Payment preferences and related sports betting behavior: A secondary analysis of player data from an online sports gambling operator

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Abstract

This study investigated the relationship between payment methods and sports betting behavior using transactional data from a European online sports gambling operator. Analyzing account data from newly registered players (N = 72,494) in Germany, Spain, Great Britain, and France, this research employed fixed-effects regression to assess intra-individual differences in gambling behavior as a function of the most recent deposit type used by a given player. Within individuals, voucher deposits ($B = -2.12$, $p < 0.001$) and eWallet deposits ($B = -1.65$, $p = 0.001$) were associated with lower daily stakes relative to bank transfers; credit and debit cards showed no significant differences. A second model examined the time from deposit to the next withdrawal attempt and provided evidence consistent with the hypothesized role of transaction friction. Relative to bank transfers, eWallet deposits were associated with a higher withdrawal hazard (HR = 1.18, p = 0.001), voucher deposits were associated with a lower hazard (HR = 0.55, $p < 0.001$), and credit and debit cards showed no significant differences. Exploratory analysis revealed significant heterogeneity in player behaviors and payment choices, and the influence of specific payment methods appeared to vary across player segments. Notably, 88.9% of deposits in the outlier-excluded analytic sample were not followed by a withdrawal under the model's event-classification rule, although successful withdrawals equaled 51.1% of deposited value. Moreover, 26.5% of withdrawal requests, representing 48.3% of requested withdrawal value, were subsequently reversed. These patterns highlight the importance of distinguishing withdrawal-event frequency from withdrawal value and completed withdrawals.

Keywords: sports betting, payments, gambling regulation, responsible gambling

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The expansion of online sports betting created unprecedented access to mobile gambling and a vast array of wagering opportunities. Central to participation in this ecosystem are the payment mechanisms that facilitate deposits and withdrawals. Payment methods significantly shape consumer behavior (Beshears et al., 2018), and in the context of gambling, this influence further extends to regulatory considerations (Gambling Commission, 2021). As gambling continues to expand into online and mobile mediums, and cashless retail activity increasingly becomes a preferred medium of transaction, understanding the role of payment methods in shaping gambling behavior has become increasingly important.

Players utilize a variety of deposit methods, from traditional credit/debit cards and bank transfers, to eWallets, to physical vouchers purchased in retail locations and redeemed online. While extensive research has explored various facets of sports betting behavior, including motivations, risk factors for problematic play, and the impact of marketing (McGrane et al., 2025; Russell et al., 2019), the role of payment preferences as a potential correlate or even predictor of specific gambling patterns remains comparatively under-investigated.

The choice of a payment method is not merely a transactional necessity. It can reflect underlying financial habits, attitudes towards privacy, impulsivity, and financial literacy. Different payment options offer varying degrees of immediacy, transaction limits, and perceived anonymity (Beshears et al., 2018; Crowe et al., 2006), which may subtly or overtly influence how individuals manage their gambling funds and, consequently, their betting behavior. Despite growing relevance, the current understanding of how various payment methods influence gambling behavior is limited. Although there is substantial research about the general effects of payment methods on broader consumer spending (Beshears et al., 2018), the gambling context presents a fundamentally different transactional structure that complicates direct application of existing frameworks. Unlike typical consumer purchases, where payment and consumption occur in close temporal proximity, online sports betting fragments the financial experience into at least three distinct stages: the account deposit, the bet placement, and the bet resolution, each of which may be separated by hours, days, or even weeks. This temporal dispersion means that the psychological concept of the "pain of paying" (i.e., negative emotions associated with spending money; Zellermayer, 1996), which depends on the coupling of payment to consumption, may operate differently in online gambling environments where the moment of financial commitment (the deposit) is decoupled from both the act of gambling and its outcome. The lack of field experiments and the inherent challenges in producing ecologically valid laboratory studies in gambling research further limit our understanding of these dynamics.

Enhancing the understanding of the relationship between payment methods and gambling behavior could have meaningful policy benefits. By identifying how different deposit methods impact gambling behavior, stakeholders may develop more targeted responsible gambling measures that address specific risks associated with each payment type. Moreover, this knowledge could inform regulatory decisions, such as whether to place restrictions on specific payment methods (Gainsbury & Blaszczynski, 2020). Better empirical evidence could also contribute to the development of educational programs aimed at helping consumers to make more informed decisions about their gambling activities.

Payment Methods and Consumer Behavior

Money eliminates the need for a coincidence of wants in barter and instead allows for generalized purchasing power (Friedman, 1994). Since the emergence of non-cash payment tools, a growing body of marketing literature reveals that consumer purchase behavior may change in straightforward or subtle ways as a function of the payment method. An early contribution to the literature was Feinberg (1986), who found the mere presence of credit card related stimuli during purchase decisions can influence spending behavior. The author found that when credit card logos were present, individuals were more likely to spend, spent more money, or decided to spend more quickly. The author suggests that these effects can be understood through a conditioning framework, where credit cards become associated with the act of spending and can trigger spending responses, potentially explaining impulsive or excessive spending.

Much of the subsequent research was framed around the "pain of paying" concept (Zellermayer, 1996), which refers to the negative emotions or psychological discomfort a person experiences when parting with their money to make a purchase or pay for a service. Credit cards, and by extension other forms of digital payment (e.g., online account wallets), tend to decouple the act of consumption from the immediate sensation of payment, thereby reducing this "pain" (Swanton et al., 2022). This feeling can be influenced by factors such as the individual's financial situation, the perceived value of the purchase, the payment method used, and the timing of the payment (Prelec & Loewenstein, 1998; Rick, 2018).

Drawing from the broader literature on consumer behavior, Thaler’s theory of mental accounting (1985, 1999) suggests that individuals categorize and treat money differently depending on its source or intended use, rather than viewing all money as fungible. Prelec and Loewenstein (1998) propose that when payment is closely coupled with consumption, the hedonic benefit of the experience can be diminished by the constant reminder of the cost. Conversely, when payment is decoupled from consumption, such as through prepayment like depositing funds into an account well before spending, the consumption experience can be more pleasurable, a concept they refer to as prospective accounting. Soman (2001) further explores how the timing of payments relative to consumption can act as a buffer that impacts spending behavior. Relatedly, Gourville and Soman (1998) show that the felt cost of a payment depreciates with time, so consumption funded by an older deposit is experienced as less costly. This may be relevant where deposits and wagers are separated by days or weeks. Extrapolated to gambling, this research suggests that the delay between the act of making a deposit and the actual betting may alter a player's perception of the money and affect their betting decisions.

Payment Insights from Gambling Studies

There is little conclusive research on the impact of payment modality on gambling behavior (Swanton et al., 2024). In a scoping review, Palmer et al. (2022) found no studies that compared cash-based gambling against or across digital payment mediums. They attribute this to the challenges with lab-based studies on this topic, including access restrictions for researchers and regulatory constraints in the gambling environment, but also note an opportunity to use field data as a solution. Limbrick-Oldfield et al. (2022) conducted two laboratory experiments, finding only weak evidence that monetary formats impacted subsequent gambling behavior but noted methodological challenges with manipulating monetary value in gambling research. Ghaharian et al. (2024) used a strategy of examining transactional data with an unsupervised clustering algorithm. They provide some evidence that payment data can be used to identify subgroups of gamblers, focusing on deposit and withdrawal frequencies.

Despite the challenges in attributing behavior to specific influences, we view the relationship of payment mechanisms and gambling behavior as an important empirical question. Transfers that involve a longer processing time and more conscious decision-making might promote more thoughtful gambling behavior than transfers via deposit methods with shorter processing times (Hing et al., 2015) and therefore could have consequences for wellness. It seems reasonable that intra-individual differences in gross wager volume (stakes) might relate to deposit methods. Although there are likely inter-individual differences between players, such comparisons provide limited insight about the behavioral impact of the deposit method since there is likely some degree of selection bias in payment methods.

To address these gaps and contribute to the existing literature, we conducted a secondary analysis of player account data from a licensed online sports betting operator. By examining real-world transactional and behavioral data, we aimed to assess relationships between the payment methods used by players for deposits (e.g., credit cards, eWallets, bank transfers) and their subsequent sports betting behaviors, including betting stakes, daily net win, odds of winning, and withdrawals. Our first hypothesis therefore reflected our view on the differential impact of deposit methods.

H1: Deposit methods are related to intra-individual differences in behavior, controlling for time-invariant differences within individuals.

A similar phenomenon may also be true for withdrawals but directly analyzing the specific payment method chosen for each individual withdrawal as an independent variable presents several challenges. First, a significant portion of players may not make frequent withdrawals or any withdrawals at all during a given observation period, leading to a potentially smaller and self-selected sample for such an analysis. This sample may not be representative of the broader player base and could be biased by factors related to winnings or playing styles. Second, the choice of withdrawal method is often constrained by the initial deposit method; players are typically encouraged or required to withdraw back to the method used for depositing due to anti-money laundering rules (Gambling Commission, 2025). Last, some deposit modalities, such as vouchers or certain pre-paid cards, do not have direct withdrawal equivalents, forcing players to use alternative methods like bank transfers or eWallets for withdrawals, which may not reflect their initial payment preference 'friction level.'

Given these complexities, the initial deposit method chosen by a player can serve as a more intuitive proxy for the anticipated or experienced transaction friction across the full cycle of their financial interactions with the platform, including withdrawals. According to withdrawal information for one of the brands in our data, eWallet withdrawals (often linked to eWallet deposits) take less than 24 hours to clear, whereas Visa/Mastercard transactions (often linked to card deposits) take 3 to 5 days (bwin, 2023). Therefore, we hypothesized that the characteristics of the deposit method, by influencing the experienced friction of the payments process, will be associated with withdrawal frequency.

H2: Lower transaction friction (i.e., faster processing time) for withdrawals linked to a given deposit method will increase the frequency of withdrawals, controlling for fixed effects.

Alternative wagering outcomes appear in Online Appendix A. Country-specific estimates with outliers included and supporting withdrawal-processing-time information appear in Online Appendices B and C, respectively.

Methodology

Data

This study used bet-level sports betting data from users (hereafter referred to interchangeably as 'players') of a major European online sports betting operator (N = 72,494) who joined the platform from February 1st to 28th, 2015, inclusive. The data covers the time period from each user’s initial sign-up date in February 2015 through July 16, 2020. We preregistered our study on the Open Science Framework (https://osf.io/pcujh/?view_only=ac8090b9383e4241bc01f24510644e85) prior to conducting any analyses.[1] Exploratory analyses reported in Online Appendices D-G were not part of the preregistered plan and were added in response to peer review.

The operator provided data in several flat files that could be cross-referenced through unique identifiers:

- User sport slips (8,295,201 rows of data): Transaction level data describing each betting slip placed by users in the sample, including data regarding user spend, user win, number of wagers, odds of winning, and timestamps.
- User deposits (1,030,497 rows of data): User deposit transactions, including deposit values, deposit methods, deposit method categories (e.g., bank transfer), deposit timestamps, and a variable denoting whether the deposit was successful or unsuccessful.
- User withdrawals (117,395 rows of data): User withdrawal transactions, including withdrawal values, withdrawal methods, withdrawal method categories (e.g., eWallet), withdrawal timestamps, and a variable denoting whether the withdrawal was completed or was reversed by the user.
- User cohort: Information about the users, including gender, age, registration country, registration date, and whether they used products other than sports betting on the platform.

As determined in the pre-registered plan, to better isolate the effects of payment preferences on betting behavior, we narrowed our focus to users from the main countries in our

[1] We pre-registered a third hypothesis test, but we determined the sample size was insufficient for estimation (n = 2) after preparing the data for analysis, and therefore we excluded it from this paper.

dataset. This minimizes the influence of differing national financial systems on our results. These countries included: Germany (32.1% of sample), Spain (16.8% of sample), Great Britain (15.1% of sample), and France (11.4% of sample). These countries were selected due to their high representation in the dataset (75.4% of users) and established online gambling markets, ensuring sufficient statistical power and relevance to European regulatory contexts.

The wagering analyses are at the daily aggregate level. The withdrawal analysis is at the successful-deposit-event level. If a player had one or more deposits on the same date as one or more bets, we associated those bets with the latest deposit (and deposit type) of that date. Thus, some bets might have been associated with the wrong deposit type if a given player changed deposit types in the same day and played in the intervening period between those deposits.[2]

As described in the pre-registered plan, we identified players with total wager volumes below the first quartile minus 1.5 times the interquartile range and above the third quartile plus 1.5 times the interquartile range, classified them ex-ante as outliers, and removed them from the study. Descriptive summary tables appear in Appendix 1; wagering-day deposit-method distributions with outliers included and country-specific outlier-excluded wagering estimates appear in Appendices 2 and 3, respectively. Exploratory analyses including the outliers are provided in Online Appendices B and G. Data preparation and the fixed-effects wagering model were executed using Stata/MP 15.1. Data cleaning was performed in R version 4.2.3 using RStudio 2023.09.1 Build 494 for MacOS. The stratified Cox proportional hazards model was estimated using the survival package (Therneau, 2026) in R version 4.4.2. We summarize key measures and their definitions in Table 1.

[2] We replicated the analysis of H1 associating the bets with the first deposit type of the day as a robustness test, which did not impact our conclusions.

Table 1
Study Measures and Definitions

Measure	Definition
Deposit Type	The payment method category (e.g., bank transfer, credit card, debit card, eWallet, voucher) used for a successful deposit transaction.
Most Recent Deposit Type	The Deposit Type used for the player's latest successful deposit transaction prior to the observed betting behavior or withdrawal event.
Withdrawal Type	The payment method category (e.g., bank transfer, debit or credit card, eWallet) selected for an intended withdrawal transaction. Players may reverse withdrawals before they are processed.
Days Since Last Deposit	The number of days that have elapsed between a player's most recent deposit and the current day of observation.
Time to Next Withdrawal	The duration, in days, from a player's successful deposit event to their subsequent withdrawal attempt. This is the time-to-event outcome in the Cox Proportional Hazards Model.
Withdrawal Frequency	The rate or likelihood of a player making a withdrawal following a deposit. Inferred from the Cox Proportional Hazards Model for 'Time to Next Withdrawal.' The hazard ratios associated with different deposit types indicate the relative likelihood (and thus implied frequency) of making a withdrawal.
Total Stakes (Daily Wager Volume)	The total monetary amount wagered by a player on sports bets on a given day.
Daily Loss	The net financial loss incurred by a player from sports betting activities on a given day (total stakes minus total prizes).
Daily Net Win	The player's net financial outcome (total winnings minus total stakes) from settled bets on a given day.
Total Deposit Amount (per user)	The cumulative sum of all monetary values deposited by an individual user throughout the observation period.
Number of Deposits (per user)	The total count of individual deposit transactions made by a user during the observation period.
Total Withdrawal Request Amount (per user)	The cumulative value of a user's withdrawal requests, including requests subsequently reversed.
Number of Withdrawal Requests (per user)	The total count of a user's withdrawal requests, including requests subsequently reversed.

Wagering Model

To examine the relationship between total stakes and deposit types, we conducted a fixed-effects regression analysis. Fixed-effects regression is a statistical method that controls for all time-invariant characteristics of individuals (i.e., players) that might influence the outcome variable, such as inherent betting tendencies, average deposit amounts, or demographic factors (Wooldridge, 2010). By including a dummy variable for each individual in the model, this approach effectively isolates the within-individual variation over time, allowing us to focus on how changes in predictors (e.g., deposit types or days since last deposit) affect player behavior while accounting for unobserved heterogeneity across players.

To understand the association between deposit type and wagering behavior, we estimate the following model:

$$Y_{it} = \boldsymbol{\alpha} + \boldsymbol{\beta}_1 \text{DepositType}_{it} + \boldsymbol{\beta}_2 \text{DaysSinceDeposit}_{it} + \boldsymbol{\gamma} X_t + \boldsymbol{\eta}_i + u_{it}.$$

The index i represents the player and the index t represents time in days. The behavioral outcome variable Y_{it} is the given behavioral outcome (total stakes; additional models using daily net win and betting odds appear in Online Appendix A), and $\boldsymbol{\alpha}$ is the model constant. The primary categorical variable of interest is DepositType_{it}, representing the 'Most Recent Deposit Type,' including bank deposit transfers, credit card payments, debit card payments, eWallet transfers, and voucher transactions. The variable is coded by indicators for each category. The variable $\text{DaysSinceDeposit}_{it}$ is the number of days since the last deposit. The vector X_t contains non-individual specific factors that affect sports betting volume, including binary variables denoting whether the date represented by individual i and time t was during each of five major football league seasons (i.e., "English Premier League," "La Liga," "Bundesliga," "Serie A," "Ligue 1") or during another major football event (e.g., FIFA World Cup). These factors' corresponding coefficients are stored in $\boldsymbol{\gamma}$. The variable $\boldsymbol{\eta}_i$ contains individual-specific constant factors (individual dummy variables) that affect Y_{it}, $\boldsymbol{\beta}_1$ and $\boldsymbol{\beta}_2$ are the coefficients for DepositType_{it} and $\text{DaysSinceDeposit}_{it}$, respectively, and u_{it} is the model error term.

For each player, we created daily summaries of their engagement and spending, including total stake, number of bets, and daily net win (total winnings minus total stakes). Those who signed up earlier in the recruitment period have more available days than those who joined later.

We predicted that at least one of the deposit types will have a statistically significant coefficient. Due to the fixed-effect design, this hypothesis was tested using betting data from players who used more than one deposit method. By comparing the same individuals' gambling behavior based on their most recent deposit method, this approach allowed analysis of differences in stakes while controlling for non-time variant individual-level effects. Although the set of multi-method depositors is non-representative of the entire population of depositors, examining differences in the same individuals based on their most recent deposit method provides a view of the relationship between gambling behavior and deposit types. In exploratory, non-preregistered extensions, we re-estimated the stakes model with the most-recent deposit amount and its interaction with deposit type (Online Appendix D).

Withdrawal Model

To understand the association between transaction friction and withdrawal frequency, we consider deposits in the outlier-excluded roster classified as bank transfer, credit card, debit card, voucher, or eWallet and use a time-to-event model to estimate how many days pass from a deposit until the next withdrawal. Deposits classified as Unknown Card were excluded from this model. Our pre-registered hypothesis specified a Cox model controlling for fixed effects. Fitting a model with separate terms for each of our 21,720 players required matrices too large to compute, so we estimate a stratified Cox model, which is analytically equivalent. The stratified specification assigns each player their own baseline hazard function, exploiting within-individual variation in deposit type and controlling for time-invariant individual characteristics. Players who used only a single included payment method throughout the observation period do not contribute to the deposit-method coefficients because they lack within-individual variation in deposit type.

We model time to withdrawal as a function of deposit type rather than withdrawal type for two reasons. First, deposit type is observed for every deposit, whereas withdrawal type exists only when a withdrawal occurs. For instance, if credit-card users never withdrew because they were spending excessively, a withdrawal-type analysis could never attribute that behavior to the method. Second, closed-loop anti-money-laundering rules push some withdrawals toward a prior deposit channel, and some modalities (e.g., vouchers) have no withdrawal equivalent, so observed withdrawal type is partly mechanical.

We estimate the stratified Cox Proportional Hazards Model:

$$h_i(t|X) = h_{0i}(t)\ \exp\left(\boldsymbol{\beta}_1 \cdot \text{DepositType} + \boldsymbol{\beta}_2 \cdot \text{NetWin}_0 + \boldsymbol{\beta}_3 \cdot \text{NetWin}_1\right)$$

where t is the number of days from a deposit to the next withdrawal; $h_{0i}(t)$ is the individual-specific baseline hazard, which controls for all time-invariant individual characteristics by restricting comparisons to within-individual variation in deposit type; DepositType is the primary categorical variable of interest, representing the 'Most Recent Deposit Type,' NetWin_0 is the same day, Daily Net Win; NetWin_1 is the subsequent day, Daily Net Win; $\boldsymbol{\beta}_1$ through $\boldsymbol{\beta}_3$ are the estimated coefficients and exp() is the exponential function. The event indicator classified a deposit as followed by a withdrawal only when the mapped withdrawal attempt occurred without an intervening deposit. Deposits with an intervening deposit, and deposits with no observed withdrawal, were coded as censored. Consistent with the preregistered implementation, an intervening deposit affected event classification but did not truncate the stored follow-up duration: time remained measured from the deposit to the mapped withdrawal attempt or, when no withdrawal was observed, to the observation endpoint (July 16, 2020). Fitting a fixed-effects model with separate terms for each of our 21,720 players would require matrices too large to compute, so we estimated the analogous stratified model. Two exploratory, non-preregistered stratified Cox robustness checks (net wins as proportions of the deposit; interval since the preceding deposit) appear in Online Appendix E.

To account for potential impacts that recent gambling outcomes can have on a player's decision to withdraw funds, we incorporated daily net win variables into our model. Specifically, $NetWin_0$ and $NetWin_1$ serve as short-term proxies for wagering-related financial changes that might increase or decrease a player's propensity to withdraw funds, irrespective of the chosen deposit method. By adjusting for these observed fluctuations in wagering outcomes, the model estimates the association between deposit type and withdrawal frequency and timing conditional on recent net wins.

Results

Summary Statistics

Table 2 describes wagering days by the most recent deposit method and country; percentages are calculated within country. The final analytical sample included 21,781 unique players, comprising 9,626 from Germany, 4,689 from Great Britain, 4,511 from Spain, and 2,955 from France. Bank transfers appear to only be meaningfully used in Germany, and some methods are generally unused in other countries. Note that our Country variable refers to the country of registration, and it is unclear if some accounts may reflect actions taken while in a different country.

Table 2
Wagering Days by Most Recent Deposit Method and Country

	Germany		Spain		France		Great Britain	
	Freq.	**Percent**	**Freq.**	**Percent**	**Freq.**	**Percent**	**Freq.**	**Percent**
Bank Transfer	26,327	13.50	314	0.35	-	-	94	0.40
Credit Card	28,730	14.73	26,070	29.00	25,043	55.19	919	3.89
Debit Card	2,132	1.09	24,818	27.61	11,364	25.04	17,654	74.72
Voucher	28,612	14.67	11,180	12.44	2,672	5.89	86	0.36

	Germany		**Spain**		**France**		**Great Britain**	
	Freq.	**Percent**	**Freq.**	**Percent**	**Freq.**	**Percent**	**Freq.**	**Percent**
eWallet	108,750	55.77	25,545	28.42	5,978	13.17	4,770	20.19
Unknown Card	431	0.22	1,967	2.19	318	0.70	103	0.44
Total	194,982	100.00	89,894	100.00	45,375	100.00	23,626	100.00

In Table 3, we provide a cross-tabulation of the withdrawal type associated with each deposit type. Across the outlier-excluded deposit sample, 11.1% of deposits were followed by a withdrawal attempt under this event-classification rule. The remaining 88.9% were classified as no withdrawal because another deposit intervened before the mapped withdrawal or no withdrawal was observed during the data period. Among deposits followed by a withdrawal attempt, 22.8% were associated with a withdrawal channel different from the most recent deposit channel. This may be allowed even in a closed-loop system that requires players to withdraw using the same method as they deposited (Gambling Commission, 2025), if players had previously made deposits using multiple modalities. Also of note, after submitting a withdrawal request, users have an option of canceling the withdrawal before it is processed. We observed that roughly 26.48% (N = 6,688) of withdrawal requests were reversed.

Withdrawal channel was related to, but not perfectly coupled with, the most recent deposit channel. The most common withdrawal methods were eWallet (41.9%), debit or credit card (33.2%), and bank transfer (23.9%), and 22.8% of withdrawals used a method other than the most recent deposit method (Table 3). Account balances preceding withdrawals are unobserved. Although sports-slip settlement timestamps are available, the extract does not provide the complete transaction ledger needed to reconstruct exact balances, including bonuses, refunds, manual adjustments, fees, and exact transactions for other gaming products.

Table 3

Withdrawal Preference by Deposit Type

	Withdrawal Type					
Deposit Type	**Bank Transfer**	**Debit or Credit**	**eWallet**	**Other**	**No Withdrawal**	**Total**
Bank Transfer	1,158	21	190	8	18,833	20,210
	5.73%	0.10%	0.94%	0.04%	93.19%	100%
Credit Card	1,467	884	105	12	24,689	27,157
	5.40%	3.26%	0.39%	0.04%	90.91%	100%
Debit Card	517	4,919	38	46	22,889	28,409
	1.82%	17.31%	0.13%	0.16%	80.57%	100%
Voucher	510	21	300	86	21,290	22,207
	2.30%	0.09%	1.35%	0.39%	95.87%	100%
eWallet	562	43	6,888	16	54,938	62,447
	0.90%	0.07%	11.03%	0.03%	87.98%	100%
Unknown Card	75	77	3	0	1,340	1,495
	5.02%	5.15%	0.20%	0%	89.63%	100%
Total	4,289	5,965	7,524	168	143,979	161,925
	2.65%	3.68%	4.65%	0.10%	88.92%	100%

Note. Deposit categories differed from withdrawal categories in the source data.

The average total deposit amount across the observation period was €262.86 (SD = €2,334.29), with the number of deposits per user averaging 7.43 (SD = 37.92). The skewness (33.85) and kurtosis (1,521.91) of total deposit amounts were both large, indicating many smaller totals and a long right tail. A total of 7,300 unique players in the outlier-excluded roster made withdrawal requests. Among these players, the average total requested withdrawal amount, including reversed requests, across the observation period was €775.46 (SD = €7,132.05), and those users made an average of 3.46 withdrawal requests (SD = 15.07). The skewness (32.63) and kurtosis (1,458.33) of total requested withdrawal amounts were also large. Further descriptive statistics appear in Appendix 1.

In terms of value, players ultimately withdrew about half of the money they deposited (51.1%, counting successful withdrawals; Online Appendix F). This is substantially more than the 11.1% deposit-to-withdrawal event rate alone would suggest.

Overall, the data indicate substantial variability in both deposit and withdrawal behaviors, with long right tails even after the preregistered outlier exclusion. These findings suggest that while the typical user engages in relatively modest deposit and withdrawal activities, a smaller subset of the retained users engages in high-value transactions.

Wagering Model

The final data set included 353,877 observations across 21,781 unique users, with a minimum of 1 observation and a maximum of 711 observations per user. An *F*-test confirmed that the overall fixed-effects model explained a significant portion of the variation in daily total stakes, $F(19, 21780) = 30.27$, $p < 0.001$. As described in Table 4, relative to the base deposit type of Bank Transfer, the use of a Voucher ($B = -2.118$, SE = 0.589, $p < 0.001$) and the use of an eWallet ($B = -1.649$, SE = 0.500, $p = 0.001$) as the last payment type were each associated with a significant decrease in daily total stakes. Longer durations since the last deposit were also associated with lower total stakes ($B = -0.004$, SE = 0.001, $p = 0.002$). In exploratory specifications (Online Appendix D), when controlling for the most-recent deposit amount, both the voucher and the eWallet associations were not statistically significant, but the Deposit Amount × Deposit Type interaction was jointly significant. These estimates describe conditional associations and do not establish whether deposit amount causally explains the method differences.

Additionally, a significant interaction was observed between Debit Card usage and time; as the days since the last deposit increased, the negative association with stakes was more pronounced for Debit Card users compared to the baseline ($B = -0.008$, SE = 0.002, $p < 0.001$). As exploratory analyses, we re-estimated the results using different outcomes (see Online Appendix A) and examined full-sample country models (see Online Appendix B). Neither payment method nor the payment-method-by-time terms significantly predicted daily net win, defined as settled winnings minus stakes, or odds weighted by stakes, so the stakes associations did not extend to those outcomes.

Table 4

Fixed-Effects Regression Results Predicting Daily Total Stakes

Variable	**Coefficient**	**Std. Error**	***p*-value**
Credit Card	-0.669	0.597	0.263
Debit Card	-0.989	0.749	0.187
Voucher	-2.118	0.589	< 0.001
eWallet	-1.649	0.500	0.001
Unknown Card	-0.299	0.982	0.761
Days Since Last Deposit	-0.004	0.001	0.002
Credit Card × Days Since Last Deposit	0.000	0.001	0.837
Debit Card × Days Since Last Deposit	-0.008	0.002	< 0.001
Unknown Card × Days Since Last Deposit	-0.002	0.005	0.628
Voucher × Days Since Last Deposit	-0.001	0.002	0.686
eWallet × Days Since Last Deposit	0.000	0.001	0.739
Constant	15.853	0.460	< 0.001

Note. The base payment type is Bank Transfer. Payment-method main effects refer to the deposit day (zero days since deposit). The days-since-deposit coefficient refers to bank transfers; interaction coefficients describe differences in that time association by method. Indicator variables include Football Season; Euro Championship; World Cup; and Olympics. Cluster-robust standard errors are reported using users as the grouping variable.

Withdrawal Model

Using a stratified Cox Proportional Hazards model, we estimated the association between deposit type and the time to a withdrawal attempt, controlling for daily net win on settled bets on Day 0 and Day 1. The analysis included 21,720 unique users and 160,430 deposit events, of which 17,791 (11.1%) were followed by withdrawal attempts. The overall model was statistically significant (Wald $\chi^2(6) = 2{,}227.48$, $p < 0.001$).

As shown in Table 5, the payment-method estimates were consistent with the hypothesized role of transaction friction. eWallet deposits were associated with an 18% higher withdrawal hazard than bank transfers ($HR = 1.18$, $p = 0.001$), whereas voucher deposits, which have no direct withdrawal equivalent, were associated with a 45% lower hazard ($HR = 0.55$, $p < 0.001$). Credit-card and debit-card estimates were not statistically significant. Net wins on the day of deposit and the following day were positively associated with withdrawal ($HR = 1.0068$ and 1.0047 per €1, respectively; both $p < 0.001$). Exploratory robustness specifications appear in Online Appendix E.

Table 5

Cox Regression of Time from Successful Deposit to Withdrawal Attempt

Variable	**Hazard Ratio**	***p*-value**	**95% CI Lower**	**95% CI Upper**
Deposit Type (Base: Bank Transfer)				
Credit Card	0.90	.115	0.80	1.02
Debit Card	1.10	.185	0.95	1.27
Voucher	0.55	< .001	0.48	0.63
eWallet	1.18	.001	1.07	1.31
Net Win (€)				
$NetWin_0$	1.0068	< .001	1.0065	1.0071
$NetWin_1$	1.0047	< .001	1.0041	1.0054
N (observations)	160,430			
N (events)	17,791			
N (users)	21,720			

Note. Hazard ratios greater than 1 indicate a higher withdrawal hazard relative to Bank Transfer. Deposits classified as Unknown Card were excluded.

Online Appendix G reports otherwise identical full-sample sensitivity models for Tables 4 and 5. In the full-sample wagering model, none of the focal payment-method or timing terms was statistically significant. In the full-sample withdrawal model, voucher was associated with a lower withdrawal hazard ($HR = 0.64$, $p < .001$), eWallet was associated with a higher hazard ($HR = 1.10$, $p < .001$), and credit-card and debit-card estimates were nonsignificant. The preregistered outlier-excluded models remain the primary analyses.

Discussion

This study aimed to investigate the relationship between payment preferences and sports betting behavior by analyzing secondary player data from a European online sports gambling operator. We hypothesized that deposit methods would be related to intra-individual differences in betting consumption (H1) and that lower transaction friction in withdrawals, proxied by the deposit method, would increase withdrawal frequency (H2). Our findings, contextualized by notable patterns in the descriptive data, provide nuanced insights into these relationships, contributing to the growing body of literature on payment modality's impact on gambling (Palmer et al., 2022).

Initial observations showed substantial variability in player behavior and payment choices across different countries and transaction types. For instance, bank transfers were the most recent deposit method for 13.5% of wagering days in Germany, compared with 0.35% in Spain and 0.40% in Great Britain. Debit cards accounted for 74.72% of wagering days in Great Britain; credit cards accounted for 29.00% in Spain and 55.19% in France. eWallets accounted for 55.77% of wagering days in Germany. This regional variation underscores the influence of differing national financial infrastructures and consumer habits, reinforcing the rationale for our country-specific exploratory analyses in Online Appendix B and highlighting that broad generalizations about payment methods must be made cautiously.

The highly skewed distributions for total deposit and withdrawal-request amounts (skewness of 33.85 and 32.63, respectively), even after outlier removal, are also noteworthy. This implies that a relatively small proportion of users accounts for a disproportionately large volume of financial transactions, a common feature in gambling datasets that signals significant heterogeneity in engagement levels. The average deposit amount per transaction also varied considerably by type, with vouchers (€23.21) having a substantially lower mean than bank transfers (€52.69) or credit cards (€39.79). This inherent difference in typical transaction size for vouchers likely contributes to their association with lower subsequent wagering. Deposit method and amount may be closely related. Methods carry different minimum and maximum deposit limits, and players may choose methods to restrict or enable how much they deposit.

Consistent with H1, our wagering model revealed that the most recent deposit type was related to intra-individual differences in daily wager volume. Specifically, compared to bank transfers, using a voucher or an eWallet as the last deposit method was associated with a statistically significant decrease in total daily stakes. Consistent with expectations, a longer time elapsed since the last deposit was associated with lower total stakes. This decline is consistent with payment depreciation (Gourville & Soman, 1998), though it cannot be separated from mechanical balance depletion without balance data. The finding that vouchers are linked to lower stakes aligns with their descriptively smaller average deposit values. If individuals primarily bet with recently deposited funds, smaller voucher deposits would naturally lead to smaller stakes.

The observation that eWallets also predict lower stakes relative to bank transfers within individuals is more complex. While the "pain of paying" theory (Zellermayer, 1996) might suggest that more decoupled payment methods could lead to increased spending, our results suggest bank transfers, often perceived as more direct, were associated with higher stakes in this intra-individual comparison. This could perhaps be due to users making larger, less frequent deposits via bank transfer (supported by a higher mean deposit amount for bank transfers than eWallets), leading to a different mental accounting for those funds. Our exploratory analyses found no statistically significant payment-method associations with daily net win, defined as settled winnings minus stakes, or betting odds weighted by stakes, suggesting that the stakes associations did not extend to those outcomes.

Regarding H2, our withdrawal model investigated the time from deposit to the next withdrawal attempt. We hypothesized that deposit methods associated with lower transaction friction (i.e., faster withdrawal processing times) would increase withdrawal frequency. The stratified Cox model provided evidence consistent with H2. Compared with bank transfers, eWallet deposits were associated with a higher withdrawal hazard, voucher deposits with a lower hazard, and credit-card and debit-card deposits showed no statistically significant differences.

Within individuals, eWallet deposits were associated with an 18% higher withdrawal hazard than bank transfers, consistent with the lower processing friction described for that channel. Voucher deposits were associated with a 45% lower hazard, while credit-card and debit-card estimates were nonsignificant. The pattern should not be interpreted as a precise ranking of processing speed because deposit type is only a proxy for withdrawal friction and voucher deposits have no direct withdrawal equivalent. The lower voucher estimate could reflect greater transaction friction, differences in available funds, deliberate self-regulation, or selection into voucher use. Our data cannot differentiate among these explanations, and a lower withdrawal hazard is not itself evidence that vouchers are protective.

Several practical implications arise from these findings. The higher eWallet estimate and lower voucher estimate both align with the hypothesized relationship between withdrawal friction and withdrawal frequency. eWallets are generally faster, whereas vouchers have no direct withdrawal equivalent. The nonsignificant card estimates and the proxy nature of deposit type nevertheless counsel against a precise causal ranking of payment channels. Regulators considering restrictions on specific payment methods should also be cautious about generalizing from within-individual comparisons among multi-method users or from deposit type as a proxy for experienced withdrawal friction.

The withdrawal event rate (11.1% of deposits) and the high withdrawal reversal rate (26.48%) both warrant attention. The event rate likely reflects a combination of funds lost through betting, players maintaining account balances across sessions, and potentially a methodological artifact of our event-classification approach, whereby a withdrawal following two consecutive deposits is attributed only to the second. The reversal rate is particularly striking from a consumer protection standpoint. Roughly one in four withdrawal attempts is canceled before funds leave the platform, returning money to the gambling account for continued wagering. This raises questions about the adequacy of current withdrawal processes and lends empirical support to cooling-off periods during which withdrawal requests cannot be reversed. The reversal rate also carries interpretative implications. Because reversed withdrawals are coded as withdrawal events in our Cox model, the rate at which deposits are followed by successful extraction of funds is lower than 11.1%. In terms of value, players ultimately withdrew about half of the money they deposited (51.1%, counting successful withdrawals; Online Appendix F). A fuller characterization of funds withdrawn would account for players' account balances, but we did not have the data to complete this whole picture.

Limitations and Future Research

Several limitations should be considered when interpreting the findings. First, the data are sourced from a single European online sports betting operator and pertain to a specific cohort of users who registered in February 2015. This specificity may limit the generalizability of our findings to different regulatory environments, payment infrastructures, gambling products, operators, or more recent time periods that have seen further evolution in technologies and user behaviors.

Second, the observational nature of this secondary data analysis means that while we can identify associations between payment methods and betting behaviors by the same individuals, we cannot definitively establish causality. The model estimates associations solely from players who used more than one payment method during the observation period. These multi-method users may differ systematically from single-method users, and our within-individual estimates may not generalize to the broader population. This is especially relevant for voucher use. Voucher-only users may differ from those who also use other methods, but linked financial accounts and the motives for choosing vouchers are not observed. There is a strong likelihood of self-selection bias, where players' unobserved characteristics, preferences, or gambling intentions may influence both their choice of payment method and their subsequent betting patterns. Although our fixed-effects model controls for time-invariant individual characteristics, time-varying unobserved factors could still confound the results.

An exploratory comparison in Online Appendix F contrasts each single deposit method-only group with multi-method accounts that used the same deposit method. Because multi-method use is associated with greater overall platform engagement and selection may operate in both directions, these between-account differences are descriptive and should not be interpreted as causal effects of deposit method.

The full-sample sensitivity results in Online Appendix G also show that estimates differ when the preregistered wager-volume exclusion is not applied, so the primary findings should not be generalized to the highest or lowest-volume users.

Last, the operational constraint within the gambling industry that often requires withdrawals to be made to the same method used for deposits (due to anti-money laundering regulations) complicates the assessment of payment friction. Our use of the initial deposit method as a proxy for the anticipated or experienced friction of the withdrawal process is an assumption. The actual friction experienced could vary based on factors not captured, and players may withdraw to different methods than their most recent deposit if multiple deposit channels were previously used or if the deposit method has no direct withdrawal equivalent.

A further limitation is that account balances are unobserved. The data extract we received contains no balance information. Although sports-slip settlement timestamps are available, exact reconstruction is unreliable because the extract lacks a complete ledger of bonuses, refunds, manual adjustments, fees, and transactions for other gaming products. We therefore could not test balance-conditional questions and rely instead on same-day and next-day net wins as short-term proxies.

Replicating this study with more recent data from diverse geographical locations, and across a wider range of online gambling operators and product types would be crucial to assess the robustness and generalizability of our findings. The payment landscape is continually evolving, and newer methods like cryptocurrencies warrant dedicated investigation. To move beyond correlational findings, natural experiment research designs could be employed where feasible. Further qualitative research, including player interviews or focus groups, could provide deeper insights into the psychological mechanisms underlying payment method choices. Exploring players' own perceptions of convenience, security, privacy, mental accounting, and the "pain of paying" associated with different methods could complement quantitative findings and help explain observed behavioral patterns.

Several mechanisms could not be examined here and are priorities for future research. Withdrawal and wagering targets may be set as multiples of the deposit and differ by method. Testing such goal-attainment accounts requires session-level balance data, which would also separate time decay of payment effects from balance depletion and support analysis of balances around withdrawals and reversals, including whether cancellation relates to withdrawal method.

Finally, vouchers may raise friction in the short run yet lower it over time by serving as an on-ramp to account linkage, testable by tracing accounts that begin voucher-only and later initiate bank transfers.

Conclusion

This study offers three principal contributions to the understanding of payment methods in online gambling. First, drawing on a cohort of 72,494 newly registered players and within-individual models fitted to outlier-excluded analytic samples (21,781 players in the wagering model and 21,720 in the withdrawal model), we demonstrate that H1 was supported: deposit methods are significantly associated with intra-individual differences in daily wagering volume, with voucher and eWallet deposits predicting lower stakes relative to bank transfers within the same player. This finding persists after controlling for time-invariant individual heterogeneity, suggesting that payment method characteristics are associated with betting intensity. Second, H2 received qualified support: eWallet deposits predicted a higher within-individual withdrawal hazard than bank transfers, voucher deposits predicted a lower hazard, and credit-card and debit-card estimates were nonsignificant. The eWallet and voucher directions are consistent with their expected withdrawal friction, but because deposit type is an imperfect proxy and vouchers have no direct withdrawal channel, these estimates should not be read as a precise causal ranking of processing speed. Third, our descriptive findings reveal that 88.9% of deposits are classified as not followed by a withdrawal attempt because another deposit intervened or no withdrawal was observed, and that 26.48% of withdrawal requests are reversed before processing, which is a finding with immediate implications for consumer protection policy.

These results point to two policy considerations. First, regulators should not assume that non-bank payment methods have uniform associations with gambling behavior. The combination of lower stakes and a lower withdrawal hazard following voucher deposits does not establish whether vouchers are protective or instead impede access to funds, so restrictions on voucher use require targeted study rather than direct causal inference from these data. Second, the high withdrawal reversal rate supports the case for cooling-off periods, to protect players from impulsive decisions to continue gambling with funds they had decided to withdraw. More broadly, the substantial cross-country heterogeneity in payment method usage underscores the need for jurisdiction-specific rather than uniform regulatory approaches to payment restrictions in online gambling.

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Appendix 1

Appendix Table 1

Summary Statistics for Deposits and Withdrawal Requests per User

Statistic	Total Deposit Amount (EUR)	Total Number of Deposits	Deposit Days	Total Withdrawal Request Amount (EUR)	Withdrawal Requests	Withdrawal Request Days
Mean	262.86	7.43	5.35	775.46	3.46	2.75
Standard Deviation	2,334.29	37.92	16.67	7,132.05	15.07	7.66
Minimum	3.66	1	1	1.00	1	1
Maximum	137,685.00	1,726	618	390,235.00	686	351
N	21,781	21,781	21,781	7,300	7,300	7,300

Note. Withdrawal summaries include reversed requests and describe the 7,300 users who made a request; deposit summaries describe all 21,781 users. Days count distinct transaction dates.

Appendix Table 2

Summary Statistics for Deposit Amounts by Deposit Type

Deposit Type	Mean (EUR)	Standard Deviation (EUR)	Skewness	Kurtosis	Observations
Bank Transfer	52.69	123.88	10.02	139.98	20,210
Credit Card	39.79	62.64	9.68	185.83	27,157
Debit Card	36.21	73.13	11.00	202.63	28,409
Unknown Card	30.23	45.92	5.94	50.01	1,495
Voucher	23.21	24.03	5.03	77.98	22,207
eWallet	31.88	51.39	9.07	174.79	62,447

Appendix Table 3

Withdrawal Request Amounts by Payment Type (Including Reversals)

Payment Type	Mean (EUR)	Standard Deviation (EUR)	Skewness	Kurtosis	Observations
Bank Transfer	356.62	1,738.27	27.03	993.93	6,857
Debit or Credit Card	165.20	392.12	8.04	93.27	7,825
Other	99.55	68.49	1.41	5.50	249
eWallet	183.85	448.42	9.77	153.20	10,324

Appendix Table 4

Deposits per Deposit Day and Withdrawal Requests per Request Day

Statistic	**Deposits per Deposit Day**	**Withdrawal Requests per Request Day**
Mean	1.39	1.26
Standard Deviation	1.40	0.97
Minimum	1	1
Maximum	87	29
Observations	116,538	20,107
Skewness	12.36	9.03
Kurtosis	375.23	149.41

Note. Withdrawal requests include requests subsequently reversed.

Appendix 2

Appendix Table 5

Wagering Days by Most Recent Deposit Method and Country – Outliers Included

	Germany		Spain		France		Great Britain	
	Freq.	**Percent**	**Freq.**	**Percent**	**Freq.**	**Percent**	**Freq.**	**Percent**
Bank Transfer	83,378	15.80	816	0.28	-	-	655	1.36
Credit Card	83,458	15.81	90,656	31.62	70,625	45.47	3,111	6.46
Debit Card	5,066	0.96	81,897	28.57	48,750	31.38	32,641	67.82
Voucher	87,864	16.65	33,631	11.73	16,238	10.45	993	2.06
eWallet	266,176	50.44	72,013	25.12	18,137	11.68	10,537	21.89
Unknown Card	1,786	0.34	7,669	2.68	1,581	1.02	192	0.40
Total	527,728	100.00	286,682	100.00	155,331	100.00	48,129	100.00

Note. Frequencies count wagering days classified by the most recent deposit method. Percentages are calculated within country.

Appendix 3

Appendix Table 6

Fixed-Effects Regression Results for Total Stakes – Outliers Removed (Base Last Deposit Type: eWallet)

	(1) **Germany**	**(2)** **Spain**	**(3)** **France**	**(4)** **Great Britain**	**(5)** **All Countries**
Bank Transfer	**1.954*****	-0.349		**38.192*****	**1.946*****
	(0.502)	(5.551)		(6.389)	(0.502)
Voucher	0.723	-2.332	**-6.576***	-17.330	0.675
	(0.495)	(1.349)	(2.907)	(10.795)	(0.493)
Debit Card	1.389	-0.834	2.436	-3.526	1.622
	(1.128)	(0.964)	(1.699)	(2.105)	(1.104)
Credit Card	**1.285****	-0.401	1.249	2.432	**1.186***
	(0.487)	(0.850)	(1.253)	(3.215)	(0.482)
Unknown Card	0.839	0.121	2.298	10.189	0.740
	(1.453)	(1.329)	(2.181)	(6.418)	(1.449)
Days Since Last Deposit	**-0.003*****	**-0.003*****	-0.008	**-0.027****	**-0.003*****
	(0.000)	(0.001)	(0.005)	(0.008)	(0.000)
Voucher x Days Since	-0.002	0.001	0.004	**-0.517****	-0.001
	(0.001)	(0.003)	(0.007)	(0.200)	(0.001)
Unknown Card x Days Since	-0.009	0.000	0.009	-0.061	-0.003
	(0.013)	(0.003)	(0.009)	(0.043)	(0.005)
Debit Card x Days Since	0.000	-0.003	-0.001	-0.004	**-0.008*****
	(0.002)	(0.002)	(0.006)	(0.010)	(0.002)
Credit Card x Days Since	**-0.002***	0.000	0.005	0.008	-0.001
	(0.001)	(0.001)	(0.006)	(0.010)	(0.001)
Bank Transfer x Days Since	-0.001	-0.007		0.192	-0.000
	(0.001)	(0.009)		(0.103)	(0.001)
Season 2015	**-1.298*****	**-1.666*****	**-2.930*****	**-9.405*****	**-2.015*****
	(0.150)	(0.247)	(0.475)	(1.155)	(0.133)
Season 2016	**-1.106*****	**-1.656*****	**-1.548***	**-7.071*****	**-1.595*****
	(0.189)	(0.339)	(0.663)	(1.539)	(0.171)
Season 2017	**-1.376*****	**-0.831***	**-2.881*****	-0.943	**-1.465*****
	(0.205)	(0.419)	(0.750)	(2.318)	(0.200)
Season 2018	**-0.645***	-0.387	-1.027	**-11.617*****	**-1.024*****
	(0.251)	(0.601)	(1.002)	(2.229)	(0.235)
Season 2019	**-0.582***	0.908	-1.687	**-15.367*****	**-0.716***
	(0.282)	(0.854)	(1.253)	(4.000)	(0.285)
Euro 2016	0.030	-0.472	0.103	**12.482*****	**0.965****
	(0.327)	(0.758)	(0.722)	(2.650)	(0.330)
World Cup 2018	**1.827*****	1.132	1.517	**-8.970****	**1.144****
	(0.514)	(0.846)	(1.618)	(3.187)	(0.428)

	(1) Germany	(2) Spain	(3) France	(4) Great Britain	(5) All Countries
Olympics 2016	-0.830	-0.483	**-2.649****	-5.180	**-1.449****
	(0.440)	(0.945)	(0.861)	(2.910)	(0.467)
Constant	**10.922*****	**14.851*****	**17.794*****	**35.785*****	**14.410*****
	(0.173)	(0.601)	(1.079)	(1.662)	(0.253)
Observations	194,982	89,894	45,375	23,626	353,877
Number of Groups	9,626	4,511	2,955	4,689	21,781
Payment and Country Interaction Terms	No	No	No	No	Yes
F-statistic	15.593	6.718	5.077	13.321	21.402

Note. eWallet is the base last deposit type because every country had a large eWallet sample (minimum N = 4,770). Cluster-robust standard errors are reported using UserID as the grouping variable.

Online Appendix A

As exploratory analyses, we re-estimated the results using daily net win and odds of winning weighted by stakes as dependent variables. In the daily-net-win model (settled winnings minus stakes), none of the payment-method main effects was statistically significant relative to bank transfers. Days since the last deposit and all payment-method-by-time interactions were also nonsignificant.

The model predicting odds of winning weighted by stakes similarly yielded no statistically significant payment-method main effects relative to bank transfers. Neither the time since the last deposit (p = 0.250) nor any payment-method interaction terms reached statistical significance. Taken together, these exploratory models indicate that the payment-method associations observed for stakes did not extend to daily net win or odds weighted by stakes.

Table A1

Daily Net Win

Variable	Coefficient	Std. Error	P-value
Credit Card	0.213	0.526	.685
Debit Card	-0.317	0.682	.642
Unknown Card	-0.769	0.800	.336
Voucher	-0.555	0.581	.339
eWallet	0.086	0.467	.855
Days Since Last Deposit	-0.0008	0.0006	.184
Credit Card x Days Since Last Deposit	0.0003	0.0007	.696
Debit Card x Days Since Last Deposit	0.0011	0.0010	.283
Unknown Card x Days Since Last Deposit	-0.0006	0.0027	.820
Voucher x Days Since Last Deposit	0.0005	0.0009	.522
eWallet x Days Since Last Deposit	-0.0003	0.0008	.743
Constant	-2.907	-	-

Note. The base payment type is Bank Transfer. Indicator variables include Football Season; Euro Championship; World Cup; and Olympics. Cluster-robust standard errors are reported using users as the grouping variable. The fixed-effects constant depends on the normalization of the absorbed player effects; its standard error and p value are omitted.

Table A2
Betting Odds Weighted by Stakes

Variable	Coefficient	Std. Error	*p*-value
Credit Card	-1490.53	1083.405	0.169
Debit Card	-1740.8	1147.679	0.129
Unknown Card	-1634.61	1096.595	0.136
Voucher	-1355.91	978.866	0.166
eWallet	-1404.01	1141.781	0.219
Days Since Last Deposit	-12.54	10.892	0.250
Credit Card x Days Since Last Deposit	11.85	10.717	0.269
Debit Card x Days Since Last Deposit	11.54	10.725	0.282
Unknown Card x Days Since Last Deposit	10.75	10.577	0.309
Voucher x Days Since Last Deposit	12.38	10.830	0.253
eWallet x Days Since Last Deposit	12.11	10.762	0.260
Constant	1,760.247	-	-

Note. The base payment type is Bank Transfer. Indicator variables include Football Season; Euro Championship; World Cup; and Olympics. Cluster-robust standard errors are reported using users as the grouping variable. The fixed-effects constant depends on the normalization of the absorbed player effects; its standard error and p value are omitted.

Online Appendix B

This online appendix reports the country-specific fixed-effects regression with outliers included. The corresponding wagering-day deposit-method table and outlier-removed regression are reported in Appendices 2 and 3, respectively. The comparison shows how the country-specific estimates change when the preregistered wager-volume exclusion is not applied.

When outliers are included in the fixed-effects regression analysis, voucher use is associated with lower total stakes in Germany, Spain, France, and the combined All Countries model. Great Britain had few voucher-associated wagering days (N = 993), and its voucher estimate was nonsignificant. The All Countries model estimates that voucher use is related to 40.887 units lower stakes (p = .004), with estimates of similar direction in Germany, Spain, and France. Given that low-volume outliers are less likely to have used multiple payment types - reducing their influence in this fixed-effects design - the larger full-sample estimate likely reflects the behavior of high-volume users who used vouchers at some point in the study period.

Table B1

Fixed-Effects Regression Results for Total Stakes – Outliers Included (Base Last Deposit Type: eWallet)

	(1)	**(2)**	**(3)**	**(4)**	**(5)**
	Germany	**Spain**	**France**	**Great Britain**	**All Countries**
Bank Transfer	-6.947	11.979		-188.743	-6.360
	(24.844)	(43.769)		(199.074)	(25.175)
Voucher	**-42.464****	**-48.983***	**-67.228****	-334.697	**-40.887****
	(14.035)	(19.824)	(24.695)	(297.919)	(14.147)
Debit Card	-13.391	-59.369	-16.260	9.509	-15.123
	(17.895)	(38.157)	(17.180)	(20.342)	(17.861)
Credit Card	11.291	2.103	-12.265	-20.010	11.485
	(14.856)	(16.678)	(15.987)	(18.036)	(14.823)
Unknown Card	-8.265	-45.942	-6.859	11.990	-9.889
	(14.706)	(26.853)	(22.440)	(15.406)	(14.037)
Days Since Last Deposit	-0.011	**-0.052***	-0.035	**-0.090***	**-0.023*****
	(0.007)	(0.021)	(0.020)	(0.039)	(0.007)
Voucher x Days Since	0.009	0.007	**0.091***	0.478	0.016

	(1) Germany	(2) Spain	(3) France	(4) Great Britain	(5) All Countries
	(0.007)	(0.025)	(0.040)	(0.489)	(0.008)
Unknown Card x Days Since	0.002	0.002	-0.054	-0.038	-0.026
	(0.035)	(0.142)	(0.094)	(0.089)	(0.108)
Debit Card x Days Since	0.003	0.020	-0.033	0.064	-0.011
	(0.009)	(0.026)	(0.044)	(0.042)	(0.015)
Credit Card x Days Since	-0.005	-0.009	0.016	-0.046	-0.009
	(0.007)	(0.014)	(0.022)	(0.124)	(0.006)
Bank Transfer x Days Since	-0.010	0.008		-0.354	-0.003
	(0.021)	(0.026)		(0.392)	(0.020)
Season 2015	-4.178	-10.247	-5.874	12.002	-5.569
	(2.740)	(9.366)	(3.724)	(14.246)	(3.196)
Season 2016	**-12.647****	16.323	-6.601	-12.948	-3.663
	(4.820)	(13.795)	(3.846)	(8.240)	(4.741)
Season 2017	-2.073	7.795	3.185	-12.088	1.432
	(5.635)	(8.598)	(5.630)	(10.291)	(4.114)
Season 2018	9.614	59.494	8.670	-13.883	22.047
	(13.809)	(46.782)	(6.213)	(10.013)	(14.634)
Season 2019	9.241	43.879	16.698	-0.121	**18.850***
	(8.013)	(24.553)	(10.840)	(13.226)	(8.118)
Euro 2016	-4.141	-13.908	-1.241	15.128	-4.061
	(2.947)	(15.770)	(4.600)	(18.480)	(3.799)
World Cup 2018	5.084	19.704	**19.919***	-12.923	10.243
	(7.513)	(19.643)	(9.682)	(9.964)	(6.902)
Olympics 2016	-6.538	-37.473	1.736	-7.959	**-13.449***
	(3.655)	(19.718)	(8.767)	(6.509)	(5.942)
Constant	**53.941*** **	**109.407*** **	**81.822*** **	**110.551*** **	**75.020*** **
	-	-	-	-	-
Observations	527,728	286,682	155,331	48,129	1,017,870
Number of Groups	11,124	5,717	3,673	5,004	25,518
Payment and Country Interaction Terms	No	No	No	No	Yes
F-statistic	4.064	1.933	2.410	2.390	3.773

Note. Cluster-robust standard errors are reported using UserID as the grouping variable. The fixed-effects constants depend on the normalization of the absorbed player effects; their standard errors are omitted.

Online Appendix C

Withdrawal-processing times for one of the sites owned by the data provider are shown in Figure C1. These published times demonstrate the challenges of inferring processing time from the categories in our dataset, because a method recorded as a single mechanism (e.g., 'Bank Transfer') may encompass more specific methods, such as Instant Banking, with different processing times.

Figure C1

bwin Withdrawal Time - Payment Options (AceOdds.com, 2024)

Method	Processing Time	Min	Fee
Bank Transfer	3 - 5 Banking Days	£10.00	Free
instant banking Instant Banking	Instant	£5.00	Free
VISA mastercard Debit Card, Visa, MasterCard, Maestro, Electron	3 - 5 Banking Days	£10.00	Free
VISA FAST FUNDS Visa Fast Funds	Under 4 Hours	£10.00	Free
NETELLER NETELLER	Up to 24 Hours	£10.00	Free
PayPal PayPal	Up to 24 Hours	£10.00	Free
paysafe card paysafecard	Up to 24 Hours	£10.00	Free
Skrill Skrill	Up to 24 Hours	£10.00	Free

[1] https://help.bwin.com/en/general-information/payments/withdrawal/withdrawal_methods-and-times

Online Appendix D

This online appendix is exploratory, non-preregistered analysis

Deposit amount and deposit method are partly confounded by construction (different deposit limits; method choice may itself serve as spending control), so moderate collinearity is expected; the deposit-amount interactions suggest, but cannot precisely resolve, whether some methods indicate proportionally larger immediate wagering as a fraction of the deposit.

Controlling for the most-recent deposit amount, deposit amount predicted stakes ($B = 0.26$, $SE = 0.03$, $p < .001$) and the voucher and eWallet associations were no longer significant ($B = -0.76$, $SE = 0.58$, $p = .19$; $B = -0.56$, $SE = 0.51$, $p = .27$; attenuations of roughly 64% and 68%), while the days-since-deposit association persisted ($B = -0.009$, $SE = 0.004$, $p = .014$). The Deposit Amount × Deposit Type interaction was jointly significant (Wald $F = 3.60$, $p = .003$): voucher ($B = 0.31$, $p = .002$) and debit-card ($B = 0.14$, $p = .019$) deposits showed steeper stake-to-deposit gradients.

Table D1

Fixed-Effects Regression of Daily Total Stakes (deposit-amount specifications)

Variable	**M0 Baseline: B (SE)**	**M1 + Deposit Amount: B (SE)**	**M2 + Interaction: B (SE)**
Credit Card	-0.669 (0.613)	-0.372 (0.600)	-†
Debit Card	-1.151 (0.777)	0.248 (0.783)	-†
Voucher	-2.091*** (0.602)	-0.761 (0.575)	-†
eWallet	-1.728*** (0.515)	-0.560 (0.507)	-†
Unknown Card	-0.355 (1.019)	0.070 (0.912)	-†
Days Since Last Deposit	-0.004** (0.001)	-0.009* (0.004)	-0.008** (0.003)
Deposit Amount	-	0.262*** (0.028)	0.208*** (0.040)
Voucher × Deposit Amount	-	-	0.314** (0.102)
Debit Card × Deposit Amount	-	-	0.142* (0.060)
eWallet × Deposit Amount	-	-	0.064 (0.047)
Credit Card × Deposit Amount	-	-	-0.031 (0.053)
Unknown Card × Deposit Amount	-	-	0.086 (0.119)

Note. The carry-forward panel contained 337,415 user-days and 20,512 users; after removal of 3,514 singleton observations, all models used 333,901 user-days and 16,998 fixed-effect users. Base = Bank Transfer. Soccer-season, tournament, and Payment Type × Days-Since-Deposit terms are included but not shown; SEs are clustered by user. † M2 payment-type main effects are conditional on a €0 deposit and are not interpreted. * $p < .05$, ** $p < .01$, *** $p < .001$. M0 and M1 use the same sample. Within-transformed-design VIFs were modest (maximum = 2.59, eWallet; mean = 1.77); M2 interactions increase collinearity by construction. Exploratory, non-preregistered.

Online Appendix E

This online appendix is exploratory, non-preregistered analysis

Expressed as proportions of the deposit, both same-day and next-day net win positively predicted withdrawal (HR = 1.1275 and 1.0671, respectively; both $p < .001$). The ratio model preserved the main payment-method pattern: voucher was associated with a lower hazard, eWallet with a higher hazard, and the card estimates were nonsignificant. The absolute-net-win model fit better than the ratio model (AIC 104,525 vs. 104,624). Adding the interval since the previous deposit yielded no significant spacing effect (HR = 0.9999 per day, $p = .111$). In the model that added days since the previous deposit, voucher remained associated with a lower hazard, eWallet was nonsignificant ($p = .051$), and the card estimates were nonsignificant.

Table E1

Cox Robustness Specifications (additions to the stratified withdrawal model)

Specification	**Voucher HR [95% CI]**	**Same-day term (HR)**	**Next-day term (HR)**	**Added covariate (HR)**	**AIC**	**Concord.**
Main model (absolute net win)†	0.55 [0.48, 0.63]	net win 1.0068	net win 1.0047	-	104,525	0.522
Net-win-to-deposit ratio	0.53 [0.46, 0.61]	ratio 1.1275	ratio 1.0671	-	104,624	0.523
Time since previous deposit	0.65 [0.56, 0.75]	net win 1.0067	net win 1.0047	days since prev. deposit 0.9999	98,883‡	0.529

Note. Stratified (within-individual) Cox proportional-hazards models. In the main and ratio specifications, voucher was associated with a lower withdrawal hazard and eWallet with a higher hazard; credit-card and debit-card estimates were nonsignificant. In the spacing specification, voucher remained significant, eWallet was nonsignificant ($p = .051$), and the card estimates were nonsignificant. Same-day and next-day net win, including their deposit-ratio forms, were statistically significant; days since the previous deposit was not. † Main model = the stratified model reported in Table 5. ‡ The deposit-spacing model is fit on the subsample with an observed preceding deposit (first deposits excluded), so its AIC is not comparable to the other rows. Exploratory, non-preregistered.

Online Appendix F

This online appendix is exploratory, non-preregistered analysis

Players ultimately withdrew 51.1% of deposited money through successful withdrawals, ranging among single-method accounts from 25.4% (voucher) to 69.7% (debit card).

Table F1

Withdrawal Value Ratios by Deposit Method

Withdrawal-to-deposit value ratio (successful withdrawals; outlier-excluded analytic sample)

Deposit method	Accounts (N)	% of deposited funds withdrawn
Debit Card	4,973	69.7
Unknown Card	111	56.7
eWallet	6,435	54.2
Credit Card	3,722	42.3
Bank Transfer	885	28.0
Voucher	2,240	25.4
Overall (outlier-excluded sample)	21,781	51.1

Note. Method-specific rows describe accounts that used only the named successful deposit method; the overall row includes all 21,781 retained accounts, including multi-method accounts. Percentages count successful (settled) withdrawals - money that left the platform. Of requested withdrawal value, 48.3% was subsequently reversed.

The analysis in Online Appendix F pairs each method-only group with multi-method accounts that used the same method. The analysis uses the preregistered four-country roster after the wager-volume outlier exclusion. Of 21,781 retained accounts, 18,366 used one successful deposit-method category and 3,415 used multiple categories. Because a multi-method account can use several categories, it may appear in more than one method pair.

Voucher-only accounts (N = 2,240) were compared with 1,419 multi-method accounts that used vouchers. Voucher deposits were larger among voucher-using multi-method accounts than among voucher-only accounts (account-level mean deposit size: €30.46 vs. €24.78), and these accounts made more voucher deposits (M = 8.79 vs. 4.35) and deposited more by voucher (M = €219.33 vs. €91.18). They also had greater total sports stakes (M = €403.49 vs. €174.31), more betting days (M = 27.11 vs. 11.52), and more withdrawal activity (50.4% vs. 8.7% made any withdrawal request; M = 4.52 vs. 0.18 requests per account).

The remaining rows provide the same paired comparison for bank transfer, credit card, debit card, eWallet, and unknown card. These comparisons are descriptive and between accounts. Multi-method use is itself associated with greater platform engagement, and selection may operate in both directions. The profiles therefore should not be interpreted as causal payment-method effects.

Table F2

Deposit, Sports-Wagering, and Withdrawal Profiles: Method-Only Versus Method-Using Multi-Method Accounts

Panel A. Deposit activity

Method group	N	Named-method deposits/account, M (SD)	Named-method deposit size, € M (SD)	Named-method deposited/account, € M (SD)
Voucher only	2,240	4.35 (9.24)	24.78 (28.67)	91.18 (198.15)
Voucher multi	1,419	8.79 (26.85)	30.46 (29.72)	219.33 (917.67)
Bank only	885	5.07 (16.71)	32.70 (69.14)	191.72 (1,146.41)
Bank multi	950	16.55 (56.55)	41.98 (106.80)	942.37 (5,710.41)
Credit only	3,722	3.50 (16.52)	42.83 (66.25)	137.87 (1,457.84)
Credit multi	1,377	10.27 (36.90)	35.98 (59.34)	412.01 (1,853.72)

Method group	N	Named-method deposits/account, M (SD)	Named-method deposit size, € M (SD)	Named-method deposited/account, € M (SD)
Debit only	4,973	3.48 (16.17)	33.03 (48.54)	132.22 (1,341.66)
Debit multi	982	11.30 (62.71)	33.48 (41.94)	374.41 (2,019.24)
eWallet only	6,435	4.89 (23.34)	26.29 (36.59)	123.94 (661.03)
eWallet multi	2,465	12.57 (52.55)	33.34 (49.38)	483.98 (3,240.09)
Unknown only	111	2.58 (8.74)	48.03 (77.64)	89.44 (192.86)
Unknown multi	220	5.64 (15.84)	32.82 (44.83)	176.02 (515.62)

Panel B. Sports-wagering activity

Method group	Sports stakes/account, € M (SD)	Betting days/account, M (SD)
Voucher only	174.31 (249.97)	11.52 (23.83)
Voucher multi	403.49 (352.45)	27.11 (41.65)
Bank only	172.17 (252.41)	16.94 (40.85)
Bank multi	363.57 (347.16)	33.88 (47.92)
Credit only	224.17 (277.44)	14.94 (27.80)
Credit multi	431.85 (366.20)	39.81 (54.48)
Debit only	171.85 (231.60)	8.38 (18.95)
Debit multi	421.88 (355.26)	33.35 (55.78)
eWallet only	187.17 (258.72)	16.51 (32.13)
eWallet multi	395.26 (349.39)	30.43 (44.45)
Unknown only	172.39 (203.60)	5.42 (11.62)
Unknown multi	502.32 (396.89)	53.25 (67.53)

Panel C. Withdrawal activity

Method group	Any request (%)	Requests/account, M (SD)	Successful amount/account, € M (SD)	Reversed requests (%)
Voucher only	8.7	0.18 (0.80)	23.14 (128.08)	21.4
Voucher multi	50.4	4.52 (26.23)	477.08 (2,158.22)	42.4
Bank only	9.9	0.46 (7.30)	53.70 (608.01)	45.6
Bank multi	50.0	5.92 (24.62)	864.68 (4,020.67)	49.8
Credit only	20.3	0.37 (1.42)	58.33 (888.87)	10.3
Credit multi	52.1	4.80 (24.99)	641.68 (3,281.38)	42.2
Debit only	49.0	0.89 (3.50)	92.12 (959.45)	14.1
Debit multi	66.3	5.49 (32.00)	525.87 (2,503.15)	34.0
eWallet only	30.0	0.74 (2.61)	67.18 (494.03)	11.8
eWallet multi	58.1	3.95 (16.06)	539.61 (2,834.15)	36.7
Unknown only	30.6	0.33 (0.53)	50.69 (97.93)	8.1
Unknown multi	64.5	13.57 (61.32)	1,079.00 (3,719.88)	45.3

Note. Each method-only row contains accounts that used only the named successful deposit method; the adjacent multi-method row contains accounts that used the named method plus at least one other method. Multi-method accounts may appear in more than one pair. Deposit measures use only transactions of the named method. Wagering and withdrawal measures describe total account activity because those outcomes cannot be uniquely assigned to a deposit method for multi-method accounts. The table uses the four-country roster after the preregistered wager-volume exclusion (21,781 accounts: 18,366 single-method and 3,415 multi-method). M = mean; SD = standard deviation. Descriptive/exploratory.

Online Appendix G

This online appendix is exploratory, non-preregistered analysis

Sensitivity of Tables 4 and 5 to the Preregistered Wager-Volume Exclusion

Online Appendix G compares the preregistered outlier-excluded estimates reported in main Tables 4 and 5 with otherwise identical models estimated on the full available samples. The full-sample specifications are sensitivity analyses and do not replace the preregistered primary estimates.

Table G1

Sensitivity of Table 4 Fixed-Effects Stakes Estimates to the Wager-Volume Exclusion

Variable	Outlier-excluded B (SE)	p	Full sample B (SE)	p
Credit Card	-0.669 (0.597)	.263	16.672 (21.076)	.429
Debit Card	-0.989 (0.749)	.187	-16.627 (28.948)	.566
Unknown Card	-0.299 (0.982)	.761	-15.353 (25.852)	.553
Voucher	-2.118 (0.589)	< .001	-38.738 (25.451)	.128
eWallet	-1.649 (0.500)	< .001	8.903 (23.744)	.708
Days Since Last Deposit	-0.004 (0.001)	.002	-0.025 (0.017)	.148
Credit Card × Days Since Last Deposit	0.000 (0.001)	.837	-0.007 (0.020)	.737
Debit Card × Days Since Last Deposit	-0.008 (0.002)	< .001	-0.012 (0.024)	.607
Unknown Card × Days Since Last Deposit	-0.002 (0.005)	.628	-0.036 (0.107)	.737
Voucher × Days Since Last Deposit	-0.001 (0.002)	.686	0.018 (0.023)	.435
eWallet × Days Since Last Deposit	0.000 (0.001)	.739	0.002 (0.020)	.936

Note. Bank Transfer is the reference category. Both models retain Table 4's payment-method-by-days-since-deposit terms, sporting-event controls, player fixed effects, and UserID-clustered standard errors. The fixed-effects constant is omitted because it depends on the normalization of the absorbed player effects. Outlier-excluded: N = 353,877 player-days, 21,781 players, within R^2 = .0027. Full sample: N = 1,017,870 player-days, 25,518 players, within R^2 = .0011. B = unstandardized coefficient; SE = standard error.

Table G2

Sensitivity of Table 5 Stratified Cox Estimates to the Wager-Volume Exclusion

Variable	Outlier-excluded HR [95% CI]	p	Full sample HR [95% CI]	p
Credit Card	0.9034 [0.7963, 1.0249]	.115	1.0389 [0.9766, 1.1052]	.227
Debit Card	1.1016 [0.9548, 1.2709]	.185	1.0386 [0.9667, 1.1157]	.301
Voucher	0.5511 [0.4801, 0.6326]	< .001	0.6425 [0.6002, 0.6878]	< .001
eWallet	1.1814 [1.0670, 1.3080]	.001	1.0992 [1.0419, 1.1596]	< .001
Same-Day Net Win	1.00682 [1.00652, 1.00712]	< .001	1.00150 [1.00146, 1.00154]	< .001
Next-Day Net Win	1.00472 [1.00409, 1.00535]	< .001	1.00046 [1.00042, 1.00050]	< .001

Note. Bank Transfer is the reference category. Both models retain Table 5's event coding, stored timing convention, same- and next-day net-win controls, player strata, estimator, and standard errors. Outlier-excluded: N = 160,430 deposits, 21,720 players, 17,791 events, concordance = .522, likelihood-ratio $\chi^2(6) = 1{,}971.79$, $p < .001$, AIC = 104,525. Full sample: N = 549,710 deposits, 25,472 players, 52,619 events, concordance = .659, likelihood-ratio $\chi^2(6) = 6{,}738.99$, $p < .001$, AIC = 465,176. HR = hazard ratio; CI = confidence interval.