

# THE DETERMINANTS OF ILLEGAL GAMBLING IN ITALY: AN EMPIRICAL INVESTIGATION AT A PROVINCIAL LEVEL

Amedeo Argentiero<sup>1</sup>

Alessio D'Amato<sup>2</sup>

Anna Rita Germani<sup>3</sup>

## ABSTRACT

In this paper, using a set of explanatory variables (enforcement variables, legal gambling, crime rate, income, education, unemployment and other socioeconomic and demographic variables) we aim to investigate the determinants of illegal gambling in the Italian provinces (NUTS-3 level), over the period 2015-2023, driven by the two following research questions: i) what are the main determinants of the illegal gambling market in Italy over the period, and ii) whether legal gambling acts as a substitute of illegal gambling or represents a further incentive for illegal gamblers. Italy represents a compelling case study because of the strong presence of organized crime systems (Scarpinato, 2008) in the illegal markets. Although previous studies on the dynamics of gambling exist, no other study, as far as we know, has evaluated the socio-economic-demographic correlates of illegal gambling patterns in Italy. The results of this study might have important implications in order to develop sound policies related to gambling in the country.

*Keywords:* illegal gambling, legal gambling, crime rate, enforcement.

*JEL classifications:* C33, D12, K42.

---

<sup>1</sup> University of International Studies of Rome – UNINT, Department of International Humanities and Social Sciences, e-mail: [amedeo.argentiero@unint.eu](mailto:amedeo.argentiero@unint.eu). Via Cristoforo Colombo 200, 00147 Rome, Italy.

<sup>2</sup> University of Rome Tor Vergata, Department of Economics and Finance, and SEEDS, Italy – email: [damato@economia.uniroma2.it](mailto:damato@economia.uniroma2.it)

<sup>3</sup> Sapienza University of Rome, Department of Legal and Economic Studies – email: [annarita.germani@uniroma1.it](mailto:annarita.germani@uniroma1.it)

## 1. Introduction

Illegal gambling represents an important challenge for regulatory authorities and policymakers with implications that range from economic distortions to social costs, and understanding its determinants is crucial for effective policy formulation and enforcement. Over the past decades, the Italian gambling sector has experienced a remarkable growth as a result of numerous interventions toward an increasing legalisation and liberalisation of gambling activities. In Italy, after 2003, the legal gambling market has, in fact, hugely expanded due to an extensive deregulation and liberalization process (with the aim of fighting against illegal gambling and collecting an increasing amount of tax revenues) and to the increasing introduction of new games and services (i.e., *slot machines* or *newslot*). Illegal gambling activities include counterfeit games (such as ‘scratch and win’ coupons), the management of unauthorized bet collection points, illegal lotteries, illegal gambling houses, and the alteration of gaming machines. With the booming of the gambling market, several products have been legalized such as online skill games in 2008, video-lotteries in 2009, new instant lottery tickets, on-line poker in 2011.

In Italy, the regulatory framework governing legal gambling activities has been shaped, over the years, by a series of normative changes aimed at balancing consumer protection with social responsibility; in 2006, the Italian government established the Agenzia delle Dogane e dei Monopoli (ADM) as the regulatory authority responsible for overseeing and licensing gambling activities in the country. ADM was tasked with enforcing regulations, issuing licenses, and combating illegal gambling. During the early 2000s, Italy embarked on a path of liberalization, transitioning from a state-controlled monopoly to a more open and competitive gambling market. This shift allowed for the introduction of online gambling, sports betting, and other forms of gaming. Italy enacted a new law in 2006 to regulate remote gambling, including online betting and gaming, with which required operators to obtain licenses from ADM and comply with strict regulatory requirements, such as player protection measures and responsible gambling initiatives. Over the years, Italy has strengthened its oversight of gambling activities to protect

consumers and vulnerable people, including measures to promote responsible gaming practices. Nowadays, Italy is the first country in Europe for gambling expenditures (net of winnings); at a global level, it is fourth behind USA, China, and Japan (Economist Data Team, 2022). Despite the alleged importance of the illegal gambling sector, there are no reliable estimates of its actual size. According to the ADM and to the National Anti-Mafia Directorate (2022), the turnover is estimated to amount around €25 billion per year but, in reality, its true size is, in fact, still unknown.

## **2. Main related literature review**

Since Becker's (1968) pioneering work based on the rational decision of a utility-maximizing individual who decides whether or not to commit a crime, taking into account the probability of being arrested and punished and the magnitude of the sanction, the economics of crime has shifted toward a more flexible approach (Argentiero *et al.*, 2020) in which several socio-economic and demographic variables can play a role in explaining criminal offences (e.g., Glaeser and Sacerdote, 1999; Fajnzylber *et al.*, 1999, 2002; Buonanno, 2003; Buonanno and Leonida, 2009; Draca *et al.*, 2011). However, the theoretical and empirical literature has given limited attention to illegal gambling and on the determinants of illegal gambling there is still a lack of attention, which is surprising given the increasing relevance and dimensions that the phenomenon is gaining in contemporary societies, where the growing internationalization of markets has provided greater opportunities for criminals to enter the illegal markets. This calls the need to carry out theoretical and empirical analyses to shed light not only on the socio-economic, demographic, and deterrence factors that can influence illegal gambling, but also on the related enforcement and institutional policies. Indeed, the economic literature with specific reference to Italy (see table below) focuses mostly on the determinants of legal gambling and its relations with other criminal activities.

Most relevant references (selected specifically with regard to Italy)	Dependent variable	Main objective(s)	Time-range
<b>Monarca U., E. Cassetta, C. R. Nava, R. Pittiglio (2022).</b> Illegal gambling: measuring the market using the MIMIC model, <i>Regional Studies</i>	Amount of illegal gambling	Estimate the magnitude of the illegal gambling market in Italy at regional level	2013-2018
<b>Matteucci N. (2022).</b> Il boom italiano del gioco d'azzardo: mercato, istituzioni e politiche, <i>Stato e Mercato</i>	No econometrics	Understand the drivers and the likely effects of the Italian gambling sector boom	
<b>Marinaci T., C. Venuleo, L. Ferrante, S. Della Bona (2021).</b> What game we are playing: the psychosocial context of problem gambling, problem gaming and poor well-being among Italian high school students, <i>Heliyon</i>	Problem gambling, problem gaming and well-being	Explore the role of the qualities of relational networks (i.e. family, perceived social and class support), in predicting problem gambling, problem gaming and overall well-being among adolescents.	Data collected through surveys
<b>Resce G., R. Lagravinese, E. Benedetti, S. Molinaro (2019).</b> Income-related inequality in gambling: evidence from Italy, <i>Review of Economics of the Households</i>	Level of income inequality in gambling activity (Erreygers Index)	Investigate who is paying the increasing revenues and the increasing social costs associated to the spread of gambling	2014-2017
<b>Gandullia L., L. Leporatti (2018).</b> The demand for gambling in Italian regions and its distributional consequences, <i>Papers in Regional Science</i>	Per capita expenditure for each type of gambling products (i.e., entertainment machines, lotto, horse racing, sports betting, and lotteries)	Analyse i) the territorial distribution of the gambling consumption and ii) how the socio-economic characteristics of the Italian regions impact the consumption of the different games	2012-2015
<b>Di Bella E., L. Gandullia, L. Leporatti (2015).</b> The impact of gambling on government budget: a European comparison with a focus on Italy, <i>Economia Internazionale/International Economics</i>	Total tax revenues on gambling revenues controlling for socio, demographic and economic variables	<ul style="list-style-type: none"> <li>- Compare the main institutional and tax differences in selected EU countries</li> <li>- Analyse the impact of this heterogeneity in regulation on the tax revenue collected by governments</li> </ul>	1995-2012
<b>Calderoni F., S. Favarin, L. Garofalo, F. Sarno (2014).</b> Counterfeiting, illegal firearms, gambling and waste management: and exploratory estimation of four criminal markets, <i>Global Crime</i>	No econometrics	Provide exploratory methodologies with which to estimate the size and proceeds of four illegal markets: firearms trafficking, counterfeiting, gambling and waste management	

With reference to Italy, the investigation of the determinants of legal gambling is increasingly attracting the attention of economics scholars (see e.g. Resce *et al.*, 2019), and the criminological literature copes widely with the study of the causes and the effects of gambling. However, despite these relevant contributions the examination of the determinants of illegal gambling is still an underdeveloped area of research in Italy, due to the limited availability of data. Against this backdrop, our contribution aims to disentangle the relation between illegal and legal gambling. Building on the insights by Monarca *et al.* (2022) which apply a structural model of MIMIC on a set of regional data (NUTS-2 level) covering the period 2013-18, we aim to further advance the investigation by using a novel and original dataset on both illegal and legal gambling at provincial level (NUTS-3) over the period 2015-2013. Our two main research questions are the following: i) What are the main determinants of the illegal gambling market in Italy? and ii) Is there a substitutive rather than a complementary relationship between legal and illegal gambling activity?

Therefore, in this work, we aim to investigate, the “push” (acting as deterrents) and the “pull” factors (acting as attractors) namely if, and to what extent, legal gambling can affect illegal gambling activities, while controlling for socio-economic, enforcement and judicial provincial heterogeneity, to contribute to a broader understanding of illegal gambling as a socio-economic phenomenon, shedding light on the intricate interplay between the socio-economic and institutional characteristics able to influence the illicit gambling market. It is hoped that our empirical findings will be translated into practical applications to fight illegal gambling in Italy; this result could be in line with the idea that we can make illegal gambling less worthwhile by fighting legal gambling and corruption.

### **3. Conceptual framework**

The aim of this section is to provide a conceptual background to our analysis. Although it is not possible to analytically quantify the impact of illegal gambling on legal gambling activities (for obvious lack of data availability), we can think to a logical model underneath our

main research question. The conceptual framework is kept as simple as possible. We model a representative agent involved in consumption of a private good  $x$ , which is our numeraire, and spending money in legal and illegal gambling, which are labelled as  $g_L$  and  $g_I$  respectively. The representative agent is assumed to maximize the following utility function:

$$U(x, g_L, g_I) = x + u(g_L, g_I) \quad (1)$$

subject to a standard budget constraint:

$$x + P_L g_L + P_I g_I = Y \quad (2)$$

where  $Y$  is exogenous income, while  $P_L$  is the unit price of legal gambling (which includes taxes), while  $P_I$  is the price of illegal gambling, which includes an expected fine, so that it increases with the probability of being discovered and the related monetary value of the punishment, as measures of illegal gambling-related enforcement<sup>4</sup>. We disregard, in this very simple preliminary formulation, the impact of gambling on revenues/income. This may be justified by the “behavioural” assumption that gambling is not performed to earn money as the first objective, or by considering the prices as “net” prices (that is, net of losses/wins)<sup>5</sup>.

The utility function  $u(.)$  satisfies standard concavity assumptions. By solving (2) for  $x$  and substituting in (1), we get the following first order conditions, for legal and illegal gambling respectively<sup>6</sup>:

$$-P_L + u_L(.) = 0 \quad (3)$$

$$-P_I + u_I(.) = 0 \quad (4)$$

Under standard concavity assumptions for the utility function, we can therefore get the following comparative statics results.

---

<sup>4</sup> This argument follows the standard literature on public enforcement of law, as in Polinsky and Shavell (1999).

<sup>5</sup> In this latter case, we need of course to assume that prices are positive.

<sup>6</sup> We limit our attention to interior solutions.

A first straightforward result is  $\frac{dg_L}{dP_L} < 0$  and  $\frac{dg_I}{dP_I} < 0$ , namely legal (illegal) gambling decrease with own price. This clearly implies that any factor increases prices will reduce gambling. So, for example, a stronger enforcement, increasing  $P_I$  through an increase in the expected fine is expected to decrease illegal gambling. The same holds for an increase in legal gambling taxes, which are expected to reduce legal gambling through an increase in the corresponding price.

A more interesting, though expected results, has to do with the impact of changes in illegal (legal) gambling when legal (illegal) prices change. We can prove the following result.

**Proposition 1.** *Under standard assumptions for the utility function, an increase in the price of legal (illegal) gambling may increase or decrease illegal (legal) gambling.*

**Proof.** Standard comparative statics implies that  $\frac{dg_L}{dP_I} = \frac{dg_I}{dP_L} = -\frac{u_{LI}}{|H|}$ , where  $|H| > 0$  is the determinant of the Hessian matrix, and  $u_{LI}$  is the cross derivative of the utility function.

As a result, if the two types of gambling are complements in the utility function, so that  $u_{LI} > 0$  then an increase in the price of legal (illegal) gambling implies a decrease in illegal (legal) gambling, while the opposite happens for  $u_{LI} < 0$ .

This might have important implications for policy, as it is possible that, for example, an increase in the tax on legal gambling increases illegal gambling, while a more stringent enforcement on illegal gambling may increase legal gambling. The possible complementarity will be subject to empirical scrutiny in the following sections.

#### 4. Variable description and data sources

Variable	Description	Source
<i>Dependent variable</i>		
Illegal gambling	denunce in violazione delle norme sul gioco d'azzardo	Ministero dell'Interno
<i>Explanatory variables</i>		
Legal gambling	amount of both physical and online gambling (in €)	ADM
Social capital	blood donors and blood donations	AVIS
Education	share of students of secondary schools above the «legal» age: ishare of students above 13 in first degree secondary school, and share of students above 18 in second degree secondary school	ISTAT
Employment rate	rate of employment	ISTAT
<i>Other controls</i>		
Gambling firms (IV)	number of firms active in legal gambling activity in a given province	
Total added value	per capita added value at provincial level (in million €, at current prices)	ISTAT
Bank deposits		BANK OF ITALY
Population	resident population as of 31 December by province	ISTAT
Area	extension of the territory of the province in square kilometers	ISTAT

#### 5. Very preliminary results

**Independent variable: physical legal gambling**

<i>log_illegal</i>	Coefficient	Robust std. err.	z	P> z	[95% conf. interval]
--------------------	-------------	------------------	---	------	----------------------



<i>log_legal</i>	.7031206	.2220003	3.17	0.002	.268008	1.138233
<i>log_pop</i>	1.137438	.4500549	2.53	0.011	.2553468	2.01953
<i>log_bank</i>	.1577081	.3745252	0.42	0.674	-.5763478	.8917641
<i>log_va</i>	-1.279682	.5113879	-2.50	0.012	-2.281983	-.2773797
<i>log_donors</i>	.007387	.0335478	0.22	0.826	-.0583654	.0731394
<i>share_overage_13</i>	.0036317	5.793941	0.00	0.999	-11.35228	11.35955
<i>_cons</i>	-18.20707	3.721989	-4.89	0.000	-25.50203	-10.9121

**Independent variable: online legal gambling**

<i>log_illegal</i>	Coefficient	Robust std. err.	z	P> z	[95% conf. interval]	
<i>log_online</i>	.172214	.0870523	1.98	0.048	.0015946	.3428335
<i>log_pop</i>	1.745806	.3697019	4.72	0.000	1.021204	2.470409
<i>log_bank</i>	-.3155085	.404323	-0.78	0.435	-1.107967	.47695
<i>log_va</i>	-.7999584	.5518919	-1.45	0.147	-1.881647	.2817299
<i>log_donors</i>	-.0014735	.0311283	-0.05	0.962	-.0624838	.0595369
<i>share_overage_13</i>	1.083948	6.481169	0.17	0.867	-11.61891	13.78681
<i>_cons</i>	-12.85965	3.849563	-3.34	0.001	-20.40465	-5.314641

- Both physical and online legal gambling have expected signs and are consistent with the findings by Monarca et al. (2022)
- We tried alternative specifications where:
  - blood donors are replaced by blood donations
  - share of students above 13 is replaced by those above 18 in second level secondary schools

- Results are confirmed
- Still preliminary but «encouraging» (and, to our knowledge, novel!)

## References (to be completed)

- Argentiero, A., Chiarini, B., & Marzano, E. (2020). Does tax evasion affect economic crime? *Fiscal Studies*, 41(2), 441-482.
- Becker, G. S. (1968). Crime and punishment: An economic approach. *Journal of political economy*, 76(2), 169-217.
- Buonanno, P. (2003). The socioeconomic determinants of crime. A review of the literature. *Working Paper Dipartimento di Economia Politica, Università di Milano Bicocca*; 63.
- Buonanno, P., & Leonida, L. (2009). Non-market effects of education on crime: Evidence from Italian regions. *Economics of Education Review*, 28(1), 11-17.
- Calderoni F., S. Favarin, L. Garofalo, F. Sarno (2014). Counterfeiting, illegal firearms, gambling and waste management: and exploratory estimation of four criminal markets, *Global Crime*
- Di Bella E., L. Gandullia, L. Leporatti (2015). The impact of gambling on government budget: a European comparison with a focus on Italy, *Economia Internazionale/International Economics*
- Draca, M., Machin, S., & Witt, R. (2011). Panic on the streets of London: Police, crime, and the July 2005 terror attacks. *American Economic Review*, 101(5), 2157-2181.
- Fajnzylber, P., Lederman, D., & Loayza, N. (1999). The Causes of Crime and Violence: A Guide for Empirical Researchers. Retrieved July, 14, 2003.
- Fajnzylber, P., Lederman, D., & Loayza, N. (2002). What causes violent crime? *European Economic Review*, 46(7), 1323-1357.
- Gandullia L., L. Leporatti (2018). The demand for gambling in Italian regions and its distributional consequences, *Papers in Regional Science*
- Glaeser, E. L., & Sacerdote, B. (1999). Why is there more crime in cities? *Journal of Political Economy*, 107(S6), S225-S258.
- Marinaci T., C. Venuleo, L. Ferrante, S. Della Bona (2021). What game we are playing: the psychosocial context of problem gambling, problem gaming and poor well-being among Italian high school students, *Heliyon*

- Matteucci N. (2022). Il boom italiano del gioco d'azzardo: mercato, istituzioni e politiche, *Stato e Mercato*
- Monarca U., E. Cassetta, C. R. Nava, R. Pittiglio (2022). Illegal gambling: measuring the market using the MIMIC model, *Regional Studies*
- Resce, G., Lagravinese, R., Benedetti, E., & Molinaro, S. (2019). Income-related inequality in gambling: evidence from Italy. *Review of Economics of the Household*, 17, 1107-1131.
- Scarpinato, R. (2008). Sistemi criminali. *Questione giustizia: bimestrale promosso da Magistratura Democratica. Fascicolo 3, 2008*, 1000-1017.