (0.957)	0.000*** (2.579)	0.000*** (3.025)
No. of casinos	–0.003*** (–3.394)	–0.003*** (–3.435)	–0.027*** (–3.094)	–0.006** (–2.401)	–0.001 (–1.000)	–0.003*** (–2.954)
Duration	0.063*** (5.421)	0.066*** (5.433)	0.377* (1.789)	0.253** (2.024)	0.052** (2.032)	0.072*** (5.252)
<i>Interaction terms</i>						
No. of neighboring lotteries * No. of bordering states		0.011 (0.340)				0.033 (0.843)
No. of neighboring lotteries * Ideology		0.007** (2.287)				0.011** (2.542)
Duration * Fiscal surplus						0.175** (1.969)
Duration * Ideology						–0.001 (–1.320)
Duration * % of evangelical Protestants						–0.001 (–0.837)
Duration * No. of neighboring lotteries						0.008 (1.060)
Constant	–2.122*** (–12.590)	–2.154*** (–13.160)	–1.371 (–1.560)	–4.190*** (–3.784)	–1.998*** (–4.968)	–2.109*** (–12.453)
Wald Chi2	106.05	137.58	103.05	90.26	36.58	206.87
P > Chi2	0.000	0.000	0.000	0.000	0.000	0.000
No. of States	50	50	50	39	29	50
No. of Events	44	44	11	10	23	44
No. of Obs.	1,255	1,255	523	367	365	1,255

Notes: Discrete-time models (probit) using robust standard errors; t statistics in parentheses;  
\* p < 0.10, \*\* p < 0.05, \*\*\* p < 0.01 (two-sided tests).

Figure 2 Interaction with time: Effect of fiscal surplus, ideology, % of evangelical Protestants and no. of neighboring lotteries on lottery diffusion for values of time, with 95% confidence interval (Model 6)



The third approach is based on normative and religious factors as an explanation of lottery adoption. Again, the relationship can be clearly confirmed by the model estimates. The proportion of evangelical Protestants for each state has a significant negative impact on the introduction of lotteries. This applies to all model specifications, both for the main models and for all individual periods. Analysis of the time-dependent interaction demonstrates (see the diagram at the bottom left-hand panel in Figure 2) that religious opposition is becoming more relevant as time passes. The religious factor is thus one of the most important variables in explaining lottery introductions; evangelical Protestantism, as a normative opposition factor, exerts a decisive influence on the regulation of state lotteries in the United States and prevents the introduction of lotteries even when they are beginning to be regarded as a legitimate model elsewhere.

The fourth approach attributes the introduction of lotteries to the regional context. The number of already established lotteries in the proximity of a state should increase the probability of adoption. This effect proves to be significant in the main model: the more lottery states border on a regional level, the greater the likelihood of introduction. The temporal change of the coefficient, however, demonstrates no significant range of values (see Figure 2), whereby a slight increase in the absolute numerical value of the coefficients can be observed.

Figure 3 Conditional regional diffusion: Effect of neighboring lotteries on the diffusion process for values of no. of bordering states and ideology, with 95% confidence interval (Model 2)

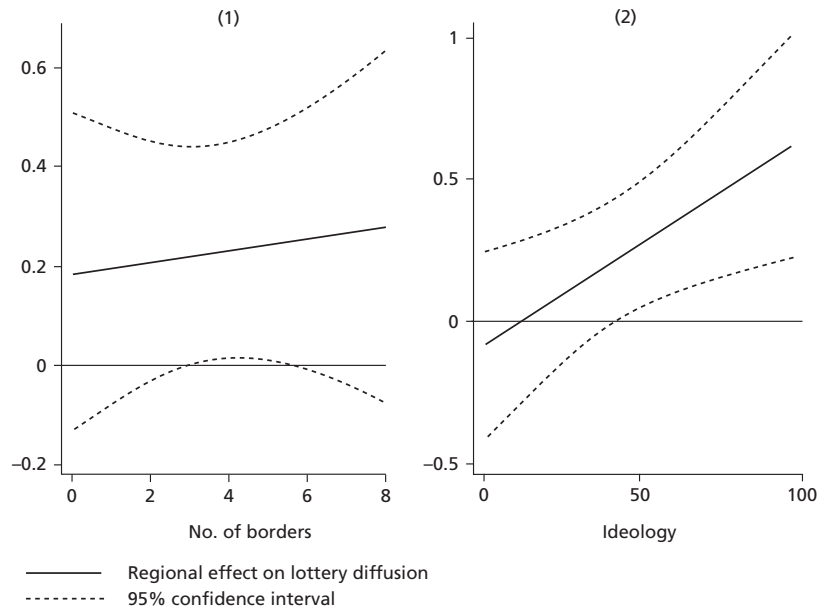


Figure 3 presents a representation of the specified interaction terms for the analysis of the proposed conditional diffusion processes. The first diagram illustrates the effect of regional lotteries on the diffusion process depending on the total number of directly neighboring states. It can thereby be observed that the effect of regional lotteries is particularly effective when the absolute number of adjacent neighbor states is high, whereby the effects for states which have between approximately three and seven neighboring borders is statistically significant. This argues for institutional pressures, which existing lotteries exert on neighborhood states and which are higher if a state has many neighboring lotteries.

The second diagram demonstrates the change in the impact of regional lotteries on the probability of adoption for the range of values of the interacting ideological position of a state. As can be seen from the diagram, the regional diffusion effect becomes considerably stronger the more liberal the ideological position of a state is. Therefore, regional diffusion effects are dependent on the political ideology of a state. While the effect is weak for states in the conservative ideological spectrum, it is significant for states with liberal, tax-favored ideological positions. The institutional pressure exerted by the neighboring states can therefore only be of practical consequence when meeting a favorable ideological environment. If it encounters a rather conservative position, adjacent regional lotteries do not have any influence.

## 5 Conclusion

This article has aimed to elucidate the patterns of the introduction and spread of state lotteries in the United States since the 1960s. To examine the discussed hypotheses, event history modeling was employed, using data that covered states in the period from 1964 to 2007. The results of the model estimates confirm the proposed approaches. With regard to the analysis of the temporal change in the effects, the findings demonstrate that different factors are dominant in explaining lottery adoptions in different phases of the diffusion process. Fiscal and political factors played an important role in the early phases of the diffusion process. In later phases, lotteries are increasingly introduced independently of these. The article explains this development with sociological neoinstitutionalism: as the number of established lotteries increases, they gain legitimation as an appropriate cultural model, which yields into a process of institutional isomorphism.

The second important finding of this paper focuses on an extension of current explanations of diffusion processes through regional factors. Here, the regional diffusion effect was analyzed conditional on the government ideology of a state, in order to capture a more exact understanding of how a regional diffusion effect evolves. The analysis showed that the effect of adjacent states is particularly high when it interacts with liberal political ideologies, while politically conservative environments do not exhibit a significant regional effect. The influence of the regional context on diffusion thus depends on the ideological order of a state, which enables or prevents the innovation to diffuse.

One of the most statistically important effects was the oppositional influence of religious beliefs, which was measured here as a proportion of conservative Protestant groups per state. The negative correlation between evangelical Protestantism and lotteries is consistent with the discussion on the relationship between gambling and Protestant ethics (Lutter 2010; Cosgrave/Klassen 2001; Ellison/Nybroten 1999; Murrell 1979). This demonstrates the enormous importance of (evangelical) Protestantism as an oppositional and prohibiting factor.

The findings from this analysis generally point to the influence of normative structures on the political regulation of economic processes. If the exchange processes carried out on markets are not consistent with the predominating values and norms of society, markets are then socially prevented (Healy 2006; Zelizer 1979; Beckert 2006). If lotteries remain banned today despite their fiscal attractiveness, this points to value-rational motives as a structuring force of modern society. The longer the diffusion process continues, the more statistically relevant this effect becomes.

However, religious opposition is not completely able to prevent the spread of lotteries. Eighty-four percent of all states currently operate a state lottery, meaning that 94 percent of the entire U.S. population lives in a lottery state. Following a ban of more than one hundred years, lotteries have today become a legitimate state institution, whose

introduction no longer requires coupling to a specific fiscal economic situation. Processes of isomorphism have produced a legitimate mode of organization, which even gets adopted by states with high levels of religious opposition.

To conclude, the analysis presented here aims to provide a more complex approach to the understanding of diffusion processes within social systems by focusing on lotteries as a form of a political and organizational innovation. A particular focus has been given to temporal dynamics, meaning the change in the causes of the diffusion process over time, and the modeling of a regional diffusion that is structured by ideological order. With these two expanded perspectives on the diffusion of political and organizational innovations, this paper demonstrates an approach that can also be applied to other areas beyond the empirical object studied here.

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