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# Impact of Spanish gambling regulations on online gambling behavior and marketing strategies

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## Abstract

**Background** A large body of research has pointed out that advertising has an impact on gambling behavior. However, little is known about how actual gambling marketing regulations impact online gambling behavior and marketing expenditure. Recently, a Spanish law—the Royal Decree 958/2020—came into force, which, in general terms, limits the marketing of gambling products. The current study aimed to examine the effect of the Spanish Royal Decree 958/2020 on gambling behavior (i.e., new accounts, active accounts, deposits, and total money bet) and marketing expenditure (i.e., advertising, bonuses, affiliation, and sponsorship) based on data from the Directorate General for Regulation of Gambling.

**Methods** We used Seasonal Autoregressive Integrated Moving Average (SARIMA) models to examine the impact of the implementation of Royal Decree 958/2020 on both online gambling behavior and marketing expenditure.

**Results** The entry into force of the Spanish Royal Decree (applied between November 2020 and August 2021) led to a permanent decrease in gambling behavior, in particular new accounts (-263k; $p = .003$) and total money bet (-€216M; $p = .034$). Additionally, regulatory measures had an impact on marketing strategies, specifically, reducing money earmarked for advertising (-€20M; $p = .004$), bonuses (-€2.6M; $p = .048$), and sponsorship (-€5.3M; $p < .001$).

**Conclusion** These findings demonstrate that regulatory measures aimed at limiting gambling advertising, bonuses, and sponsorships impact new accounts (i.e., new gamblers) and total money gambled, but hardly active accounts (i.e., regular gamblers). This study can serve as a model for countries where gambling advertisements have not yet been regulated.

**Keywords** Gambling, Marketing, Advertising, Sponsorship, Regulatory measures

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## Background

Gambling, a widespread social activity worldwide, is a highly addictive activity and is recognized as a behavioral disorder with significant public health implications, defined by persistent, compulsive, and maladaptive gambling patterns continuing despite clinically significant consequences (e.g., job loss, impairment of important personal relationships, financial debt, and emotional distress) [1]. Gambling entails important consequences in terms of mental health (e.g., depression, anxiety), including substance use [2, 3]. However, gambling not only has an impact on the health of gamblers but also has a significant social impact [4], as it affects personal and family relationships [5, 6], academic performance [7], and can have serious financial consequences [8]. Consequently, interest in studying this addictive behavior has arisen in recent years to mitigate its impact on individuals' well-being and their relatives, particularly among adolescents and young people.

In the Spanish general population aged 15 to 64, past-year gambling participation reached 53.8%, with 52.9% engaging in offline gambling and 5.5% in online gambling. Online gambling refers to the act of betting or wagering on games, sports, or events via the Internet, typically through websites or platforms offering several forms of gambling activities. Among offline gambling activities, lotteries (e.g., the EuroMillions lottery) were the most prevalent (99.0%), followed by instant lotteries, such as scratch cards (30.9%), and pool betting (11.7%). On the contrary, online gambling was primarily characterized by sports betting (36.0%), followed by lotteries (the same as offline lotteries) (33.0%) and card games (e.g., blackjack, poker) (19.2%). In contrast, gambling participation among adolescents exhibited distinct patterns. Specifically, 21.5% reported gambling in the past year, with 17.7% engaging in offline gambling and 10.7% in online gambling. Among offline gambling activities in the adolescent population, lotteries were the most prevalent (40.6%), followed by bingo (35.9%) and instant lotteries (33.6%). In the online modality, the most common forms of gambling were video games with gambling elements (i.e., loot boxes) (51.5%), sports betting (35.2%), and cryptocurrency (26.8%) [9]. Notably, in Spain, most gambling activities are regulated and require a license, including betting exchanges, competitions, bingo, blackjack, poker, slot machines, and roulette, among others [10]. As of now, a total of 77 licensed operators are authorized to offer online gambling services in the country [11], and to our knowledge, there is an absence of reliable data concerning the extent of the unregulated or illegal gambling market.

Traditional frameworks present an idiosyncratic model, focusing on the study of individual variables, such as sociodemographic characteristics (e.g., age, socioeconomic status), psychological variables (e.g., impulsive choice, mental health), or gambling-related variables (e.g., type of gambling), to explain the mechanism underlying the development of a gambling disorder [2, 3, 12]. However, recent research has attempted to understand gambling from a broader perspective by analyzing contextual, commercial, sociocultural, and environmental variables [13–16]. One such variable is gambling marketing, which includes advertising, promotion (i.e., bonus), affiliate programs, and sponsorship.

A large body of research has shown that marketing has an impact on gambling behavior [17, 18], particularly among vulnerable populations, such as young people [19] and individuals with gambling disorder [20–23]. Studies have consistently shown that advertising leads to the normalization of gambling [24], increases loss of control, and reduces risk perception [25]. Moreover, advertising increases the probability of gambling, the time spent gambling, the gambling frequency, the amount of money gambled, and problem gambling [17, 23, 26, 27].

Several variables might explain the impact of advertising on gambling behavior. Both quantitative and qualitative studies report that one of the marketing strategies that most impact gambling behavior is bonuses, which include personalized promotions (e.g., free bets) at a specific time (e.g., in the next hour) [26, 28–30]. Furthermore, online gambling advertisements (e.g., websites, pop-ups, social media) have a greater impact on gambling behavior compared to traditional media (e.g., TV) [31], given their interactivity (e.g., direct access to the webpage) and how they adapt to the characteristics of the person (e.g., their gambling behavior, age, gender) [32, 33].

In the field of substance use, regulatory measures, such as price adjustments, marketing restrictions, and limited accessibility (e.g., prohibition for minors), have demonstrated a significant impact on substance consumption, including tobacco [34–36], alcohol [37, 38], and sugary beverages [39]. In this line, several studies have called for the need to conduct legislative measures to regulate gambling, with special emphasis on advertising, promotion, and sponsorship [40–43].

To our knowledge, there are very few studies that examine the impact of regulatory measures on gambling behavior. On one hand, several studies have examined the effect of the ban on electronic gaming machines in Norway on gambling, concluding that gambling participation, frequency, and related problems were significantly reduced [44–48]. On the other hand, Planzer et al. (2014) investigated the relationship between gambling policies and gambling disorder in Europe and found that there is no association between prohibitions against online gambling and the minimum age for engaging in gambling and developing gambling disorders [49]. It is

worth noting that the study was carried out in 2014, and since then, gambling legislation has been meaningfully modified. Recently, a preliminary descriptive report concluded that regulatory measures on marketing strategies in the Netherlands have led to a reduction in advertising and visits by non-gamblers. However, no decrease in gambling frequency among gamblers has been observed [50]. Other studies have analyzed the effectiveness of several harm reduction measures, including self-exclusion systems, on-screen messages, the removal of ATMs, and the implementation of maximum bet amounts, among others [51–53]. Although these studies do not examine the impact of a specific law, the measures mentioned are effective in reducing harm to gamblers and could be included within legal regulations.

In this vein, Spain enacted Royal Decree 958/2020 in November 2020 [54], a law that regulates, on the one hand, the conditions under which gambling operators can conduct advertising, sponsorship, promotion, or any other form of commercial communication of their activity; and on the other hand, the conditions to develop certain responsible gambling policies and the protection of gamblers. Specifically, the Royal Decree includes restrictions on advertising, with radio, television, and video platforms (e.g., YouTube) limited to the hours between 1 am and 5 am. The use of celebrities in commercial communications is prohibited, as well as sponsorship of sports teams (e.g., on shirts or in stadiums). Additionally, promotions aimed at attracting new customers are banned. Gambling operators are required to identify at-risk gamblers and implement and promote self-exclusion systems. Furthermore, deposit limits are set, capping the amount a gambler can deposit at €600 per day, €1,500 per week, and €3,000 per month.

The current study aimed to examine the effect of the Spanish Royal Decree 958/2020 on gambling behavior (i.e., new accounts, active accounts, deposits, and total money bet) and marketing expenditure (i.e., advertising, bonuses, affiliation, and sponsorship) using official data from the Directorate General for Regulation of Gambling, which is part of the Spanish Ministry of Consumer Affairs.

## Methods

### Data sources

The Directorate General for the Regulation of Gambling (*Dirección General de Ordenación de Juego*), within the Spanish Ministry of Consumer Affairs, provides quarterly data on the online gambling market throughout Spain. The dataset comprises the activities performed by licensed gambling operators in Spain. These online gambling data were collected from company reports and aggregated by the Directorate General for the Regulation of Gambling. This study employs a time series covering data from January 2013 to December 2023.

### Study variables

The study considered eight dependent variables, four of which related to online gambling behavior and the remaining four related to marketing strategies.

The gambling behavior-related variables included the following: (1) active accounts, that is, the number of accounts in which at least one bet has been placed in a month; (2) new accounts, that is, the number of new user registrations in which at least one deposit has been made; (3) deposits, i.e., the total amount of money (in euros) credited into gambling accounts; and (4) the total amount of money bet (in euros), that is, the total expenditure bet by gamblers to participate in gambling. The total amount bet is not a reflection of the real expenditure, since part of the participation comes from prizes won and bonuses.

Marketing-related variables were: (1) advertising expenditures, that is, total amounts spent by gambling operators to spread their brand and/or services through the traditional media or the Internet; (2) bonus expenditures, which is the total amounts spent by gambling operators to promote participation in gambling, as well as customer loyalty through released bonuses, discounts and similar mechanisms; (3) sponsorship expenditures, that is, total amounts spent by gambling operators in the financing of goods, activities or events, to promote its name, brand, image, activities or products; and (4) affiliation expenditures, which is the total amounts spent by gambling operators on individuals promoting their services and products and diverting traffic from their digital media (e.g., streaming channel) to the gambling operators' websites.

Given that the regulations contained in the Royal Decree came into force progressively from its approval in November 2020 until August 2021, an event (independent variable) was considered for each quarter for the last quarter of 2020 and the first three quarters of 2021. In other words, the study's independent variables consisted of four possible events related to the Royal Decree 958/2020 implementation, in particular, (1) October – December 2020 (Q4 2020), (2) January – March 2021 (Q1 2021), (3) April – June 2021 (Q2 2021), and (4) July – September 2021 (Q3 2021).

### Statistical analysis

The dependent variables are expressed in total amounts (e.g., accounts or money) per quarter, with the only exception of the active accounts variable, where the monthly average is used to avoid overestimating this value (as many active accounts remain the same across quarters). Descriptive analyses (Table 1) were conducted to calculate the sum of each dependent variable for each

**Table 1** Number of new and active accounts, total money bet, and marketing-related variables (i.e., advertising, bonus, affiliation and sponsorship)

| | New accounts | Active accounts[a] | Deposits | Total money bet | Advertising | Bonus | Affiliation | Sponsorship |
|---|---|---|---|---|---|---|---|---|
| 2013 | 1,291,324 | 278,873 | 469,444,777 | 5,543,093,752 | 66,999,762 | 30,219,742 | 11,715,257 | 1,553,702 |
| 2014 | 1,283,642 | 361,078 | 580,552,880 | 6,506,479,126 | 72,120,695 | 27,897,364 | 12,505,456 | 950,948 |
| 2015 | 1,406,226 | 409,842 | 771,410,666 | 8,540,630,873 | 82,565,797 | 37,280,304 | 13,889,864 | 324,218 |
| 2016 | 1,903,738 | 575,106 | 1,084,599,635 | 10,876,370,479 | 113,136,055 | 89,886,576 | 19,529,851 | 3,566,827 |
| 2017 | 1,969,377 | 649,431 | 1,369,930,653 | 13,035,542,842 | 101,337,701 | 84,915,476 | 22,022,744 | 9,233,126 |
| 2018 | 2,559,304 | 831,580 | 1,720,635,500 | 16,707,238,379 | 164,137,428 | 112,090,640 | 30,718,724 | 13,857,530 |
| 2019 | 2,826,167 | 903,272 | 1,893,154,597 | 17,981,032,130 | 175,156,813 | 123,442,738 | 37,686,441 | 19,809,382 |
| 2020 | 3,012,658 | 871,829 | 2,188,167,508 | 20,751,211,786 | 193,716,837 | 189,495,363 | 37,038,689 | 25,756,375 |
| 2021 | 2,608,633 | 998,502 | 2,583,319,712 | 25,325,049,764 | 191,732,964 | 181,987,018 | 38,205,424 | 19,118,618 |
| 2022 | 1,366,786 | 1,057,484 | 2,849,389,350 | 25,246,516,092 | 116,527,597 | 167,333,872 | 35,695,783 | 2,668,959 |
| 2023 | 1,352,910 | 1,161,126 | 3,179,542,376 | 26,495,417,531 | 122,766,119 | 165,998,397 | 42,043,600 | 3,586,581 |

Note. [a] Monthly average of active accounts. Financial variables are adjusted for inflation.

year, spanning from 2013 to 2023, with the variables grouped by year, with the exception of active accounts, which are expressed as a monthly average.

A Seasonal Autoregressive Integrated Moving Average (SARIMA) model was used to evaluate the impact of the gambling law on online gambling behavior and marketing expenditure [55]. SARIMA models are highly versatile and efficient for time series analysis [56, 57], making them particularly suitable for studies on addictive behaviors [58–63]. The stationarity of the time series was evaluated with the Dickey-Fuller Generalized Least Squares (DF-GLS) to estimate the differencing parameter in the SARIMA model (see Supplementary Material) [64]. Once the SARIMA model parameters were estimated, and considering the difficulty in fixing a specific time point when the Royal Decree 958/2020 had an effect due to its progressive implementation, different combinations of independent variables (i.e., four quarters during which Royal Decree 958/2020 was applied) were tested exploratorily [65], considering these independent variables as both pulse (temporary effect) and step (permanent effect) functions. The resulting models that exhibited the best fit to the empirical data, as determined by $R^2$ and RMSE, were selected. The model residuals were tested using the Box-Ljung Q statistics. Additionally, financial variables, including marketing expenditure, deposits, and total money bet, were adjusted for inflation using the Consumer Price Index (CPI) data from the National Statistics Institute of Spain, with January 2013 as the reference value (see https://www.ine.es/). The effect of COVID-19 between the second quarter of 2020 and the second quarter of 2021 was controlled as an independent variable in the model. This effect was studied due to its potential influence on gambling behavior, as evidenced by previous studies [66]. In this regard, the first stay-at-home order was implemented in mid-March 2020, resulting in the temporary closure of stores, bars, and other businesses, including betting shops and casinos, until mid-June (i.e., the end of Q2 2020). A subsequent stay-at-home order was in force in October 2020, which was in effect until May 2021 (i.e., from Q4 2020 to the middle of Q2 2021), when the Spanish government declared the end of the 'state of emergency'. During these quarters, measures were progressively relaxed (e.g., from curfews, perimeter closures, and a ban on nightlife to free movement between cities and the opening of recreational indoor activity facilities using masks) [67].

All statistical analyses were performed with SPSS (version 28, SPSS Inc., Chicago, IL, USA), except for the DF-GLS test, which was calculated using EViews 12. All statistical analyses were conducted with a significance level of $p \leq .05$.

## Results

### Descriptive statistics of online gambling behavior and marketing variables

Table 1 reflects changes in variables relative to gambling marketing expenditure and online gambling behavior adjusted for inflation. There has been a slight increase from 2013 to 2023 in new accounts (4.77%, from 1,291,324 to 1,352,910) and a substantial increase in active accounts (316.36%, from 278,873 to 1,161,126). In the same vein, deposits grew significantly (577.30%, from €469 million to €3.179 billion), as did the total amount of bets (378%, from €5.543 billion to €26.495 billion). The descriptive statistics reveal marketing spending has increased over the years, with an 83.23% increase in advertising spending (from €67 million to €122 million), 449.30% in bonuses (from €30 million to €166 million), 259% in affiliate spending (from €12 million to €42 million), and 130.84% in sponsorship spending (from €1.5 million to €3.6 million).

### Impact of Royal decree 958/2020 on online gambling behavior

Table 2 delineates the influence of the Royal Decree's approval on the dependent variables (i.e., active and new accounts, deposits, total amount bet, and marketing variables). Additionally, Figs. 1 and 2 illustrate the actual data of the time series and the SARIMA model predictions, which estimate trends in the absence of Royal Decree 958/2020.

The Royal Decree's approval of the implementation of new restrictions in the second quarter significantly and permanently reduced the number of new accounts by 263,000 (EST = -263,177.6; $p = .003$), compared to previous time series trend. Conversely, the Royal Decree had no impact on the number of active accounts. Moreover,

**Table 2** Results of SARIMA models with Royal decree 958/2020 events

| Variables | IV | EST | 95%CI [LL; UL] | SE | t | *p* | $R^2$ | Q (lag) | *p* | SARIMA |
|---|---|---|---|---|---|---|---|---|---|---|
| New accounts | RD Q4 2020[a] | - | - | - | - | - | 0.901 | 12.346 (16) | 0.720 | (1.0.0) (1.0.0) |
| | RD Q1 2021[a] | - | - | - | - | - | | | | |
| | RD Q2 2021[c] | -263,177.6 | -426,972.2; -99,383.0 | 81,162.8 | -3.243 | 0.003 | | | | |
| | RD Q3 2021[a] | - | - | - | - | - | | | | |
| | COVID-19[b] | 173,518.1 | 81,491.9; 265,544.3 | 45,600.4 | 3.805 | < 0.001 | | | | |
| Active accounts | RD Q4 2020[a] | - | - | - | - | - | 0.326 | 12.282 (17) | 0.783 | (0.1.0) (0.1.1) |
| | RD Q1 2021[a] | - | - | - | - | - | | | | |
| | RD Q2 2021[a] | - | - | - | - | - | | | | |
| | RD Q3 2021[a] | - | - | - | - | - | | | | |
| | COVID-19[b] | -195.8 | -83,391.8; 83,000.2 | 41,224.9 | − 0.005 | 0.996 | | | | |
| Deposits | RD Q4 2020[a] | - | - | - | - | - | 0.614 | 8.999 (14) | 0.831 | (0.1.3) (0.1.1) |
| | RD Q1 2021[a] | - | - | - | - | - | | | | |
| | RD Q2 2021[a] | - | - | - | - | - | | | | |
| | RD Q3 2021[a] | - | - | - | - | - | | | | |
| | COVID-19[b] | -1,648,487.1 | -14,573,937.1; 11,276,962.9 | 6,404,761.9 | − 0.257 | 0.798 | | | | |
| Total money bet | RD Q4 2020[a] | - | - | - | - | - | 0.449 | 14.398 (16) | 0.569 | (0.1.1) (0.1.1) |
| | RD Q1 2021[a] | - | - | - | - | - | | | | |
| | RD Q2 2021[c] | -216,206,976 | -413,936,776.0; -18,477,176.0 | 97,978,197.3 | -2.207 | 0.034 | | | | |
| | RD Q3 2021[a] | - | - | - | - | - | | | | |
| | COVID-19[b] | 306,478,972 | 12,375,974.8; 600,581,969.2 | 145,732,618.4 | 2.103 | 0.043 | | | | |
| Advertising | RD Q4 2020[a] | - | - | - | - | - | 0.635 | 10.464 (17) | 0.883 | (0.0.1) (0.0.0) |
| | RD Q1 2021[a] | - | - | - | - | - | | | | |
| | RD Q2 2021[a] | - | - | - | - | - | | | | |
| | RD Q3 2021[c] | -20,084,367.2 | -33,425,284.9; -6,743,449.6 | 6,610,632.6 | -3.038 | 0.004 | | | | |
| | COVID-19[b] | -4,673,093.3 | -19,164,576.2; 9,818,389.6 | 7,180,755.6 | − 0.651 | 0.519 | | | | |
| Bonus | RD Q4 2020[a] | - | - | - | - | - | 0.943 | 15.930 (17) | 0.529 | (0.1.1) (0.0.0) |
| | RD Q1 2021[c] | -2,635,997.6 | -5,239,592.0; -32,403.2 | 1,290,121.6 | -2.043 | 0.048 | | | | |
| | RD Q2 2021[a] | - | - | - | - | - | | | | |
| | RD Q3 2021[a] | - | | - | - | - | | | | |
| | COVID-19[b] | -33,015.3 | -3,662,353.0; 3,596,322.4 | 1,798,393.4 | − 0.018 | 0.985 | | | | |
| Affiliation | RD Q4 2020[a] | - | | - | - | - | 0.360 | 26.687 (17) | 0.063 | (0.1.0) (0.1.1) |
| | RD Q1 2021[a] | - | | - | - | - | | | | |
| | RD Q2 2021[a] | - | | - | - | - | | | | |
| | RD Q3 2021[a] | - | | - | - | - | | | | |
| | COVID-19[b] | -213,272.0 | -1,345,637.8; 919,093.8 | 561,104.9 | − 0.380 | 0.706 | | | | |
| Sponsorship | RD Q4 2020[b] | 2,520,596.0 | 1,241,479.0; 3,799,713.0 | 633,822.4 | 3.977 | < 0.001 | 0.799 | 11.700 (18) | 0.862 | (0.1.0) (0.0.0) |
| | RD Q1 2021[a] | - | | - | - | - | | | | |
| | RD Q2 2021[a] | - | | - | - | - | | | | |
| | RD Q3 2021[b] | -5,327,603.0 | -6,487,036.8; -4,168,169.2 | 574,517.5 | -9.273 | < 0.001 | | | | |
| | COVID-19[b] | -340,856.0 | -943,020.9; 261,308.9 | 298,382.1 | -1.142 | 0.261 | | | | |

Note. [a]Event not included in the model. [b]Pulse effect (temporary). [c]Step effect (permanent). IV = Independent variable; EST = Estimate; LL = lower limit; UP = upper limit; SE = Standard error; Q = Ljung-Box test; RD Q4 2020 = regulation of Royal Decree 958/2020 that entered into force in November and December of 2020; RD Q1 2021 = regulations of Royal Decree 958/2020 that entered into force between January and March 2021; RD Q2 2021 = regulations of Royal Decree 958/2020 that entered into force between April and June 2021; RD Q3 2021 = regulations of Royal Decree 958/2020 that entered into force between July and September 2021. COVID-19 = COVID-19 effect from April 2020 to June 2021.

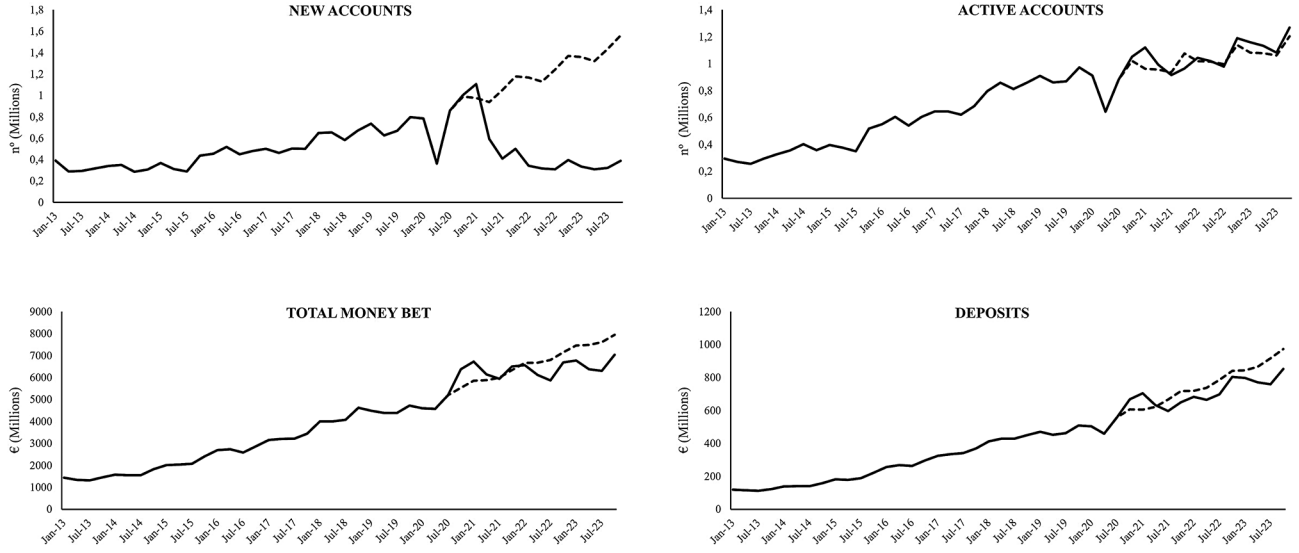


**Fig. 1** Actual data (solid lines) of the time series vs. model predictions (dashed lines) without the effect of Royal Decree 958/2020 on online gambling behavior

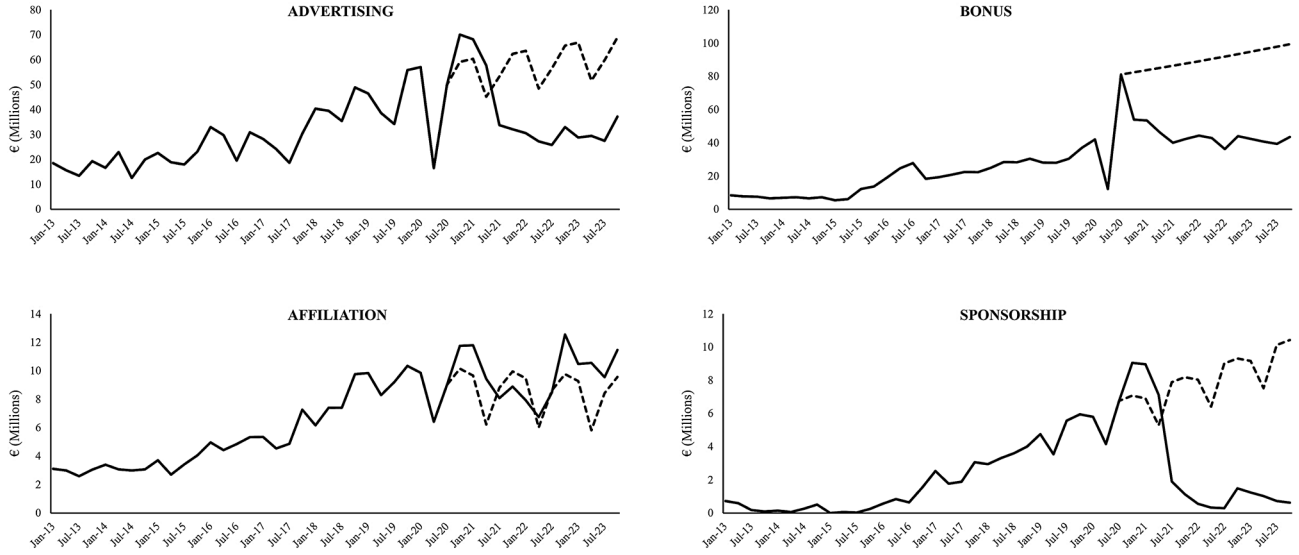


**Fig. 2** Actual data (solid lines) of the time series vs. model predictions (dashed lines) without the effect of Royal Decree 958/2020 on marketing expenditure adjusted for inflation

it had a substantial effect on betting behavior, significantly reducing the amount of money bet by 216 million euros starting from the second quarter of 2021 (EST = -216,206,976; $p = .034$). However, there was no impact on the trend of deposits made by gamblers.

### Impact of Royal decree 958/2020 on marketing expenditure

Regarding marketing expenditure, the Royal Decree contributed to a reduction of 20 million euros in advertising expenditure in the third quarter of 2021 (EST = -20,084,367.2; $p = .004$). Bonus expenditure decreased by approximately 2.6 million euros in the first quarter of 2021 (EST = -2,635,997.6; $p = .048$). Sponsorship expenditure by gambling operators initially increased by 2.5 million euros after the Royal Decree's approval in the last quarter of 2020 (EST = 2,520,596.0; $p < .001$), but then significantly decreased by 5.3 million euros in the third quarter of 2021 (EST = -5,327,603.0; $p < .001$). Finally, the Royal Decree appears to have no effect on affiliation program expenditure.

### Impact of COVID-19 on online gambling behavior and marketing expenditure

The impact of COVID-19 was incorporated into all models as a pulse effect (temporary effect) between the

second quarter of 2020 and the second quarter of 2021. Although a decline in most dependent variables can be observed graphically (see Figs. 1 and 2) during the first full lockdown (i.e., Q2 2020), the results concerning online gambling behavior demonstrated a substantial increase in the number of new accounts (EST = 173,518.1; $p < .001$) and the total money bet (EST = 306,478,972; $p = .043$) throughout the entire period of COVID-19 restrictions (i.e., from Q2 2020 to Q2 2021). The remaining gambling-related variables did not evidence a significant change ($p$-value between 0.796 and 0.996). Notably, COVID-19 did not impact marketing expenditure, as evidenced by all $p$-values being set between 0.261 and 0.985.

## Discussion

This is the first study examining the impact of gambling marketing regulation, particularly the Spanish Royal Decree 958/2020, on online gambling behavior (i.e., new and active account numbers, the total amount bet on online games, and deposits), as well as marketing expenditure (i.e., advertising, affiliation, bonuses, and sponsorship). Two findings were highlighted: (1) regulatory measures conducted in Spain led to a permanent decrease in gambling behavior, in particular, new accounts and total money bet; and (2) the Spanish regulation had an impact on marketing strategies, specifically in reducing expenditures earmarked for advertising, bonuses, and sponsorship.

According to the data provided by the Directorate General for the Regulation of Gambling, findings indicate that the implementation of the Royal Decree has impacted online gambling behavior. Specifically, from the second quarter of 2021 (April – June), there was a permanent reduction in the number of new accounts on online betting operators and the total amount of money wagered, in comparison with the previous time series trend. During this period, articles related to the limits on the number of deposits gamblers can make, self-exclusion systems, and the detection of risky behaviors came into effect. Additionally, advertising on television and radio was restricted to between 1 am and 5 am. Although these regulatory measures impacted on new accounts, they did not affect the number of active accounts, or the deposits made. This could suggest that regulatory measures affect non-gamblers, reducing the likelihood of initiating gambling behavior, but do not influence active gamblers. These outcomes are aligned with preliminary findings in the Netherlands, where marketing regulation measures decreased gambling behavior among non-gamblers but did not impact gamblers [50]. On the other hand, marketing strategies in previous years may have had a significant long-term impact, that is, the increase in promotional and sponsorship strategies observed during 2019 and 2020 may have had a significant effect on long-term gambling behavior.

Several reasons may explain why the Royal Decree has not had an impact on some variables of online gambling behavior that have not been found. First, the most plausible explanation is that the impact of the Royal Decree on the number of active accounts and deposits will be observed in the long term. Also, although the legislative measures cover a large part of the marketing strategies of gambling operators, the gambling industry continues to advertise in different ways [68]. Gambling operators can advertise on their channels (e.g., websites, social media profiles) and exploit the Internet advertising legal loophole (e.g., Twitch), despite knowing the negative impact it has, especially on the young population [69]. Additionally, promotions can be addressed to those gamblers who give their consent, and lottery products are exempt from this regulation, so they can be advertised in any media (e.g., television). Finally, although in Spain and other European countries, sponsorship of football events is not allowed, for instance, the Betano® bookmaker is an official sponsor of international competitions (e.g., Euro2024, 2024 Copa América) [70], and Bet365® is a sponsor of the UEFA Champions League 2025, and Betway® is a sponsor of other football teams (e.g., Manchester City).

On the other hand, while it does not affect the amount deposited, the law has had a notable impact on the total amount wagered. It is important to highlight that the total amount wagered is a more sensitive variable that more accurately reflects engagement in gambling. Additionally, a feasible explanation relates to the fact that the law limits the maximum amount of money a gambler can deposit, specifically allowing for three limits: a maximum of €600 in one day, €1,500 in one week, and €3,000 in one month. However, these limits are remarkably high, and according to the results of the current study, these measures have not had a significant effect on the amount of money deposited and indeed continued their increasing trend beyond expectations.

In chronological order, the implementation of the Royal Decree (in November 2020) temporarily increased the money allocated to sponsorship by gambling operators. The prohibition of sponsoring football teams, jerseys, and stadiums in the following months (specifically in August 2021) led to a significant increase in spending on this marketing strategy before the end of 2020.

Conversely, the measures approved in the first quarter of 2021 (January - March) permanently decreased the money allocated to bonuses. As aforementioned, several articles came into effect aimed at regulating promotions and bonuses related to gambling, as well as the detection of risky behaviors, economic limits for deposits, the self-exclusion mechanism, and the prohibition of advertising in any media between 1 am and 5 am. Subsequently,

the provisions that came into effect in the third quarter (July - September) significantly reduced the money allocated to advertising and sponsorship. In addition to the articles that came into force in previous months, during this period (i.e., April - June) those relating to restrictions on promotions to attract new customers, the use of public figures in advertisements, and the limitation of commercial communications on social media, among others, entered into force. Additionally, provisions related to the sponsorship of gambling operators by public figures or sports teams by the gambling operators were also implemented in July 2021. This means that no gambling operator can sponsor sports teams, nor can they appear on sports facilities or jerseys.

These results could be interpreted in light of previous experiences with other addictive behaviors. Tobacco control also led to a reduction in the total marketing expenditure by the tobacco industry in the United States, which increased exponentially until 2003, when it began to decline. The total marketing expenditure by the tobacco industry peaked historically in 2003, reaching over USD 21.088 billion, and then progressively decreased by 63.8% to USD 7.624 billion by 2019 [71, 72]. However, there was a change in marketing strategies. While advertising expenditure significantly decreased from 1975 to 2019 (by 88%, from USD 1.829 billion to USD 221 million), spending on promotions (i.e., discounts, free samples) increased by 45% from 1975 to 2019 (from USD 389 million to USD 564 million), and price discounting increased by 5,886% (from USD 144 million to USD 6.846 billion) [71]. As observed, the inflection point in the marketing strategy change occurred in 2003, coinciding with the implementation of the Framework Convention on Tobacco Control [73] and the Tobacco Master Settlement Agreement [74]. In this vein, researchers point out the need to learn lessons from other addictive behaviors to promote gambling regulations, both to enforce legal regulations that have been shown to work and also to monitor, review, and change legal regulations as industry strategies change [13, 15, 75].

Despite the restrictions on affiliate programs (e.g., between 1 am and 5 am, not targeting minors, and including a "responsible gambling" label), no changes have been observed in this variable, unlike the changes seen in other marketing strategies. This could be due to the difficulty in controlling the content of affiliate programs (e.g., not linking gambling to success, hours of broadcasting, etc.) by the state, given the large number of accounts, their heterogeneity (in terms of platforms and content), and the difficulties in accessing them.

Marketing-related results have significant implications, as previous evidence indicates that promotions (i.e., bonuses) [31, 76] and sponsorships [30, 76] are two of the marketing strategies that most impact gambling behavior, especially among young people and gamblers [23, 31, 77]. The gambling industry customizes its promotions to the characteristics of the gamblers (e.g., gambling frequency, sports they usually bet on) in a way that makes placing a bet more attractive. Promotions have been linked to various gambling-related variables, both subjective (e.g., normalization, risk perception) and objective (e.g., frequency, money gambled) [17, 23, 25–27], suggesting that a decrease in the money allocated to bonuses will have a direct impact on gambling behavior, possibly affecting variables not examined in the present study.

Finally, regarding the impact of the COVID-19 pandemic on online gambling, a significant increase in the number of new accounts and in the total amount of money bet was identified. This finding is consistent with the most recently published systematic review on the impact of COVID-19 on gambling behavior, which concluded that there was an incremental trend in online betting behavior [66]. Our results should be interpreted in conjunction with the epidemiological data on online gambling during the pandemic (November-December 2020) in Spaniards aged 15 to 64 years. Data reveals that 1.3% of individuals ceased gambling, 0.7% reduced their online gambling behavior, but 2.1% maintained it and 1.1% initiated online gambling [78]. The rise in online gambling behavior during the pandemic is particularly relevant in the context of the favorable outcomes resulting from the Royal Decree, as it has been observed that despite the increase in online gambling behavior due to the pandemic, the Royal Decree led to a permanent decrease in gambling behavior (specifically in new accounts and total money bet).

Considering the results, it is crucial to emphasize the importance of effective legal regulation rather than opting to promote self-regulation. It should be underlined that attempts by the gambling industry to self-regulate (e.g., corporate social responsibility, responsible gambling, how to restrict deposits) [79] have repeatedly proven ineffective in preventing gambling-related problems [80, 81]. This ineffectiveness is partly due to the focus on "problem gamblers" rather than the "problematic products" promoted by the industry. These self-regulation strategies are often used by the industry to delay the implementation of more stringent and necessary governmental regulations [82].

The findings of the current study have significant implications within the Spanish context, particularly in light of recent developments such as the Spanish Supreme Court issuing ruling 527/2024, which nullified several key articles of the Royal Decree 958/2020 [83]. Among others, restrictions on bonus promotions, the use of celebrities, and advertising on social media were turned down under the justification that those articles lack scientific evidence supporting their restriction. The interference of

the gambling industry has been widely reported in previous studies [52, 84–86], and this is another example of industry litigation aimed at preventing regulatory measures from being implemented.

These results should be interpreted under several limitations. Firstly, the analysis is confined to data from the past ten years, that is, from 2013 to 2023. Also, only three years have elapsed since the approval of the regulatory measures (i.e., November 2020), with a mere year and a half since the full implementation of all articles (i.e., August 2021). Furthermore, it is worth mentioning that the law was implemented progressively, with several articles coming into force at different times over almost a year (from November 2020 until August 2021). As a result, the analysis of the impact of the law as a whole is complex. In this vein, it was difficult to determine a point in time at which the effects should take place, as knowledge of the law may have had an effect earlier, or the entry into force of the law may have a longer-term effect. On the other hand, the study focuses solely on online gambling behavior, thereby excluding in-person gambling activities. Also, other relevant variables in the context of gambling research were not available in the dataset, which precludes an examination of potential mediating factors of the regulatory measures' impact, such as age, gender, or gambler profile (e.g., frequency, type of gambling). Finally, examining the impact of the pandemic on gambling patterns presented considerable challenges due to the implementation of numerous regulatory measures occurring at several temporal points following COVID's proliferation (e.g., temporary suspension of sporting events, closure of entertainment venues that were followed by a subsequent reopening but with restrictions).

## Conclusions

In conclusion, this study is the first to examine the impact of legislative measures on online gambling behavior and marketing expenditure, using official data provided by the Directorate General for Regulation of Gambling. The findings suggest that regulatory measures have a permanent impact on gambling behavior, leading to a substantial reduction in the number of new accounts and a slight decrease in the amount of money wagered. Furthermore, the gambling industry allocates less money to advertising, bonuses, and sponsorship—marketing strategies closely associated with gambling behavior. Notably, it is crucial to persist in the implementation of regulatory measures and the monitoring of their enforcement with the ultimate objective of reducing the normalization of gambling and, consequently, of gambling behavior.

Our findings advocated the implementation of regulatory measures that have been shown to be effective in other countries [52], with the ultimate goal of reducing the impact of gambling on public health. Spain has joined this growing trend seen across Europe, where countries like Germany, the Netherlands, and Italy have already introduced similar regulatory measures [87]. This broader context illustrates the drivers and barriers to regulatory change, showing that despite differences in national gambling landscapes, there is a clear movement towards stricter regulations in response to public health concerns. Of note is that further research is needed to examine the impact of regulatory measures in other countries and contexts.

These findings have important implications for the field of gambling, as reducing the number of new accounts—essentially, the influx of new gamblers—could lead to a decrease in problem gambling in the medium and long term. Framing these regulatory measures as primary and environmental prevention strategies for gambling harm would strengthen the public health narrative, indicating that marketing and gambling restrictions directly impact gambling behavior. Notably, further prospective research is needed to confirm whether this impact on online gambling behavior persists in the long term, even after the removal of the aforementioned articles.

Specifically, in this study, the impact of the following measures on gambling behavior was analyzed: prohibition of advertising between 1 am and 5 am; prohibition of the use of celebrities in commercial communications, as well as sponsorship of sports teams; prohibition of promotions aimed at attracting new gamblers and problematic gamblers, the obligation to identify risk gamblers, and implement and promote self-exclusion systems, and limitation of deposit limits. Given the findings, this study can serve as a model for other countries where gambling advertisements have not yet been regulated [87].

### Abbreviations

| | |
|---|---|
| DF | GLS Dickey-Fuller Generalized Least Squares |
| CPI | Consumer Price Index |
| SARIMA | Seasonal Autoregressive Integrated Moving Average |

## Supplementary Information

The online version contains supplementary material available at https://doi.org/10.1186/s12954-025-01219-7.

Supplementary Material 1

Supplementary Material 2

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### Author contributions

G.A.D. and A.K. designed the work. A.G.P. analyzed and interpreted the data. G.A.D. wrote the initial draft. G.A.D., A.K. and A.G.P. revised the manuscript.

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**Data availability**
The datasets used and analyzed during the current study are available in the website of the Directorate General for the Regulation of Gambling (https://www.ordenacionjuego.es/datos-estudios/estudios/descarga-datos-mercado-juego).

## Declarations

**Ethics approval and consent to participate**
Not applicable.

**Consent for publication**
Not applicable.

**Competing interests**
The authors declare no competing interests.

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