European Journal of Law and Economics (2023) 55:291–311
https://doi.org/10.1007/s10657-022-09758-1

Regulatory objectives vs fiscal interests: Are German casino locations motivated by beggar-thy-neighbor policy? An empirical analysis

Justus Haucap[1,2] · **Radivoje Nedic**[1] · **Talha Şimşek**[1,2]

Accepted: 28 October 2022 / Published online: 23 November 2022

Abstract
In this paper we provide an empirical analysis of German casino locations. Due to the "mercantilistic background" of casinos, we assume that casinos are more likely to be found at borders and in tourist areas. Even though location decisions have been made in the past, we use cross-sectional data at county level to analyze whether the current locations of casinos are consistent with present-day policy objectives. We discuss whether fiscal incentives and/or regulatory objectives to prevent harmful gambling are relevant for today's locations of German casinos. For our empirical analysis we use location and tourism indicators which are both significant factors for the location of German casinos. We find that the likelihood of a casino location increases if a county is located at a state border. We conjecture that border locations are chosen to share negative externalities of gambling with neighboring states while attracting revenues from out-of-state gamblers. This can be viewed as a type of beggar-thy-neighbor policy, which is inconsistent, however, with the objectives of the State Treaty, which is to provide legal gambling opportunities for the population within the state. For better implementation of the objectives, a more balanced distribution of casinos throughout the urbanized regions in Germany is recommended.

Keywords Casinos locations · Negative externalities · Gambling regulation · State border effect · Logit model · Urbanization

JEL Classification D72 · L83 · L88 · H7

The authors like to thank Jennifer Rontganger for her thorough review of the manuscript, which has previously been circulated under the title "An Empirical Analysis of German Casino Locations". We also like to thank Sophia Gaenssle and two anonymous referees for their most helpful comments and participants of the Hohenheimer Oberseminar in Ilmenau for very constructive discussions.

✉ Talha Şimşek
simsek@dice.hhu.de

Extended author information available on the last page of the article

1 Introduction

The appropriate regulation of gambling markets is not an uncontroversial topic and it is still being intensively discussed in the literature (Coryn et al., 2007; Carran, 2018; Bühringer, 2018). While parts of the gambling market have long been organized in a legal, regulated framework, other parts of gambling take place in black markets. The reasons for regulation and also partial prohibition include not only various market failures triggered by information asymmetries and external effects, but also by boundedly rational or even the pathological behavior of some gamblers (Coryn et al., 2007). Partly, gambling also has a negative reputation (see, e.g., Yani-de Soriano et al. 2012).

From a regional economic perspective, casinos have positive and also negative effects (Coryn et al., 2007; Walker & Barnett, 1999). Some of the positive effects a casino has on the region include the jobs associated with a casino, the local income generated, possibly also tax revenues, and tourist attraction. On the negative side are possible external effects such as noise, the negative image already mentioned, an increase of gambling addiction, property crimes, and money laundering (Coryn et al., 2007). As Dümmler et al. (2001) explain, the macroeconomic benefit of casinos has a "mercantilistic background": As little as possible should be imported and as much as possible should be exported, so that the largest part of the value creation remains in the domestic market. The bigger the share of labor, investors, and suppliers originating from the region of the casino location, the higher the benefit of a casino for the region. In contrast, the negative effect of the gaming business is ideally exported (i.e., consumed by persons from outside the region in which the casino is located) (Dümmler et al., 2001).

Accordingly, casinos have a certain similarity to so-called NIMBY (Not In My Backyard) goods. In the case of NIMBY goods, significant social costs of production are incurred locally (such as aircraft noise), while the benefits (from an airport) also arise elsewhere, so that, while many welcome the existence (of airports) in principle, they do not welcome it in their neighborhood (Frey et al., 1996; van der Horst, 2007). For casinos, the effects may be somewhat different, but related. From the point of view of a casino location, the social costs (e.g., from gambling addiction) should be exported as much as possible, while the benefits (e.g., from jobs and tax revenues) should remain as local as possible. This can also be viewed as a type of beggar-thy-neighbor policy. In this context, it is surprising that the locations of casinos has not yet been systematically analyzed from the beggar-thy-neighbor policy perspective. A very good case study for this purpose is Germany since it has the most neighboring states in Europe. In addition, Germany has a federal state system and the individual federal states bear the advantages and disadvantages of a casino location more or less independently. Hence, both state and federal borders should be relevant for the location of casinos. Especially since the responsibility for the location decision rests with the federal state and is, therefore, a public policy decision-making process.

In this paper, we want to analyze whether German casinos are located at borders and in tourist areas to export any potentially negative effects of consumption.

The analysis of the location of casinos is important in order to analyze whether current locations are in line with the regulatory objectives of the State Treaty on Gaming (GlüStV) or whether they are more motivated by fiscal objectives. The GlüStV is Germany's regulatory framework with an objective to provide legal gambling opportunities for the German population so as to steer the "natural gambling instinct" of the population into orderly and supervised channels by offering a limited range of games of chance as a suitable alternative to unauthorized gambling, and to counteract the development and spread of unauthorized gambling in black markets.

We use cross-sectional county-level data to analyze whether current casino locations are consistent with official policy objectives.[1] Due to the mercantilistic background of casinos, we conjecture that casinos are more likely to be found at borders and in tourist areas in order to raise revenues from gambling taxes and create jobs, though working all the while to "externalize" the negative effects of gambling. The State Treaty on Gambling, in contrast, has the main objective to provide legal gambling opportunities so that the population abstains from illegal offerings. For that purpose, legal gambling locations should be close to the respective population.

Our paper is structured as follows: First, we present an overview of the gambling regulation in Germany and a literature review. After the data and model section, we report the results. Finally, we discuss model limitations and summarize the findings in the conclusion.

2 Gambling regulation in Germany

Gambling is only allowed in regulated forms in Germany. The GlüStV is intended to limit the negative effects of gambling. Section 1 Number 1 GlüStV contains the objective of preventing gaming and betting addiction and creating the preconditions for an effective addiction control. Section 1 Number 2 GlüStV is about limiting and channeling the supply of gambling. Dietlein et al. (2012) consider the channeling objective as the most important instrument against gambling and betting addiction. In particular, the second objective aims to combat illegal gambling by channeling the existing gambling demand toward legal gambling activities (Dietlein et al., 2012; Haucap et al., 2017).[2]

The regulation of casinos is at the level of the federal states. Regulation in the respective federal states is composed of the *Spielbankgesetz* and *Spielordnung*. The respective laws regulate who may operate a casino. A distinction is made between a concession model and a state monopoly. In the case of a state monopoly, the location

[1] Although the location decision is in the past and a panel regression would cover potential time trends and socioeconomic changes, we still prefer cross-sectional data. On the one hand, our aim is to show whether current locations are still consistent with current regulation. On the other hand, it is not possible to collect all data over the time period of casino openings, as we rely on the availability of data from the Federal Statistical Office.

[2] For a more detailed explanation of the objectives of the GlüStV, see Dietlein et al. (2012).

Table 1 Overview of the Federal states–Operator model and operator

Federal state	Model	Operator	
		State	Private
Baden-Württemberg	Concession Model	X	
Bavaria	State Monopoly	X	
Berlin	Concession Model		X
Brandenburg	State Monopoly	X	
Bremen	State Monopoly	X	
Hamburg	Concession Model		X
Hessen	State Monopoly/Concession Model	X	X
Mecklenburg-Western Pomerania	Concession Model		X
Lower Saxony	Concession Model		X
North Rhine-Westphalia	State Monopoly	X	
Rhineland-Palatinate	Concession Model		X
Saarland	State Monopoly	X	
Saxony	State Monopoly	X	
Saxony-Anhalt	Concession Model		X
Schleswig-Holstein	Concession Model	X	
Thuringia	Concession Model		

Source: Own illustration. Based on Sandhaus and Shirvani (2019)

is determined directly by the federal states. In the case of the concession model, the location is determined indirectly by regulation. Even if an operator chooses a location within the regulatory landscape and also meets all other legal criteria for opening a casino, the operator has no legal claim to the granting of a concession (Sect. 4, Number 2, Sentence 3, GlüStV). Since the operator model represents either a state monopoly or a concession model, the location decision is made by the federal states and should therefore be in line with the objectives of the GlüStV. Hence, the responsibility for the location decision rests with the federal states. For an overview of the operator models and the operators of casinos in the individual federal states, see Table 1.

Other regulations may apply in the respective federal states that affect casinos. However, standardization is achieved with the GlüStV, which was agreed between all 16 federal states. This treaty sets out the framework and includes certain policies relating to casinos (Sandhaus & Shirvani, 2019).[3]

State laws limit the number of casinos and/or the municipalities in which a casino may be located. For example, the number of casinos is limited to a maximum of five in Saxony. A municipality restriction applies in Baden-Württemberg. Only in Baden-Baden, Konstanz, and Stuttgart may casino be operated. In Thuringia, both the number and the municipality are restricted. Only one casino is permitted and this

[3] For an overview of state gaming laws, see Sandhaus and Shirvani (2019).

Table 2 Overview of the Federal states–Municipal restriction

State	Municipality restriction
Baden-Württemberg	Baden-Baden, Konstanz, Stuttgart
Bavarian	Municipalities with state baths, spas or resorts
Berlin	/
Brandenburg	Potsdam, Frankfurt (Oder), Cottbus + bordering Municipalities
Bremen	For each municipality, one casino and branch office
Hamburg	/
Hessen	Bad Homburg, Kassel, Wiesbaden
Mecklenburg-Western Pomerania	/
Lower Saxony	/
North Rhine-Westphalia	/
Rhineland-Palatinate	Bad Neuenahr-Ahrweiler (Branches: Bad Dürkheim und Nürburg), Mainz (Branches: Bad Ems und Trier)
Saarland	/
Saxony	/
Saxony-Anhalt	/
Schleswig-Holstein	/
Thuringia	Erfurt

Source: State laws

may only be located in Erfurt. For an overview of the municipality restriction in the federal states, see the following Table 2.

The gambling market[4] has several different forms of games. Casinos are one of the legal outlets of the gambling market in Germany. In contrast to arcades which only contain machine-based gaming, casinos also contain table games. There are 69 casinos in Germany. These are spread over 15 of the 16 federal states. Only in Thuringia are there no casinos. Of the 69 casinos, 35 are privately operated (BupriS, 2021) and 34 are state-owned (DSbV, 2021).

3 Literature review

The location of casinos in Germany has not been analyzed so far. However, there is various literature on the distribution and location of casinos in the US, but the literature is mostly based on the performance (Lambert et al., 2010; Navin & Sullivan, 2007; Wenz, 2008). Lambert et al. (2010) analyze whether the location of casinos has an impact on their success and efficiency. Cookson (2010) analyzed the distribution of Native American casinos with respect to Indian reservations. He concluded that "multiple-state tribes have more than twice the probability [...] of having a casino as do [a] single-state tribe." With regard to non-Native American casinos, Wenz (2008) concludes that they tend to be located beyond state borders.

[4] Additional information about the gambling market can be found in Meyer et al. (2009).

Regarding the effects of a casino on the local labor market, Humphreys and Marchand (2013) found that employment in Canada increased in both the gaming industry and the hospitality industry. Indeed, increased revenues result from the local gaming industry. In addition, Ishizaka et al. (2013) analyzed a suitable location to construct a new casino in the region of Greater London. In contrast to our work, Ishizaka et al. (2013) consider new locations for casinos in their analysis. They question the Casino Advisory Panel 's (2007) recommendation that casinos should be located in Newham. In their analysis, they state that if profits are to be maximized, Westminster would be a more appropriate location. Westminster is known for generating the highest revenue in the tourism sector. However, if one considers not only profitability but also social criteria, they come to the same conclusion as the Casino Advisory Panel. Based on the work of Ishizaka et al. (2013) and Humphreys and Marchand (2013), we include tourism indicators in our regression. Spas and casinos have a historical connection in Germany. Until the early 1970 s, all 12 German casinos were located next to spas. It was not until the mid-1970 s that casinos were opened in large German cities or in their immediate neighborhood. This can be explained by the trend toward city tourism, which is especially reflected in the average capacity utilization.

The national border is considered to play a major role in the location of casinos. Assaf et al. (2013, p. 153) study the performance of Slovenian casinos. Their analysis shows that national borders lead to an increased performance of casinos. The idea is that international customers spend more, on average, than domestic customers (Roehl, 1996). Thereby, international customers contribute to mitigating negative consequences for the domestic population (Lee et al., 2010). Based on this literature, we include location indicators in our regression to reflect the border effect and the resulting fiscal benefits.[5] Lambert et al. (2010) also analyze the location of casinos and include a border effect in their regression. Their paper studies the success and efficiency of casinos in the US and finds that border effects are not very important. The authors explain this finding with a small variation of the variable in their sample. Still, they conclude that the most successful locations are in large urban areas near state borders (Lambert et al., 2010). In contrast, we believe that Germany is a better case study for analyzing the location of casinos, especially with respect to border effects, since 86 of 401 counties are located on state borders, which leads to a higher variation. In addition, Germany has the most neighboring countries and the longest border in Europe. Moreover, Germany has a federal system with additional domestic state borders within Germany.

There are social costs associated with casinos. In the literature on the legalization of casinos, among the issues discussed are the associated economic benefits and social costs. Social costs are not directly measurable (Eadington, 1998, p. 55). Strict prohibition or a severely limited supply of casinos leads to an increase in the demand of illegal gambling (Eadington, 1999, p. 183 f.). If, however, one considers the social costs associated with the presence of a casino, for example,

[5] To control for fiscal benefits at the state border, we would have liked to use a variable that reflects money per patron. Unfortunately, there is no publicly available data of this type.

Grinols and Mustard (2004) discuss the extent to which crime rates are influenced by casinos. On the one hand, it is argued that crime is directly reduced because casinos have a direct effect on the labor market and the economy. This is confirmed by the study of Humphreys and Marchand (2013). On the other hand, Grinols and Mustard (2004) suggest a link between crime rates and pathological gambling behavior. As also shown in the study by Strohäker and Becker (2017), the concentration of gamblers with pathological behaviors increases with the presence of a casino. The literature further includes many criteria associated with the social costs of casinos that can be attributed to pathological gambling behavior. Among the criteria, increased insolvency and suicide rates, neighborhood crime, health care costs, and family problems are suspected (Kearney, 2005, p. 285 f.; Eadington, 1999, p. 187; Mallach, 2010, p. 19). As can be seen, the social costs of casinos cover various externalities. Grinols & Mustard (2004, p. 24 f.) estimate, that crime-related social costs in US areas with casinos were about $75 per adult in 2003.

In addition, there is a large body of literature in the area of player barring. Pursuant to §8 of the GlüStV, operators are obliged to block players who either report themselves or are reported by third parties. There are studies on the effectiveness of the player barring system in Germany. Furthermore, player barring systems are also widespread regulatory instruments internationally. In Canada, the barring system started as early as 1989 (Nowatzki & Williams, 2002), in the USA in 1996 (O'Hare, 2004; Blaszczynski et al., 2007) and in New Zealand in 2003 (Townshend, 2007). In addition, there are barring systems in several countries in Europe and Asia (Strohäker & Becker, 2017, p. 8). The empirical study by Meyer and Hayer (2010) is considered the basis for the evaluation of the barring system in German casinos. Meyer and Hayer (2010) investigated the effectiveness and benefits of player bans over a longer period of time. They used questionnaires from consistent banned players—over a period of time—to evaluate the effectiveness of player barring with regard to pathological gambling behavior. The results of their analysis suggest a positive benefit from player bans. Another analysis is conducted by Strohäker and Becker (2017). They examined the decisive factors for self-exclusion, concluding that the proximity of a casino to the place of residence was a decisive criterion for excluded gamblers. They found that with an increased distance of a casino to the residence, the share of bans decreases. The location of casinos thus directly influences the concentration of pathological gambling behavior. For these reasons, a different regulatory tool was used in the past to prevent addiction. This was the *Residenzverbot*. Citizens who lived within five kilometers of a casino were not allowed to enter it (Strohäker & Becker, 2017). Fiedler (2015) also evaluated the blocking system in German casinos. Overall, a ban effect is considered positive, as a decrease in gambling participation is observed among banned gamblers. In both the USA and Canada, a barring system was found to reduce the share of pathological gamblers (Ladouceur et al., 2007, p. 91; Nelson et al., 2010, p. 143).

Based on the previous mentioned literature, the location of gambling supply seems to have an impact on pathological gambling behavior. Therefore, it is even more important to analyze current casino locations (Fig. 1). Due to the mercantilistic

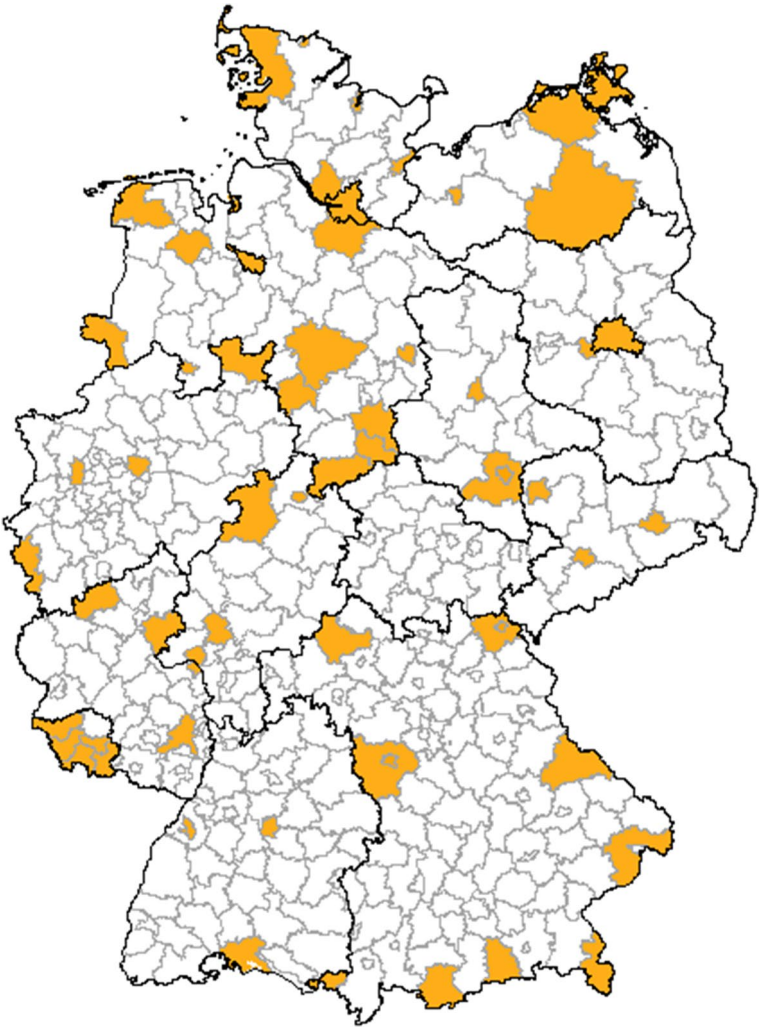

Fig. 1 Graphical illustration of counties with casinos

background of casinos, we assume that casinos are more likely to be found at borders and tourist areas. Considering the literature, this does not seem to be in line with the objective of the GlüStV, which is to provide legal gambling opportunities for the population so as to control harmful gambling.

4 Data and model

For our analysis, we created our own data set at the county level. We have included all counties and county-level cities in our data set. Most of the data were taken from the Federal Statistical Office or the statistical offices of the federal states. The

Table 3 Variable definition

Variable	Definition
Dependent variable	
Casino	Dummy variable equal to 1 if a casino is located in a county.
Location indicators	
State border	Dummy variable equal to 1 if a county contains a state border.
Federal state border	Dummy variable equal to 1 if a county contains a federal state border.
State border × federal state border	Dummy variable equal to 1 if a county contains a state or federal state border.
Tourism indicators	
Spa	Number of spas that meet the requirements of the German Spas Association.
Average capacity utilization	A calculated value (ratio of overnight stays to bed days in percent) that expresses the use of sleeping facilities in a reporting period.
Control variables	
Socioeconomic indicators	
Average age	Average age in a county.
Disposable income	Disposable income of private households in thousand euros per capita.
Migration background	The migration background variable represents the percentage of the population group with a migration background in relation to the total population. Consequently, the variable shows the proportion of people who have immigrated from abroad or are descendants of immigrants.
Other indicators	
Population	Number of population in thousands.[a]
County-level city	Dummy variable equal to 1 if a county is a county-level city. According to the data, one third of the population of Germany lives in county-level cities. Therefore, the variable county-level city can be seen as a proxy for big cities.
Federal state FE	Dummy variables, which each equal 1 if a county is located in the respective state.

[a] We would have liked to include *population density* in our regression, but there is a high correlation between *population density* and *migration background*. As a proxy, we included the variables *county-level city* and *population* in the regression, since county-level cities tend to be big cities and are thus densely populated

definition for each variable can be found in Table 3. The individual sources for each variable can be found in Table 9 in the appendix.

The data set contains 401 observations with 26 missing values related to the variable *average capacity utilization*. The 401 observations are equal to the number of counties in Germany. We included 11 variables in the regression. To counteract the variation in the different regulations of the individual federal states, as can be seen in Table 2, dummy variables were included for each of the federal states (*federal state FE*). The dependent variable is *casino*. It represents a dummy variable. The independent variables of the regression are:

- Location indicators: *state border*, *federal state border*, *state border* × *federal state border*
- Tourism indicators: *spa*, *average capacity utilization*
- Control variables:
  - Socio-economic indicators: *average age*, *disposable income*, *migration background*
  - Other indicators: *population*, *county-level city*, *federal state FE*

Tables 4 and 5 show the descriptive data and Table 6 reflects the pairwise correlation and the variance inflation factor (VIF) of the variables.

Only variables with a correlation of less than 0.6 were included in the regression. We also calculated the VIFs of our model. Some of the literature concludes that multicollinearity is a problem with a VIF above 10. Although Wooldridge (2019) only sees a limited use of VIF, he recommends looking at the VIF out of curiosity. Nevertheless, our model does not include VIFs above 10.

For our analysis we use a logit model,.[6] which takes the following form:

$$\begin{aligned}&\hat{P}(casino = 1|state\,border, ..., federal\,state\,FE)\\&= \wedge(\hat{\beta}_0 + \hat{\beta}_1 state\,border + ... + \hat{\beta}_{11-25} federal\,state\,FE),\end{aligned} \tag{1}$$

where $\wedge(z) = exp(z)/[1 + exp(z)]$ is the logit function.

5 Results

As shown above, the explanatory variables were divided into location and tourism indicators. The control variables were subdivided into socioeconomic and other indicators. The indicator groups are successively included in the calculation of the regression. Based on this, the explanatory power of each indicator group is to be identified. The results are presented in Table 7. We estimated the models with robust standard errors.

As can be seen from models 1 and 2, both location and tourism indicators contribute most of the explanatory power to the variation of the variable *casino*. Accordingly, these indicators should be important for the location of casinos. In models 3 and 4, additional indicator groups were included as control variables.

As logit models are nonlinear, interpretations of the magnitude of the effects are not directly available (Wooldridge, 2019). However, with the help of the Average Partial Effects (APE), an interpretation of the average effects can be made. Here, the mean of the marginal effects is calculated across all observations. The results are

[6] Since we have a binary dependent variable, we use the logit and probit model, as these are the most commonly used binary models in applied economics (Greene, 2018) Since our regression results do not differ significantly when using logit or probit (see Table 11 in the appendix), we keep the logit model. Furthermore, Greene (2018) summarizes that in most cases the choice between logit and probit models does not make much difference.

Table 4 Descriptive data of the dummy variables

Variables	N	Mean	St. Dev.	0 (Abs.)	1 (Abs.)	0 (%)	1 (%)
Casino	401	0.15	0.36	341	60	85	15
State border	401	0.21	0.41	315	86	79	21
Federal state border	401	0.49	0.50	203	198	51	49
state border × federal state border	401	0.08	0.28	368	33	92	8
County-level city	401	0.27	0.44	294	107	73	27

Table 5 Descriptive data of the variables

Variables	N	Mean	St. Dev.	Min	Pctl(25)	Pctl(75)	Max
Spa	401	0.97	1.91	0	0	1	16
Average capacity utilization	375	35.99	8.39	17.80	30.05	41.00	60.30
Average age	401	44.91	1.95	40.20	43.70	46.00	50.50
Disposable income	401	22.50	2.61	16.31	20.58	23.95	39.03
Migration background	401	16.73	9.49	2	9.8	23.6	50
Population	401	207.03	243.88	34.21	103.66	242.16	3,644.83

Table 6 Correlation matrix

Var	VIF	1	2	3	4	5	6	7	8	9	10	11
1	–	1										
2	2.95	0.2***	1									
3	2.29	0.1	−0.1**	1								
4	2.29	0.1	0.5***	0.3***	1							
5	1.75	0.1***	0.2***	0.1	0.1	1						
6	2.51	0.2***	0.1*	−0.1***	0.0	0.0	1					
7	2.81	0.0	0.1	0.2***	0.1***	0.2***	−0.3***	1				
8	2.04	−0.1	−0.1	−0.2***	−0.1**	0.0	0.1***	−0.3***	1			
9	6.10	−0.0	−0.1**	−0.2***	−0.1**	−0.2***	0.3***	−0.5***	0.3***	1		
10	1.98	0.1***	−0.0	−0.0	0.0	0.1	0.1***	−0.2***	0.1	0.2***	1	
11	3.57	0.1***	−0.0	−0.2***	−0.1	−0.4***	0.4***	−0.3***	−0.2***	0.4***	−0.1**	1

1 = casino, 2 = state border, 3 = federal state border, 4 = state border × federal state border, 5 = spa, 6 = average capacity utilization, 7 = average age, 8 = disposable income, 9 = migration background, 10 = population, 11 = county-level city

Note: $^{***}p < 0.01$; $^{**}p < 0.05$; $^{*}p < 0.1$. For the actual p-values of the pairwise correlation test of the variables see Table 10

presented in Table 8. We estimated the Average Partial Effects of the logit model with robust standard errors.

Table 7 Results—Logit model

	Casino			
Variables	Model 1	Model 2	Model 3	Model 4
(Intercept)	−3.5407***	−9.2763***	−8.8676	−13.1141
	(0.7262)	(1.2615)	(6.9908)	(7.9885)
Location indicators				
State border	1.8114***	1.9965***	2.1445***	2.3893***
	(0.4847)	(0.5967)	(0.6156)	(0.6700)
Federal state border	0.6748	1.2208**	1.2509**	1.6464***
	(0.4503)	(0.5052)	(0.5019)	(0.5709)
State border × federal state border	−1.2432*	−1.9175**	−1.9379**	−2.1360**
	(0.7384)	(0.9098)	(0.9071)	(0.9514)
Tourism indicators				
Spa		0.1597**	0.1703*	0.2081*
		(0.0800)	(0.0949)	(0.1099)
Average capacity utilization		0.1229***	0.1161***	0.0892**
		(0.0224)	(0.0291)	(0.0348)
Control variables				
Socioeconomic indicators				
Average age			−0.0688	0.0404
			(0.1400)	(0.1566)
Disposable income			0.1026	0.1192
			(0.0975)	(0.1162)
Migration background			0.0076	−0.0448
			(0.0385)	(0.0486)
Other indicators				
Population				0.0031
				(0.0022)
County-level city				1.2317
				(0.7746)
Federal state FE	✓	✓	✓	✓
AIC	308.9141	266.8300	271.1409	268.0719
BIC	384.7994	349.2954	365.3871	370.1719
Log Likelihood	−135.4571	−112.4150	−111.5704	−108.0359
Deviance	270.9141	224.8300	223.1409	216.0719
Num. obs.	401	375	375	375
McFadden R^2	0.1996	0.3358	0.3408	0.3617
ROC AUC	0.7803	0.8641	0.8617	0.8805

Note: $^{***}p < 0.01$; $^{**}p < 0.05$; $^{*}p < 0.1$

The variables *state border*, *federal state border*, and *state border* × *federal state border* are all significantly different from zero. The null hypotheses can be rejected with a one percent probability of error. Compared to counties

Table 8 Average partial effects of the model 4

Variables	Casino Model 4 APE
Location indicators	
State border	0.2698***
	(0.0762)
Federal state border	0.1375***
	(0.0408)
State border × federal state border	−0.1237***
	(0.0328)
Tourism indicators	
Spa	0.0182*
	(0.0097)
Average capacity utilization	0.0078**
	(0.0030)
Control variables	
Socioeconomic indicators	
Average age	0.0035
	(0.0132)
Disposable income	0.0104
	(0.0101)
Migration background	−0.0039
	(0.0041)
Other indicators	
Population	0.0003
	(0.0002)
County-level city	0.1244
	(0.0842)
Federal state FE	✓

***$p < 0.01$; **$p < 0.05$; *$p < 0.1$

For model fit see Model 4 in Table 7 and for comparison with the APE of the probit model see Table 12 in the appendix

without any borders, the likelihood of having a casino increases, on average, by 26.98 percentage points for a county with a state border, but without a federal state border. Likewise, the probability increases by 13.75 percentage points in a county with a federal state border, but without a state border. If a county is located on both a state and federal state border, the likelihood increases by 28.36 percentage points, on average, compared to a county without any borders.

Looking at the tourism indicators, the null hypothesis can be rejected for *spa* with a 10 percent likelihood of error and for *average capacity utilization* with a 5 percent error likelihood. The probability of a casino location increases by an average of 1.82 percentage points when the number of spas increases by one unit and by an average of 0.78 percentage points when the average utilization rate

increases by one unit. Our results confirm our hypothesis that casinos are more likely to be found at borders and in tourist areas.

6 Discussion

German casinos are significantly located in counties with state borders. One explanation is the mercantilistic background of casinos and the resulting fiscal reasons described earlier. Since it is rather unlikely at the border to steer the home population's natural gambling desire into legal channels, this is inconsistent with official policy objectives.

Considering the results for both indicator groups, our results are consistent with the existing literature. The analysis by Roehl (1996) shows that international customers of casinos spend more on average. Thus, on the one hand, there is an increased demand at state borders by international customers. On the other hand, it is also possible to share the social costs of gambling with the neighboring countries at state borders (Lee et al., 2010). From an economic view, location on the state border is correspondingly advantageous. As long as fiscal interests do not harm the objectives of the GlüStV, economic benefits can be achieved (Fiedler, 2015). However, we assume that it is not possible to achieve the objectives of the GlüStV optimally at the state border. The gambling demand has to be channeled nationwide through an urbanized area to prevent the development and spreading of prohibited games on the black market. For that purpose, the distribution of the casinos should be closer to the local population. Assuming that channeling at borders is not optimal, our results are not consistent with the objective of the GlüStV at either the state or federal state border, since the official objective is to channel the own population's gambling demand, not that of foreigners.

The significance of the interaction variable also underlines the relevance of the state and federal state border. A stronger overall effect is observed in counties with both a state and federal state border. Although state variation was included with the *federal state FE* variables, the location indicators are still strongly significant. This illustrates the relevance of the indicator group.

The tourism indicators can be used as a proxy for the number of tourists. The higher the tourism indicators, the higher the potential demand from foreign players. Ishizaka et al. (2013) even use tourism spending as criteria for the profitability of casinos. From an economic point of view, both variables should have a positive effect, since the number of potential customers increases with rising tourism and international customers tend to spend more (Roehl, 1996). In addition, the variable *spa* provides a historical context. Until the early 1970 s, all 12 German casinos were located in spas. Casinos were not opened in German cities or in their immediate vicinity until the mid-1970 s. The shift to urban areas can be explained by the trend of city tourism (Deutscher Tourismusverband e. V., 2006, p. 6). The low significance of the variable *spa* can be explained with the *federal state FE*. Table 2 shows that in some federal states only locations in spas are allowed. If we omit the *federal state FE* variables, the significance of the variable *spa* increases. However, this leads to biased results because the federal states regulate the location decision differently (omitted variable bias). Considering the literature and our

results, casinos are more likely to be found in tourist areas. However, based on the objectives of the GlüStV, casinos should address local population instead of tourists.

Moreover, we like the idea of analyzing whether the influence of our explanatory variables differ in explaining the location decisions of early- vs. late-arriving casinos. Unfortunately, only four new casinos have opened in the last 10 years. If we consider the last 15 years, there were still only nine casino openings. Apart from that, old casinos should also be in line with the current policy. In each federal state, the concession of a casino can be either revoked and/or is limited to 10 or 15 years. Since the main objectives of the GlüStV that we consider in our analysis have remained essentially unchanged, locations that do not comply with current policy may already have had their concession revoked or may not be allowed to renew. With this paper, we want to show whether the current locations are still compatible with the current regulation. Our analysis shows that many casino locations should be reviewed for their compatibility with the objectives of the GlüStV.

As shown above, the location decision for both private and state-operated casinos is under the responsibility of the federal states and should thus be in line with the objectives of the GlüStV. Based on our results and the discussion, the implementation of regulation seems to fail here. The significance of the location and tourism indicators rather suggest that fiscal interests dominate in the location of casinos. Fiedler (2015) makes clear that fiscal interest should not be considered as the main reason for gambling supply, but only as a positive side effect. Eadington (1999, p. 184) shows that in the US many regulations intended to protect consumers are usually symbolic in nature. This phenomenon can be transferred to the German gambling market.

7 Limitations

The underlying data set covers all counties in Germany and thus 401 observations. Counties, like federal states, administrative districts, and municipalities, represent one of the administrative levels in Germany. However, the municipality level has a smaller subdivision and comprises 10,799 municipalities. Consequently, a data set at the municipality level would entail a significantly higher number of observations. The challenge of the different counties is that they have different sizes in terms of area. This can lead to bias in the variables. For most variables, density or ratio can be included in the data set, which minimizes inaccuracy. However, for dummy variables, the differences in the sizes of counties cannot be taken into account. This can be seen in Fig. 2 as an example of the dummy variable *federal state border*. The figure contrasts the two federal states Mecklenburg-Western Pomerania and Rhineland-Palatinate. Based on the figure, it is clear that the counties in Mecklenburg-Western Pomerania are significantly larger in area than, for example, the counties in Rhineland-Palatinate. The county of Mecklenburgische Seenplatte (yellow) has a federal state border, and so do the cities in the north of the county. In contrast, the county-level city of Neustadt an der Weinstraße (green), for example, has no federal state border. Consequently, there is a certain inaccuracy in counties with large surface areas for dummy variables. Using a data set at the municipality level, there is less inaccuracy. Nevertheless, we deliberately chose the county level because of the coverage of casinos. A casino covers the gambling supply across multiple municipalities, which makes an observation at the county level more meaningful.

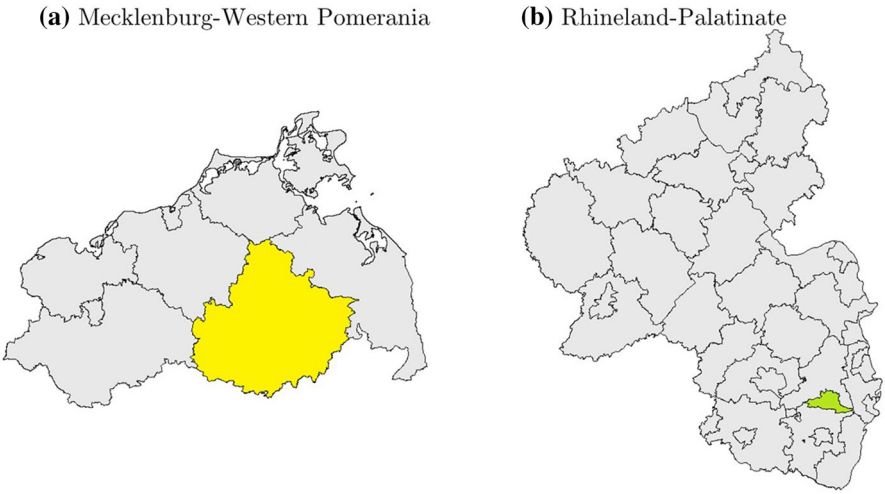

Fig. 2 Model limitation due to differences in size of counties. Note: yellow = Mecklenburgische Seenplatte, green = Neustadt an der Weinstraße (Color figure online)

8 Conclusion

Due to various market failures, triggered by information asymmetries and externalities, but also by boundedly rational or even pathological behavior of some players, regulation is widespread in gambling markets. As assumed above, location decisions for both private and state-operated casinos are the responsibility of the federal states and should thus be in line with their official regulatory objectives. Due to the mercantilistic background of casinos, we conjecture that casinos are more likely to be found at borders and in tourist areas, even though this may contradict regulatory objectives. Considering the literature and our results, the regulation seems to fail here. We can observe casino locations on borders and in tourist areas, disregarding the regulators' objectives to provide legal gambling opportunities for the home population so as to channel their gambling desires into legal and regulated spheres. The significance of the location and tourism indicators rather suggest that fiscal interests dominate in the location of casinos. This finding is also consistent with Calcagno et al. (2010) who find that casino legalization in the USA is motivated by keeping gambling revenues and gambling taxes within the state and to attract tourism or "export" taxes.

For a better implementation of the objectives of the GlüStV, a different distribution of casinos is recommended, away from borders and locations with strong tourism to locations close to the local population. Thus, channeling local demand comes to the fore and fiscal interests are merely a positive side effect. Above all, placement at the state border entails both increased demand and the sharing of social costs with neighboring countries. The phenomenon of locations of casinos at state borders is not an isolated case, which is why it is difficult to imagine implementation at the national level alone. Looking at the

European environment, casinos are also observed at national borders. This is the case in countries such as Austria, Switzerland, the Czech Republic, and Italy. If Germany chose to distance itself from national borders, it bear the social costs of its own casinos as well as those of neighboring countries. Consequently, a Europe-wide approach may be desirable.

Appendix

See Tables 9, 10, 11 and 12.

Table 9 Overview of the data set and sources

Variable	Source
Casino	German casino associations (BupriS; DSbV)
State border	Own determination
Federal state border	Own determination
State border × federal state border	Own determination
Spa	Ministry of Lower Saxony
Average capacity utilization	Federal Statistical Office
Average age	Statistical offices of the federal states
Disposable income	Statistical offices of the federal states
Migration background	Statistical offices of the federal states
Ppopulation	Federal Statistical Office-GENESIS-Online
County-level city	Federal Statistical Office
Federal state FE	Own determination

Table 10 Significance of the correlations

Var	1	2	3	4	5	6	7	8	9	10	11
1	–										
2	0.00	–									
3	0.13	0.02	–								
4	0.12	0.00	0.00	–							
5	0.00	0.00	0.33	0.29	–						
6	0.00	0.10	0.01	0.31	0.35	–					
7	0.49	0.14	0.00	0.00	0.00	0.00	–				
8	0.21	0.34	0.00	0.03	0.42	0.01	0.00	–			
9	0.85	0.04	0.00	0.03	0.00	0.00	0.00	0.00	–		
10	0.00	0.21	0.57	0.49	0.63	0.00	0.00	0.41	0.00	–	
11	0.00	0.42	0.01	0.25	0.00	0.00	0.00	0.00	0.00	0.03	–

1 = casino, 2 = state border, 3 = federal state border, 4 = state border × federal state border, 5 = spa, 6 = average capacity utilization, 7 = average age, 8 = disposable income, 9 = migration background, 10 = population, 11 = county-level city

Table 11 Results—Logit and Probit model

	Logit model	Probit model
(Intercept)	−13.1141*	−6.8677*
	(7.3372)	(4.1051)
Location indicators		
State border	2.3893***	1.3024***
	(0.6353)	(0.3381)
Federal state border	1.6464***	0.8621***
	(0.5347)	(0.2807)
State border × federal state border	−2.1360**	−1.1381**
	(0.8642)	(0.4686)
Tourism indicators		
Spa	0.2081**	0.1181**
	(0.0938)	(0.0533)
Average capacity utilization	0.0892***	0.0516***
	(0.0341)	(0.0184)
Control variables		
Socioeconomic indicators		
Average age	0.0404	0.0184
	(0.1497)	(0.0837)
Disposable income	0.1192	0.0542
	(0.0917)	(0.0509)
Migration background	−0.0448	−0.0275
	(0.0461)	(0.0253)
Other indicators		
Population	0.0031**	0.0017**
	(0.0014)	(0.0007)
County-level city	1.2317*	0.6860*
	(0.7055)	(0.3873)
Federal state FE	✓	✓
AIC	268.0719	266.0181
BIC	370.1719	368.1182
Log Likelihood	−108.0359	−107.0090
Deviance	216.0719	214.0181
Num. obs.	375	375
McFadden R^2	0.3617	0.3677
ROC AUC	0.8805	0.8817

***$p < 0.01$; **$p < 0.05$; *$p < 0.1$

Table 12 Average Partial Effects of the logit and probit model

	Logit model	Probit model
Location indicators		
State border	0.2698***	0.2581***
	(0.0762)	(0.0708)
Federal state border	0.1375***	0.1297***
	(0.0408)	(0.0384)
State border × federal state border	−0.1237***	−0.1196***
	(0.0328)	(0.0320)
Tourism indicators		
Spa	0.0182*	0.0183**
	(0.0097)	(0.0089)
Average capacity utilization	0.0078**	0.0080***
	(0.0030)	(0.0028)
Control variables		
Socioeconomic indicators		
Average age	0.0035	0.0029
	(0.0132)	(0.0129)
Disposable income	0.0104	0.0084
	(0.0101)	(0.0097)
Migration background	−0.0039	−0.0043
	(0.0041)	(0.0039)
Other indicators		
Population	0.0003	0.0003
	(0.0002)	(0.0002)
County-level city	0.1244	0.1221
	(0.0842)	(0.0780)
Federal state FE	✓	✓
Num. obs.	375	375
Log Likelihood	−108.0359	−107.0090
Deviance	216.0719	214.0181
AIC	268.0719	266.0181
BIC	370.1719	368.1182

***$p < 0.01$; **$p < 0.05$; *$p < 0.1$

Funding Open Access funding enabled and organized by Projekt DEAL. The authors did not receive support from any organization for the submitted work.

Declarations

Conflict of interest The authors have no relevant financial or non-financial interests to disclose.

References

Assaf, A. G., Cvelbar, L. K., & Pahor, M. (2013). Performance drivers in the casino industry: Evidence from Slovenia. *International Journal of Hospitality Management, 32*(1), 149–154.

Blaszczynski, A., Ladouceur, R., & Nower, L. (2007). Self-exclusion: A proposed gateway to treatment model. *International Gambling Studies, 7*(1), 59–71.

Bühringer, G. (2018). Regulation of gambling: A tightrope walk between freedom of choice and public control. *Sucht, 64*(5–6), 237–240.

BupriS (2021). Mitglieder. Available online at: http://bupris.de/uber-bupris/mitglieder/ (August 7, 2021).

Calcagno, P. T., Walker, D. M., & Jackson, J. D. (2010). Determinants of the probability and timing of commercial casino legalization in the United States. *Public Choice, 142*(1–2), 69–90.

Carran, M. A. (2018). *Gambling regulation and vulnerability*. Elgar Studies in Law and Regulation, Edward Elgar: Cheltenham.

Casino Advisory Panel. (2007). Final report of the Casino Advisory Panel, London.

Cookson, J. A. (2010). Institutions and casinos on American Indian reservations: An empirical analysis of the location of Indian Casinos. *Journal of Law and Economics, 53*(4), 651–687.

Coryn, T., Fijnaut, C., & Littler, A. (2007). *Economic aspects of gambling regulation: EU and US perspectives*. Brill/Nijhoff: Boston & Leiden.

Deutscher Tourismusverband E. V. (2006). Städte- und Kulturtourismus in Deutschland. Grundlagenuntersuchung, Bonn.

Dietlein, J., Hecker, M. & Ruttig, M. (2012). *Glücksspielrecht: Glücksspielstaatsvertrag - §§33c ff. GewO, SpielV, RennwLottG*. Beck Verlag, München, 2 edition.

DSbV (2021). Mitglieder. Available online at: https://www.deutscher-spielbankenverband.de/mitglieder-2/ (August 7, 2021).

Dümmler, P., Furrer, J., & Thierstein, A. (2001). Die Entstehung einer Casinolandschaft in der Schweiz. Einige volkswirtschaftliche Überlegungen. In J. Furrer and B. Gehrig (Eds.), *Aspekte der schweizerischen Wirtschaftspolitik - Festschrift für Franz Jaeger* (pp. 121–142). Rüegger: Chur.

Eadington, W. R. (1998). Contributions of casino-style gambling to local economies. *The ANNALS of the American Academy of Political and Social Science, 556*(1), 53–65.

Eadington, W. R. (1999). The economics of casino gambling. *Journal of Economic Perspectives, 13*(3), 173–192.

Fiedler, I. (2015). Evaluierung des Sperrsystems in deutschen Spielbanken. *Zeitschrift für Wett- und Glücksspielrecht, 10*(03–04), 188–197.

Frey, B. S., Oberholzer-Gee, F., & Eichenberger, R. (1996). The old lady visits your backyard: A tale of morals and markets. *Journal of Political Economy, 104*(6), 1297–1313.

Greene, W. H. (2018). *Econometric Analysis*. 8th edition. Pearsons: New York.

Grinols, E. L., & Mustard, D. B. (2004). Casinos, crime, and community costs. *Review of Economics and Statistics, 88*(1), 28–45.

Haucap, J., Nolte, M., & Stöver, H. (2017). *Faktenbasierte Evaluierung des Glücksspielstaatsvertrags*. Kölner Studien zum Sportrecht 8, Institut für Sportrecht: Köln.

Humphreys, B. R., & Marchand, J. (2013). New casinos and local labor markets: Evidence from Canada. *Labour Economics, 24*, 151–160.

Ishizaka, A., Nemery, P., & Lidouh, K. (2013). Location selection for the construction of a casino in the Greater London region: A triple multi-criteria approach. *Tourism Management, 34*, 211–220.

Kearney, M. S. (2005). The economic winners and losers of legalized gambling. *National Tax Journal, 58*(2), 281–302.

Ladouceur, R., Sylvain, C., & Gosselin, P. (2007). Self-exclusion program: A longitudinal evaluation study. *Journal of Gambling Studies, 23*(1), 85–94.

Lambert, T. E., Srinivasan, A. K., Dufrene, U. B., & Min, H. (2010). Urban location and the success of casinos in five states. *International Journal of Management and Marketing, 3*(3), 1–17.

Lee, C. K., Kang, S. K., Long, P., & Reisinger, Y. (2010). Residents' perceptions of casino impacts: A comparative study. *Tourism Management, 31*(2), 189–201.
Mallach, A. (2010). *Economic and social impact of introducing casino gambling: A review and assessment of the literature*. Community Affairs Discussion Paper 10-01, Federal Reserve Bank of Philadelphia.
Meyer, G., & Hayer, T. (2010). *Die Effektivität der Spielsperre als Maßnahme des Spielerschutzes - Eine empirische Untersuchung von gesperrten Spielern*. Peter Lang: Frankfurt.
Meyer, G., Hayer, T., & Griffiths, M. (2009). *Problem Gambling in Europe: Challenges, prevention, and interventions*. New York: Springer.
Navin, J. C., & Sullivan, T. S. (2007). Do riverboat casinos act as competitors? A look at the St. Louis market. *Economic Development Quarterly, 21*(1), 49–59.
Nelson, S. E., Kleschinsky, J. H., LaBrie, R. A., Kaplan, S., & Shaffer, H. J. (2010). One decade of self exclusion: Missouri casino self-excluders four to ten years after enrollment. *Journal of Gambling Studies, 26*(1), 129–144.
Nowatzki, N. R., & Williams, R. J. (2002). Casino self-exclusion programmes: A review of the issues. *International Gambling Studies, 2*(1), 3–25.
O'Hare, C. (2004). Self-exclusion-concept vs. reality. *Gaming Law Review, 8*(3), 189–191.
Roehl, W. S. (1996). Competition, casino spending, and use of casino amenities. *Journal of Travel Research, 34*(3), 57–62.
Sandhaus, D. & Shirvani, R. (2019). Überblick über die Spielbankgesetzgebung der Bundesländer. Landtag NRW.
Strohäker, T. & Becker, T. (2017). Casino Gambling in Germany: Development, Legal Conditions and the Exclusion System. Forschungsstelle Glücksspiel der Universität Hohenheim. Working Paper.
Townshend, P. (2007). Self-exclusion in a public health environment: An effective treatment option in New Zealand. *International Journal of Mental Health and Addiction, 5*(4), 390–395.
van der Horst, D. (2007). NIMBY or not? Exploring the relevance of location and the politics of voiced opinions in renewable energy siting controversies. *Energy Policy, 35*(5), 2705–2714.
Walker, D. M., & Barnett, A. H. (1999). The social costs of gambling: An economic perspective. *Journal of Gambling Studies, 15*(3), 181–212.
Wenz, M. (2008). The spatial evolution of casino gambling. *Cityscape: A Journal of Policy Development and Research, 10*(3), 203–227.
Wooldridge, J. M. (2019). *Introductory econometrics: A modern approach*, 7th edition. Cengage: Boston.
Yani-de Soriano, M., Javed, U., & Yousafzai, S. (2012). Can an industry be socially responsible if its products harm consumers? The case of online gambling. *Journal of Business Ethics, 110*(4), 481–497.

Authors and Affiliations

Justus Haucap[1,2] · Radivoje Nedic[1] · Talha Şimşek[1,2]

Justus Haucap
haucap@dice.hhu.de

Radivoje Nedic
radivoje.nedic@hhu.de

[1] Düsseldorf Institute for Competition Economics (DICE), Heinrich-Heine-University Düsseldorf, Universitätsstr. 1, 40225 Düsseldorf, Germany

[2] Institute for Gambling and Society (GLÜG), Ruhr-Universität Bochum, Bochum, Germany