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## DETERMINANTS OF INTERNET GAMBLING POLICY ADOPTION

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### Abstract

Since its inception, online gambling legalization has been a controversial and contentious subject among governments worldwide. Residents in these jurisdictions face an uncertain future regarding the liberty to gamble online. This study seeks to identify which demographic, economic, technological, and sociological determinants contribute a government's decision to allow their citizens to gamble online. A seemingly unrelated bivariate probit regression analysis revealed that national population, government revenues as a percentage of GDP, the Hofstede Uncertainty Avoidance Index, number of Internet users, and a country's Christianity proportion contributed significantly to the observed distribution of online gambling legality in 47 countries.

Key Words: internet, online, gambling, gaming, policy, legal, prohibit

### Introduction

The decision of whether to adopt legal online gambling has been controversial in many different jurisdictions, and has led to different policy decisions among nations. Some countries have taken active steps to legalize various forms of online gambling, while others have chosen to explicitly ban the practice. Still others have opted to passively allow or disallow online gambling by way of lack of regulation or imposing past regulation aimed at brick and mortar casinos.

Although some research has been done to elicit the determinants of lotteries and brick and mortar casino legality, no studies have sought to explore the determining factors of online gambling adoption. Through an exploratory analysis using probit regression procedures, our purpose in this study is to identify the demographic, economic, technological, and sociological indicators that affect a government's decision to allow their citizens to gamble online.

The focus of this research is on the rights given to citizens, and so the model established here may help online gaming operators more accurately focus their marketing efforts on jurisdictions in which online gaming is legal for residents. Further, this research increases the ability for these operators to target markets in which the socio-economic indicators suggest online gaming is likely to be permitted may provide them with a larger return on investment. Government lobbyists may also use results of this and similar research to compare their jurisdictions to similar regions as a means of campaign to politicians. Finally, the results of this study will enable future empirical studies of gaming industry impacts to be corrected for potential selection bias in countries that have and have not adopted legal online gambling. That is, this study could be used to compute the inverse mills ratio in Heckit models where the selection bias is due to presence of legal online gambling.

### Literature Review

The academic study of online gambling is a relatively new field. The first occurrence of money being wagered using the Internet dates back only 15 years, with the sale of lottery tickets from the International Lottery in Liechtenstein, for a manual drawing that occurred on October 7, 1995 (Romney, 1995). Just a few months later in

January 1996, Intertops.com, based and licensed in Antigua, became the first online casino to accept a wager (Business Wire, 2005). Online gambling grew quickly, from 15 by the end of 1996, to 650 online casinos by the end of 1999, and 1,800 sites by the end of 2002 (Schwartz, 2006). By 2007, online gambling sites were operating in 45 different jurisdictions (Casino City, 2010). The first online poker room, PlanetPoker, opened in 1998 and was quickly followed by numerous others (Williams & Woods, 2007). The World Series of Poker Main Event, the world's largest live poker tournament, became a popular televised event in 2003, when its winner, Chris MoneyMaker, gained his entry to the tournament by winning a satellite event on an online poker room. This "MoneyMaker Effect" inspired a rush of interest in the game, and thousands more hopefuls took to their computers to seek fortunes in online poker rooms (Grohman, 2006).

Despite this rapid growth, the percentage of the general population gambling on the Internet remained small when compared to the overall percentage of gamblers. In 2007, the United Kingdom Gambling Commission (2009) reported a 68% overall gambling prevalence rate, with a rate of 48% when excluding those who had gambled solely on the National Lottery. During that same time period, Internet gambling was reported by 6% of survey respondents (UK Gambling Commission, 2009). This percentage, however, was still a large increase over the short time during which online gambling had been available to the masses. In 2006, for example, Internet gambling was reported by only 3.1% of respondents, a number that nearly doubled by the end of the following year (UK Gambling Commission, 2010). Governments worldwide struggled to keep up throughout this rapid expansion of online poker rooms and casinos, attempting to develop an understanding of these new gambling venues, which easily spanned across national borders and became a policy challenge.

#### Casino Policy Adoption

In response to the use of the Internet for gambling, government policy tends to take four general forms - actively allow, actively prohibit, passively allow, or passively prohibit (Policy Department, 2008). Those governments who actively allow or prohibit have passed legislation which deals explicitly with Internet gambling, and those who passively allow or prohibit have not enacted any specific legislation, or have chosen to apply any pre-existing gaming regulation to this new gambling medium (Policy Department, 2008). In the United Kingdom, for example, online gambling was actively allowed, in Cyprus<sup>1</sup> it was passively allowed, and in Germany it was actively prohibited. In predominantly Muslim countries where Sharia Law reigns, Internet gambling is passively prohibited since the Muslim religion bans all forms of gambling. Thus, there is no need to create legislation to explicitly ban Internet gaming. In an attempt to enact enforceable laws, the United States took a more vague approach with the Unlawful Internet Gambling Enforcement Act of 2006, which prohibits the transfer of funds from a financial institution to Internet gambling sites for "unlawful Internet gambling" (H.R. 4954, 2006). iMEGA v. Attorney General et al. (2009) determined that "unlawful Internet gambling" referred to the status of brick and mortar gambling policy in the state in which the wager was placed.

Prior literature on brick and mortar casino policy adoptions has helped to identify several categories of predictors for this research question. Calcagno, Walker, and Jackson (2010) used a tobit model to identify several predictors of United States state casino policy adoption in the categories of fiscal variables, majority political party, intra- and inter-jurisdiction competition, and demographic variables. The intra- and inter-jurisdictional competition variable of note, because it is reflective of the neighboring state effect, like is seen in Pennsylvania and New Jersey.<sup>2</sup> In the borderless Internet, every country is able to act as neighbor to any other country in the world, so competition has the potential to exist between any two jurisdictions.

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<sup>1</sup> At the time of this writing, Cyprus grants online gambling licenses under current law but Government is actively discussing tightening their regulations.

<sup>2</sup> Concern that Atlantic City was drawing Pennsylvania residents and their disposable income away from the state was among the primary drivers of expanded gaming in Pennsylvania.

Furlong (1998) also studied United States state casino policy adoption. Using a logistic regression model, he inferred that adoption is affected by ideological identification, per capita tax collections, and longitudinal changes in job growth. Unlike Calcagno (2010), who found the Baptist religion to be a significant demographic indicator, Furlong (1998) did not find that religious affiliation demonstrated any statistically significant effect on casino policy adoption. Richard (2010) approached the research question with a more global perspective, applying a logistic regression model to 13 countries in Europe, Southeast Asia, and South and North America. Richard's (2010) model found that income level, unemployment, tourism targeting, and religious intensity were significant contributors to a country's gambling legality.

## Methods

The following analysis is intended to determine common traits of those countries around the world that have adopted online gambling regulations which either permit or ban the practice for jurisdiction residents. Online lotteries and pari-mutual horse racing are not considered in this study. Neither the USA nor Canada was included in the dataset. Online gambling regulation in these countries is the purview of states/provinces, rather than a national regulation, and the existence of Tribal jurisdictions for gambling offers further policy complications (Canadian Parliament Bill C-150, 1969; *iMEGA v. Attorney General et al.*, 2009).

The literature surrounding brick and mortar casino adoption, as well as online gambling adoption, identified a large number of potential predictor variables. Additional technological indicator variables, such as the number of Internet users and personal computers, were added due to their hypothesized relevance to the necessities of Internet gambling. Hofstede indices, widely recognized as functional cultural indicators, were also selected to represent a means of quantifying sociological measures (Hofstede, 2009). The number of variables was only increased by a variety of transformations applied to time series data, such as compound annual growth rate, natural logarithms, and year over year growth. In the interest of brevity, only significant variables are discussed at length in the results.

## Expression of Criterion Variable

Eighty (80) countries were examined based on the availability of data on the legality of online casino gambling and online poker in 2008. Data indicating legality was obtained from Rose and Owens (2009), Casino City (2010), and Policy Department (2008). Two different dependent variables were coded in a binary format. One variable reflected the legality of online sports betting and another reflected the legality of online casino/poker style gambling. A value of "1" indicated the country legally permitted the online gambling type, and a "0" value if otherwise.<sup>3</sup> "Legality" in this study refers to allowance for the country's residents to gamble, not to permission for gaming companies to operate within the country's borders.

## Expression of Predictor Variables

The independent variable data were compiled from several sources. Economic and demographic predictor variables were retrieved from the International Monetary Fund's 2010 World Economic Outlook Database. Annual economic and demographic variables were measured and data were collected for the years 2000 through 2008. These variables included real Gross Domestic Product (GDP) in domestic currency units, real GDP in US dollars, unemployment rates, government revenues as a percentage of GDP, government expenditures as a percentage of GDP, net government lending/borrowing, population, progression rates to secondary school, and literacy rates. Technology infrastructure variables were retrieved from the International Telecommunications Union's World Telecommunication Development Report and Database. Like the economic and demographic variables, annual technology infrastructure variables were measured and data was collected for the years 2000 through 2008.

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<sup>3</sup> Due to restrictions on data collection, it was unclear in many cases if policy was passive or active. Therefore, we used a binary approach to describe online gambling legality and aggregate passive and active law.

Technology infrastructure variables included Internet users, fixed broadband Internet subscriptions, mobile subscriptions, average bandwidth, and number of personal computers.

Sociological predictor variables were retrieved from Itim International's Geert Hofstede Cultural Dimensions, including the Power Distance Index, Uncertainty Avoidance Index, Masculinity Index, and the Individualism Index. The Long-Term Orientation Index was not included due to the low number of countries with computed values. Detailed descriptions of these indices can be found at Hofstede (2009).

#### Estimation Technique

Due to the presence of two different dependent variables (online sports betting and online casino/poker gaming), which may have correlated error terms, a seemingly unrelated (SUR) bivariate probit regression model was fit to the data. SUR bivariate probit estimation simultaneously estimates two different probit models, but a joint maximum likelihood procedure is used instead of estimating each model separately. Consider:

$$\begin{aligned} Y_{1i}^* &= X_{1i}\beta + \mu_{1i} \\ Y_{1i} &= 1 \text{ if } Y_{1i}^* > 0 \\ Y_{1i} &= 0 \text{ otherwise} \end{aligned}$$

$$\begin{aligned} Y_{2i}^* &= X_{2i}\beta + \mu_{2i} \\ Y_{2i} &= 1 \text{ if } Y_{2i}^* > 0 \\ Y_{2i} &= 0 \text{ otherwise} \end{aligned}$$

In which  $Y_1^*$  represents the estimated probit model for online casino/poker legalization,  $Y_2^*$  represents the estimated probit model for online sports betting legalization,  $X_i$  are the independent variables, and  $\beta$  is the coefficient vector. With two univariate probit model, it is assumed that the errors are distributed  $N(0,1)$ , and it is implicit that the error terms  $\mu_i$  are independent. The bivariate probit model, however, was selected because the decisions to legalize online sports betting and online casino/poker wagering are interrelated, and the error terms  $\mu_i$  can therefore defined as:

$$\begin{aligned} \mu_{1i} &= \eta_i + \varepsilon_{1i} \\ \mu_{2i} &= \eta_i + \varepsilon_{2i} \end{aligned}$$

In which the model errors are composed in part by error unique to the model ( $\varepsilon_i$ ) and in part by error common to both models ( $\eta_i$ ) (Greene, 2011). Since the unexplained error from the probit regressions may be related for online sports betting legalization and online casino/poker legalization, a joint optimization is preferred due to the efficiency gains in our inference (Wooldridge, 2010).

#### Results

Five independent variables were identified as being related to the observed distribution of online casino gambling and/or poker being legal in the selected countries. List-wise deletion was used to account for missing values, and no split sample was used for analysis as the deletion method reduced the dataset to 47 observed countries. As shown in Appendix B, all variable means with the exception Internet Users per 100 people showed no significant difference in the full sample and the estimated sample means. Potential issues from the Internet users variable are discussed in the limitations section. Countries in which Sharia Law dictates policy were dropped from the model as such law prohibits all gambling and thus these countries did not add any more explanatory value to the model. Overall model fit results are summarized in Table 1. Table 2 displays the model marginal effects. The standard errors of the model were corrected for any arbitrary forms of heteroskedasticity (StataCorp LP, 2009).

The classification precision for online casino and/or poker was 72.3% and the classification precision for online sports betting was 76.6%; the constant-only models predict 51.1% and 66.0% of values respectively. The overall McFadden Pseudo-R<sup>2</sup> value was 0.328.

Table 1  
*Model Coefficients for Seemingly Unrelated Bivariate Probit Regression to Predict Online Casino/Poker and Sports Betting Policy*

	(1) Online Casino/Poker	(1) Online Sports Betting
Government Revenue as a Percentage of Gross Domestic Product (2008)	0.080** (0.29)	0.069* (0.028)
Hofstede Uncertainty Avoidance Index	-.030** (0.012)	-0.036** (0.012)
Christianity as a Percentage of Total Population <sup>t</sup>	0.017* (0.08)	0.022* (0.010)
Internet users (2008, per 100 people)	-0.033* (0.013)	-0.009 (0.013)
Population (2008, millions)	-0.014* (0.007)	-0.007 (0.005)
Constant	0.241 (1.009)	-0.244 (0.999)

Robust standard errors are shown in parentheses; \*significant at .05 alpha level, \*\*significant at .01 alpha level, <sup>t</sup>Dates vary due to the different census years of each country.

Table 2  
*Seemingly Unrelated Bivariate Probit Regression Model Marginal Effects*

	(1) Online Casino/ Poker =1 Online Sports Betting =1	(2) Online Casino/ Poker =1 Online Sports Betting =0 <sup>s</sup>	(3) Online Casino/ Poker =0 Online Sports Betting =1	(4) Online Casino/ Poker =0 Online Sports Betting =0
Government Revenue as a Percentage of GDP (2008)	0.031** (0.011)	-	-0.006 (0.006)	-0.025** (0.011)
Hofstede Uncertainty Avoidance Index	-0.012* (0.005)	-	-0.001 (0.002)	0.013* (0.005)
Christianity as a Percentage of Total Population <sup>t</sup>	0.007* (0.003)	-	0.001 (0.004)	-0.008* (0.004)
Internet users (2008, per 100 people)	-0.013* (0.005)	-	0.01 (0.005)	0.003 (0.005)
Population (2008, millions)	-0.005* (0.002)	-	0.003 (0.002)	0.002 (0.002)

Robust standard errors are shown in parentheses; \*significant at .05 alpha level, \*\*significant at .01 alpha level. <sup>s</sup>Omitted marginal effects is due to the predicted incidence of Casino/Poker=1 and Sports=0 being zero given sample coefficient estimates. <sup>t</sup>Dates vary due to the different census years of each country.

Three variables, Population, Internet users, and Hofstede UAI, are negatively related to the dependent variable. The marginal effects of Population on Casino/Poker and Sports betting legality (Online Casino/Poker =1 and Online Sports Betting =1), show that a 1% increase in population would decrease the likelihood of a country legally permitting online gambling by 0.5%. In the same model, the marginal effects for Internet users and UAI

show that the likelihood of a country legally permitting online gambling is decreased by 1.3% and 1.2%, respectively with a one unit increase in the respective independent variable.

Government revenue as a percentage of GDP and Christianity as a percentage of the total population are positively related to the dependent variable. The marginal effects for government revenue as a percentage of GDP indicate that a 1% increase in revenue results in a 3.1% increase in the likelihood of online gambling being legal. The marginal effects for Christianity as a percentage of the total population show that a 1% increase will result in a 0.7% increase in the likelihood of legal online gambling.

#### Discussion

The results from this model specification reasonably identify indicators of online gambling legality. Variables consistent with those found in previous literature, as well as Internet-specific variables, were found to be significant indicators of policy adoption.

The negative relationship between population and online casino/poker gambling policy may reflect the number of small countries that have sought to license online gaming to increase net exports from larger markets. Some small countries also may lack the political, technological, and economic infrastructure to effectively restrict this industry.

The positive coefficient estimate of government revenue as a percentage of GDP suggests that proportionally larger governments will be more likely to adopt legal online gambling. Larger governments indicate that a country draws in more from taxation and other income sources. This variable finding is similar to some of the state level fiscal variable findings in Furlong (1998) and Calcagno et al. (2010). Larger governments also would be expected to provide more to their constituents in the form of public goods and state sponsored quasi-public goods such as universal healthcare and social safety nets, which may make voters less risk adverse to potential problem gambling issues.

The negative relationship between Internet users and legality of online casino/poker gaming could be explained by the irrelevance of policy action for technologically underdeveloped nations – countries whose populace has limited access to the Internet, and therefore to online gaming, have little need to take action against it. Online gaming, therefore, may tend to be passively allowed. In more developed countries, if gambling was illegal prior to major technological advances, there may be loopholes in the law that passively allows gambling. Thus, new regulations had to be put in place to close the loopholes, resulting in active prohibition. The absence of significance in online sports betting alone may indicate a prior comfort with those activities, that is unaffected by emerging technological access. Whereas the introduction of online sites may be the first introduction of casino style games to many jurisdictions, sports and betting on sports have been prevalent in cultures throughout history (Binde, 2005).

The Hofstede Uncertainty Avoidance Index (UAI) is negatively related to the legal status of online gambling. The UAI describes the extent to which a culture programs its members to feel either uncomfortable or comfortable in unstructured situations (Hofstede, 2009). Uncertainty avoiding countries try to minimize unstructured situations by enforcing strict laws and rules, and are less likely to be tolerant of opinions different from what they are used to. Gambling has been marked for years by ubiquitous condemnation of the activity; many cultures have treated it as a “deviant” activity (Reith, 2007; Bernhard, 2007). Because a higher UAI value indicates a culture’s lower tolerance of uncertainty, the negative relationship between UAI and legality of gambling is expected.

The negative relationship of percentage of Christianity in the population with the dependent variable reveals itself conversely as a non-Christian negative coefficient. Religions like Buddhism and Hinduism ban gaming, and in countries where those religions are more prevalent, we may be more likely to see the religious morality influence gambling policy decisions.

## Conclusion

The findings from this study provide a basis from which future research on gambling adoption, and in particular, online gambling, can be built. Demographic, technologic, economic, and sociologic characteristics were found to influence the adoption of online gambling. In addition, the results from the bivariate probit regression analysis further supported findings from prior literature that fiscal budgetary needs are an important consideration in government adoption of gambling policy.

Regarding practical applications of this model, these findings may be used by online gaming operators to focus the direction of their marketing efforts. Countries whose socio-economic characteristics are more receptive to online gambling may produce higher returns on investment for these operators than jurisdictions where online gambling is less likely to be legally allowed. The findings may also assist other stakeholders to evaluate the probability of success of lobbying efforts to either adopt legal online gambling or to ban online gambling altogether.

## Limitations

Due to the use of a binary method to define the dependent variable, some subtleties of online gambling legality could not be captured in this study. As mentioned in the introduction, some countries have actively legalized or banned online gambling, while others chose a more passive approach to regulation. Some countries provided other challenges to data analysis, as they permit some forms of online gambling, such as lotteries and pari-mutuel wagers, but ban other forms, including casinos and poker rooms. The precise legal status of online gambling in these countries may not have been accurately captured in the model derived here.

Although social factors were used, no variables reflecting the cross-jurisdictional implication of problem gambling addiction and social responsibility were considered in the model. Moral objections to gambling appeared indirectly in the model in the form of religion independent variables, but only a general cultural indicator, the Hofstede Uncertainty Avoidance Index, was used to account for cultural preferences for online gambling. No gambling specific index was tested.

Restrictions on data availability limited our ability to examine the timing of policy changes, as well as the sample of countries examined. In addition, no countries which regulate gambling at a state or provincial level were included in the model. There may have been time related variables that failed to be captured by this model, since it merely provided a cross section of the online gambling timeline, and therefore lacked temporal variability.

Any systematic difference in the sample group of countries included in this study may limit the generalizability of the findings to other nations. Appendix A provides a test of differences in means between the variables used in the estimation sample and the overall sampling frame of countries. Although most variables suggest no significant difference, the mean of internet user rates in the estimation sample does differ significantly from the mean of the 1999 country sampling frame. Nevertheless, the results do provide a greater understanding of factors that contribute to a country's decision to permit or ban Internet gambling.

## Future Research

In addition to continuing to test the findings from this study in replicated research, future studies should examine methodologies that explain the differences in active and passive policy decisions. Alternative explanatory variables, such as non-discrete brick and mortar measurements (e.g. slot machines per capita) and cultural social responsibility concerns (e.g. survey results of populace legal gambling preferences), should be tested in future studies, as theories of online gambling adoption continue to evolve. Research from the point of view of an operator would also be beneficial, as in some countries online gambling licenses are offered but its citizens cannot wager on those sites.

The adoption of other forms of online gambling, in particular, lotteries and pari-mutuel wagering, should be explored, as this study focused only on casino/poker games and sports betting. Temporal studies utilizing panel data

sets to analyze timing of legalization could be used to avoid missing information that may happen while looking at only a cross-section. Finally, as data for other jurisdictions becomes available, a wider scope of countries should be included to recalibrate the adoption model. This could also include states and provinces in countries such as the United States and Canada (respectively), which have some autonomy over the legality of online gambling.

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**Appendix A**  
**Summary Statistics and Test of Difference in Full Sample and Estimation Sample Means**

	Full Sample Mean	Full Sample Size	Estimation Sample Mean	Estimation Sample Standard Deviation	Min	Max	T-Stat of Difference in Estimation Sample Mean	P-Value
Legal Online Casino/Poker Indicator <sup>i</sup>	0.549	n=71	0.511	0.505	0	1	-0.524	0.345
Legal Online Sports Betting Indicator <sup>ii</sup>	0.657	n=70	0.660	0.479	0	1	0.035	0.397
Government Revenue as a Percentage of GDP (2008) <sup>iii</sup>	35.097	n=182	35.582	10.229	15.827	59.74	0.325	0.376
Hofstede Uncertainty Avoidance Index <sup>iv</sup>	65.398	n=83	64.213	24.806	8	112	-0.327	0.376
Christianity as a Percentage of Total Population <sup>v</sup>	67.176	n=72	64.364	32.802	0.7	100	-0.588	0.333
Population (2008, millions) <sup>vi</sup>	50.477	n=88	62.236	172.970	0.413	1182.06	0.466	0.355
Internet users (2008, per 100 people) <sup>vii</sup>	28.489	n=199	51.033	25.377	1.22	87.70	6.090	0.000

\*Estimation sample size is n=47; <sup>i</sup>Compiled from Rose and Owens (2009), Casino City (2010), and Policy Department (2008); <sup>ii</sup>Compiled from Rose and Owens (2009), Casino City (2010), and Policy Department (2008); <sup>iii</sup>All countries taken from International Monetary Fund (2010); <sup>iv</sup>All countries taken from Hofstede, G. (2009); <sup>v</sup>All countries taken from Central Intelligence Agency (2010); <sup>vi</sup>All countries taken from International Monetary Fund (2010); <sup>vii</sup>All countries taken from International Telecommunication Union (2010).