The Impact of Live Sports Broadcasting on Digital Piracy and its Societal Consequences

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Abstract

This study investigates the impact of digital piracy on illegal gambling activities in the context of live sports broadcasting. When previously free content becomes restricted, users may resort to illegal channels to access the content. This research analyzes the relationship between digital piracy and illicit gambling by examining a specific event in South Korea where a media company introduced a subscription model for English Football League broadcasts. The study finds a positive correlation between increased visits to illegal sports broadcasting websites and higher engagement in illegal gambling. These findings contribute to our understanding of the consequences of digital piracy and provide insights for industry stakeholders and policymakers.

Keywords: Digital piracy, live content, sports broadcasting, illegal gamble

1. Introduction

Digital piracy, encompassing the illegal sharing of copyrighted files, has evolved with real-time network technologies and the rise of live-streaming services (Hill 2007; Moore and McMullan 2009; Wong 2016). This has led to the emergence of "live-streaming piracy," involving the unauthorized retransmission of live content through illicit broadcasting websites (Wong, 2016). Of particular concern is the impact on the live content industry, especially live sports content operators, who risk losing customers to illegal streaming sites.

The availability of live sports games on such platforms poses not only a threat to the sports broadcasting industry (Horner, 2013) but also societal consequences, as these sites often have affiliations with illegal gambling platforms. This connection between live content piracy and illicit gambling activities remains largely unexplored in the literature, which has predominantly focused on piracy's effects on conventional media content (Bai and Waldfogel 2012; Herz and Kiljański 2018; Lu et al, 2021).

To address this research gap, this study investigates the causal relationship between live sports content piracy and illegal gambling activities. The study utilizes a unique setting in South Korea, where the cessation of English Premier League (EPL) broadcasting rights to other outlets led users to visit illegal streaming sites associated with illicit gambling platforms (Horner, 2013). The research employs a difference-in-differences design, treating EPL games (excluding matches involving Tottenham Hotspur Football Club) as the treatment group and football matches from France Ligue 1 as the control group.

Through data collected from the most popular illegal sports streaming website in Korea, the study finds that an increase in visits to illicit streaming platforms corresponds to a higher number of illicit sports gamblers on illegal gambling sites (Horner, 2013). These findings indicate the distinct piracy patterns between time-sensitive live sports content and time-insensitive content, highlighting the significance of the study's results.

This research contributes to the literature by examining the impact of live-streaming piracy on illegal gambling, shedding light on an overlooked aspect of media content piracy. The findings emphasize the unintended negative consequences of live content piracy and provide valuable insights for policymakers aiming to curb underground unlawful gambling incidents facilitated by illegal streaming platforms.

2. Literature Review

2.1. Digital Piracy

While previous studies have primarily focused on the piracy of conventional media content, such as movies and music (Rob and Waldfogel 2007; Ma et al. 2014; Telang and Waldfogel 2018), the piracy of live content and its potential societal consequences remain largely unexplored. Lu et al. (2020) argue that digital piracy can have positive effects in the movie industry

due to word-of-mouth (WOM) effects from illegal users. They find that post-release piracy is positively associated with WOM volume, and that the presence of post-release piracy actually increases box office revenue. Similarly, Peukert et al. (2017) demonstrate that the shutdown of a popular piracy channel negatively affects the box office revenue of an average movie. Regarding the availability of media content on over-the-top (OTT) platforms and its impact on piracy, Danaher et al. (2010) find that the removal of TV show content from OTT services leads to an increase in content piracy (substitution effect). They also find that delivering TV shows on OTT platforms reduces attempts to share illegal content (Danaher et al. 2015)

However, the research on the piracy of live content is limited, leaving a gap in the existing literature. This study aims to contribute to this body of research by investigating the digital piracy of live sports content and its potential correlation with other illicit activities such as gambling. In addition to exploring this specific area, our study also incorporates a comprehensive review of two related research domains: studies on online gambling and the broader societal implications of online platforms. By integrating these areas, our research aims to provide valuable insights into the complex relationship between live sports content piracy and its potential consequences.

2.2 Online Gambling

The advancement of Internet technologies has fueled a substantial growth in both legal and illegal gambling activities, enabling remote interactions and transcending national boundaries (Gainsbury and Wood 2011). Online gambling research has garnered significant attention across various academic disciplines, although information systems (IS) studies in this area remain limited. Abarbanel et al. (2017) investigate the influence of online gambling site atmospherics on gamblers' behavioral intentions, employing the stimulus-organism-response (SOR) structural model. Hou et al. (2019) explore the impact of IT-based disruption on users' unwanted online gambling habits, particularly in relation to illegal gambling webpages. Ma et al. (2014) develop a conceptual model of online gambling and empirically test it using longitudinal data, finding that users' online gambling behavior is influenced by cumulative net gains or losses.

While early research on illegal gambling primarily focused on legalizing or reducing the industry, recent studies have shed light on the structure and associated illicit activities. Wang and Antonopoulos (2016) identify personal connections, known as "guanxi," as a prominent means for illegal gambling entrepreneurs to access potential customers. Albanese (2018) highlights the interconnectedness of illegal gambling businesses with activities such as animal fighting, money laundering, and fraud. Choi et al. (2020) reveal that the introduction of Bitcoin, a decentralized digital currency, has facilitated the rapid proliferation of illegal gambling on the Darknet.

Despite the significant attention given to online gambling research, there remains a dearth of empirical IS studies focused on illegal gambling activities. This research gap can be addressed through the examination of new channels, such as illegal sports streaming websites, and investigating the causal relationship between live sports streaming piracy and illegal sports gambling.

2.3 Societal Impacts of Online Platforms

Academic research on online platforms has primarily focused on examining the effects of these platforms on conventional industries and their broader economic and societal consequences (Chan et al. 2019). Greenwood et al. (2017) investigate the impact of the ride-sharing platform Uber on society and find a significant reduction in driving fatalities following its entry into the market. Additionally, Park et al. (2021) demonstrate that ride-sharing platforms effectively mitigate incidents of sexual harassment compared to traditional taxi services.

While studies have explored the societal implications of online platforms in the context of illicit services, such as prostitution or drug abuse, there is limited research in this area. Chan et al. (2019) analyze the entry of Craigslist, a prominent online classified advertisement platform, and observe an expansion of the sex industry as a result. Furthermore, Liu and Bharadwaj (2020) reveal that the entry of Craigslist is associated with an increase in drug offenses, including drug abuse, violations, and overdose deaths.

It is noteworthy that Craigslist was not established with the intention of facilitating illicit services or goods. However, the platform's presence demonstrates the spillover effects that online platforms can have. Similarly, illegal sports streaming websites, functioning as online media platforms, pose potential risks and can contribute to economic and social issues. Individuals who are unwilling to pay for subscription-based services often resort to illegal sports streaming websites to access content for free. Given that many illegal sports streaming sites are affiliated with illicit

gambling websites, the piracy of live sports content through these platforms may have a positive influence on illegal sports gambling.

3. Institutional Background

3.1 Live Sports Content vs. Traditional Digital Content

Live sports content differs from traditional digital content in several important aspects. Firstly, live sports content possesses an inherent liveness, creating a sense of urgency and limited availability for viewers. Unlike movies or music that can be enjoyed at any time, sports fans prefer consuming sports content through live broadcasts to avoid spoilers and experience the excitement in real-time (Hoof 2016). The time-dependency of live sports content contributes to its unique appeal and distinct consumption patterns.

Moreover, the production and distribution process for live sports content differs from traditional digital content. Sports events are typically sold through auctions, where broadcasting rights are exclusively offered to the highest bidder in each nation. This contrasts with traditional content creation firms that license their content to multiple providers. As a result, the business model of live sports content relies on exclusive partnerships, which can drive up the cost of legal access and potentially push some viewers towards illegal streaming alternatives (Hoof 2019)

The methods of piracy for live sports content also differ from traditional digital content. Live sports content is particularly vulnerable to live-streaming piracy due to its liveness and immediacy (Wong, 2016). Technological advancements have made it easier for individuals to access high-quality illegal content that rivals legal streaming options. Additionally, the exclusivity of sports broadcasting rights, limited to subscribers or members of specific platforms, may drive users to seek cheaper or free alternatives through illegal streaming services. The value of live sports content is closely tied to its timing, as fans prefer to watch matches and games live rather than recorded versions. Once match results are widely known, the value of the content significantly decreases, incentivizing users to seek illegal streaming platforms to access live content (Hoof 2016).

In summary, live sports content exhibits unique characteristics compared to traditional digital content. Its inherent liveness, exclusive distribution model, and vulnerability to live-streaming piracy present distinct challenges and consumption patterns. Understanding these differences is crucial for addressing the issue of piracy in the live sports content industry.

3.2 Affiliation Revenue Model

Affiliation is widely recognized as a revenue model and online business strategy that effectively facilitates customer acquisition through partnerships with other companies (Gregori et al. 2014; Dwivedi et al. 2017). Through affiliation, a company establishes connections to its website, leading to increased traffic and sales for the affiliated sites (Fox and Wareham 2007).

In 2019, the majority of unlicensed sports streaming websites were found to be affiliated with illicit gambling websites. This can be attributed to the implementation of a stringent policy by the Korea Communication Standards Commission (KCSC), which employed Server Name Indication (SNI) filtering to block illegal websites associated with gambling, drugs, prostitution, and other illicit activities. Consequently, illegal gambling websites were forced to operate underground, unable to publicly open their URLs. To circumvent government monitoring, these websites adopted a new revenue model by affiliating with illegal sports streaming platforms. As users flock to these illicit streaming sites for free access to live sports content, they become a viable source of new members for illegal gambling websites.

Likewise, for illegal sports streaming websites, affiliation with illicit gambling platforms serves as a stable source of revenue. These streaming sites receive affiliation fees from illegal gambling websites by redirecting their users to these platforms. To incentivize user engagement, illegal live sports broadcasting websites reward active members with "points" that can be exchanged for cyber credits used for gambling on the affiliated illegal gambling sites. For example, users can earn 500 to 600 points by checking in or uploading their gambling activities on an illegal streaming site, with 100 points roughly equivalent to 0.1 US dollars. Once a user accumulates more than 10,000 points (approximately US$10), they can transfer the funds to an affiliated illicit gambling website and continue gambling. Consequently, users of illicit streaming websites are highly likely to engage in unlawful betting while watching live sports broadcasts through these illegal platforms.

Figure 1 illustrates the relationship between users, illegal live sports broadcasting websites, and illegal gambling websites. Users provide their personal data

to the illegal streaming platform, which is affiliated with an illegal gambling website, in exchange for free access to sports content. The illegal live sports broadcasting site then shares this data with the affiliated illegal gambling platform to receive affiliation fees, effectively positioning itself as a platform connecting users to illegal gambling activities. Figure 1 depicts the interconnection among users, illegal live sports broadcasting websites, and illicit gambling websites.
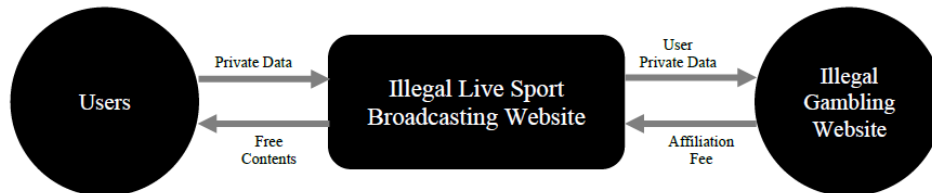

Figure 1. Business Model of Illegal Live Sports Broadcasting Website

3.3 Research Design

Eclat Entertainment, a South Korean company, has held the exclusive broadcasting rights for the English Premier League (EPL) in South Korea since 2008. In 2017, they launched their paywall over-the-top (OTT) service called SPOTV NOW, which became the exclusive platform for EPL broadcasts. Since SPOTV NOW holds a monopoly on EPL broadcasting in the market, the distribution strategy employed by the platform has the capacity to influence the rates of piracy for EPL content.

Initially, SPOTV NOW sold the EPL copyright to major online media outlets in Korea, such as NAVER, Daum-Kakao, and Afreeca TV, allowing users to watch EPL games on these platforms without any additional sign-up, login, or pay-per-view requirements. However, conflicts arose between SPOTV NOW and other media portals due to increasing broadcasting fees. In August 2019, NAVER, the largest portal site in South Korea, temporarily suspended EPL broadcasts after failing to reach an agreement on the broadcasting fee with SPOTV NOW. However, people can enjoy watching EPL matches through Daum-Kakao and Afreeca TV without charge. Furthermore, Naver bought EPL broadcasting right on August 28, 2019 and began to provide EPL matches for free.

Eventually, in September 2020, SPOTV NOW made the decision to stop selling broadcasting rights to other platforms and became the sole provider of EPL broadcasts through its paywall app. To attract new subscribers, they offered free access to matches of the Tottenham Hotspur Football Club, which is highly popular in Korea due to the presence of a Korean football player. This event is considered an exogenous shock, while EPL matches (excluding those involving Tottenham Hotspur) serve as the treatment group in the study. As a control group, the researchers selected matches from the French "Ligue 1." Several criteria were used to compare these leagues with EPL, including game rules, number of matches, number of teams, number of available players, and availability of match broadcasting in South Korea. Based on these criteria, the K-League was found to have significant differences from EPL, while Ligue 1 closely matched the characteristics of EPL. Seoul Broadcasting System (SBS) holds the copyright for Ligue 1, and they offer online livestreaming of sports matches for free on their website. Additionally, SBS sports broadcasts Ligue 1 matches on their TV channel, allowing people to watch all Ligue 1 matches without restrictions after signing up for a membership on the website or via the TV channel. To support this choice, the parallel trend graph below illustrates different gambling trends in Tottenham Hotspur and EPL before the treatment event.
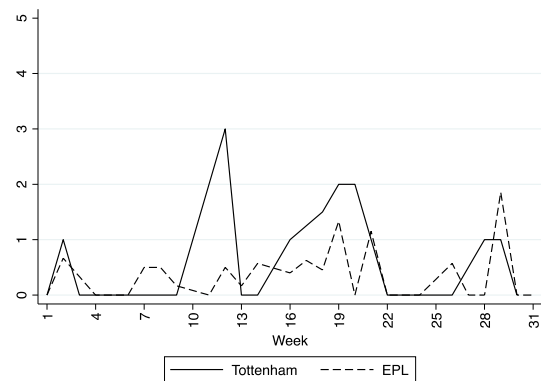

Figure 2 Gambler Trend of Tottenham Hotspur and EPL Before the Exogenous Shock

4. Data and Empirical Model

4.1 Data Description

The study collected weekly illegal gambling data for 1,419 matches in the English Premier League (EPL) and Ligue 1 from August 10, 2019, to May 24, 2021, spanning a period of 651 days. The data was obtained from a prominent illegal sports streaming website that has been operational since 2018 and attracts a large number of users, with over 1,000 simultaneous users and 1.2 million monthly visitors. The information gathered included screenshots containing user ID, date, time, home team, and visiting team, which were aggregated at the week-match level.

Table 1. Descriptive Statistics

Variables	Description and data source	N	Mean (Std. Dev.)	Min. (Max.)
Dependent Variables				
$Gambler_{it}$	The number of illegal gamblers for match i at week t -Source: an illegal sports streaming site	1,419	0.848 (1.147)	0 (7)
Bet_{it}	The number of illegal bets made for match i at week t -Source: an illegal sports streaming site	1,419	1.015 (1.489)	0 (12)
Independent Variables				
$Treat_i$	1 if match i belongs to EPL, except Tottenham Hotspur,0 otherwise -Source: Google Sports	1,419	0.509 (0.500)	0 (1)
$Post_t$	1 if week t is after September 12, 2020 (Season 2020-21), 0 otherwise -Source: Google Sports	1,419	0.536 (0.499)	0 (1)
Match-specific Factors				
AMV_{it}	The difference average market value of two teams in match i (in USD) -Source: transfermarket.com	1,419	6,781,288 (6,629,865)	0 (28,536,362)
$PlayerAge_{it}$	The difference between average player ages of two teams in match i (in years) -Source: transfermarket.com	1,419	1.198 (0.872)	0 (4.4)
$TeamAge_{it}$	The difference between average team ages of two teams in match i (in years) -Source: transfermarket.com	1,419	22.634 (20.877)	0 (117)
$Squad_{it}$[1]	The difference between squad sizes of two teams in match i -Source: transfermarket.com	1,419	4.719 (4.071)	0 (24)
$KoreanPlayer_{it}$	1 if match i has at least one domestic (Korean) player -Source: transfermarket.com	1,419	0.100 (0.300)	0 (1)
$Foreigner_{it}$	The difference between the number of foreigner players in match i -Source: transfermarket.com	1,419	5.831 (4.227)	0 (21)
$Rank_{it}$	The difference between previous rank of two teams in match i -Source: transfermarket.com	1,419	7.407 (4.910)	0 (20)
$PastRecords_{it}$	The number of cumulative home-team wins in the past seasons[2] in match i -Source: transfermarket.com	1,419	2.342 (2.230)	0 (10)
Situational Factors				
$Weekend_{it}$	1 If match i made on weekend, 0 otherwise -Source: Google Sports	1.419	0.635 (0.482)	0 (1)
$Primetime_{it}$	1 If match i made from 6pm to midnight (in Korean time), 0 otherwise -Source: Google Sports	1,419	0.275 (0.447)	0 (1)
$Covid_t$	The number of confirmed cases of COVID 19 on the week of match i -Source: Google (JHU CSSE COVID-19 Data)	1,419	38,839.870 (292.487)	0 (136,983)
$Bitcoin_t$	The closing price of bitcoin at week t (in USD) -Source: coinmarketcap.com	1,419	22297.43 (177643.1)	6613 (63547)

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[1] Squad means a group of sports players from which a team is chosen.

[2] We collected EPL and Ligue 1 match data including individual match records from 2008 to 2021 seasons.

Although both EPL and Ligue 1 are among the top five European football leagues, there are notable differences between the two. To assess the similarity of EPL and Ligue 1 matches, team-level data from 2018 to 2020 was also collected. Two reference points were established for the 2019-2020 and 2020-2021 seasons in both leagues. Objective indicators such as team incorporation date, squad size, and the number of foreign players were obtained to provide further context. Descriptive statistics for the research variables can be found in Table 1.

4.2 Demand of Digital Piracy and Illegal Gambling

In order to assess the change in user demand and interest in digital piracy of English Premier League (EPL) football matches, the study utilizes keyword search volume as a proxy for consumer demand. Lu et al. (2021) suggest that online search engine queries can effectively indicate potential consumer interest in digital content. In this study, the researchers analyze consumer searches for piracy-related queries using NAVER, a prominent internet portal in Korea, and Google Trends. The selected keyword for analysis is "EPL Free broadcasting," and the data is collected from August 1, 2019, to January 31, 2021. The findings, as depicted in Figure 2, demonstrate a significant increase in piracy demand for illegal EPL

streaming content following the introduction of the paywall service.

4.3 Model Specification

Our main model utilizes the difference-in-differences (DID) design to evaluate the impact of SPOTV NOW's paywall policy on illegal gambling activities. Specifically, our treatment event (i.e., exogenous shock) is the launch of paywall service on EPL matches on 12 September 2020. The treatment group is EPL matches (except Tottenham Hotspur Football Club matches), and the control group includes Ligue 1 matches. The model specification is as follows:

$$\begin{aligned} Gamble_{it} = \ &\beta_0 + \beta_1 * Treat_i * Post_t \\ &+ \beta_2 Treat_i + \beta_3 Post_t \\ &+ \beta_4 C\,V_{it} + \alpha_t + \gamma_i + \varepsilon_{it} \end{aligned}$$

, where the dependent variable of $Gamble_{it}$ is either the number of gamblers for the match i at week t, ln($Gambler_{it}$), or the number of illegal bets for the same match, ln(Bet_{it}). $Treat_i$ is an indicator that takes the value of one if a match belongs to EPL matches; $Post_t$ is an indicator that takes the value of one if the observation day is after the treatment event;
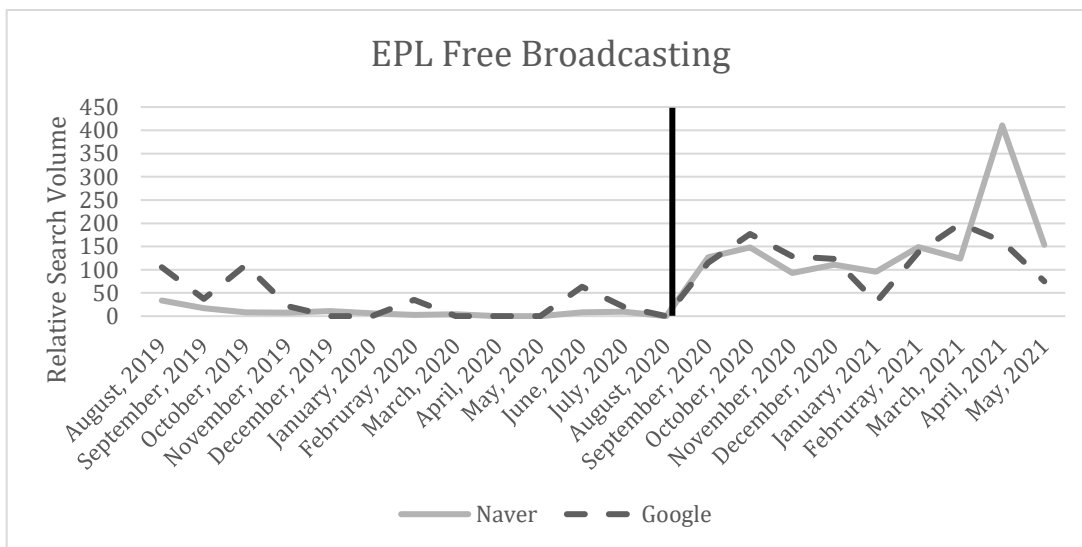
Figure 3. Digital Piracy of EPL Matches

$Treat_i * Post_t$ is a standard DID term indicating whether a football match belongs to the treatment group and is made after the Treatment event. α_i and γ_t are match- and time-specific fixed effects; CV_{it} is a

vector of control variables including match-specific factors (i.e., $AMV_{it}, PlayerAge_{it}, TeamAge_{it}, Squad_{it}, KoreanPlayer_{it}, Foreigner_{it}, Rank_{it}, and PastRecords_{it}$) and situational factors (i.e., $Weekend_{it}, Primetime_{it}, Covid_t, and Bitcoin_t$). We take log transforms to $Bitcoin_t$, and $Covid_t$ variable. Finally, ε_{it} is an unobserved error term. We estimate the equation using ordinary least squares (OLS) with robust standard errors clustered at the match level. We do not find strong correlations among the explanatory variables used in the models.

The key assumption underlying the DID design is the parallel trends assumption (Angrist and Pischke 2009). In the absence of the treatment, the dependent variable of both the treatment and control groups should present the same trend. We conduct the following three tests to examine whether this assumption was violated in our empirical setting. we examine whether the two groups exhibit parallel trends before the treatment event. We plot the number of gamblers over the entire research period in Figures 3. We observe that the trends of illegal gamblers measures show parallel pre-trend before the treatment event (i.e., before 31st week) but the measures in the treatment group (i.e., solid line) increase dramatically after the launch of paywall service on EPL matches.
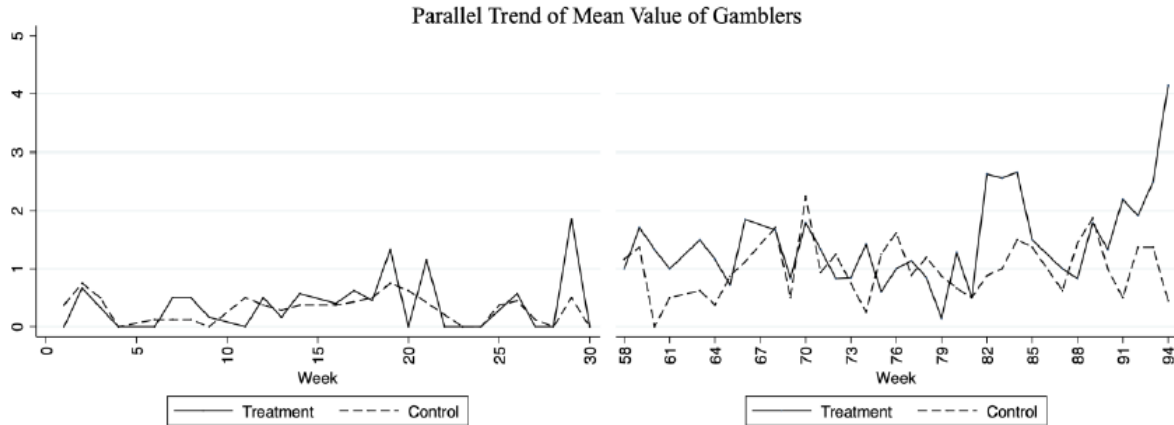
Figure 4. Parallel Trend of Illegal Gamblers

5. Result

We find that the treatment effects (i.e., Treat * Post) lead to increasing the number of gamblers in Model (1) and the number of bets in Model (2). After the treatment effects, treatment groups in Model (1) have 15.7% of more gamblers on average than the control groups (= exp (0.146) - 1 at p<0.05). Treatment groups in Model (2) have 17.7% of more gambling on average than control groups (= exp (0.163)-1 at p<0.05). The results support that the increase in live content piracy has significant effects on the increase in illegal gambling activities.

The results of our study provide strong support for the impact of the new policy, which prohibits the sale of broadcasting rights to other platforms, on the increase in both live sports streaming piracy and illicit gambling activities. In order to ensure the robustness of our main findings, we conducted a comprehensive set of additional tests. These tests included the application of DID estimations using two different matching methods (Propensity Score Matching and Mahalanobis Distance techniques), as well as the implementation of a synthetic control approach. We also conducted falsification checks using permutation-based placebo tests and alternative dependent variables and examined another treatment shock. Although the detailed results of these robustness checks are not included in this version of the manuscript, they consistently confirm the robustness and consistency of our key findings across different analytical approaches.

Table 2. Estimation Results from DID Analysis

Variables	(1) ln (Gambler)	(2) ln (Bet)
Post	0.226**	0.248**
	(0.072)	(0.079)
Treat*Post	0.146*	0.163*
	(0.058)	(0.066)
Weekend	0.146*	-0.068
	(0.058)	(0.042)
Squad	-0.079*	0.004
	(0.037)	(0.006)
Foreigner	0.002	0.004
	(0.006)	(0.007)
ln(AVM)	0.003	0.004
	(0.006)	(0.036)
ln(Covid)	0.012	-0.002
	(0.032)	(0.020)
ln(Bitcoin)	-0.004	0.008
	(0.019)	(0.012)
Rank	0.011	0.059
	(0.011)	(0.040)
Victory	0.038	-0.010
	(0.036)	(0.007)
Constant	0.109	-0.100
	(0.421)	(0.460)
Time Fixed Effects	Yes	Yes
Match Fixed Effects	Yes	Yes
Observations	1,010	1,010
R-squared	0.231	0.222

6. Disucssion

This research examines the impact of the launch of a paywall service for English Premier League (EPL) matches on live content piracy and illegal gambling participation. The study utilizes a difference-in-differences (DID) method and focuses on data from EPL and Ligue 1 matches. The findings reveal a significant increase in the number of gamblers and gambling bets following the piracy of live content.

The study contributes to the digital piracy literature by exploring changes in consumer behavior related to illegal streaming site visits and gambling participation. It also sheds light on the negative societal outcomes that can arise from alliances between illegal streaming and gambling sites.

Practical implications of the study include insights for content providers and policymakers, as the introduction of paywall policies is shown to contribute to an increase in illegal gambling. The study also highlights the societal and legal concerns associated with the involvement of online platforms in illegal gambling activities.

The paper acknowledges limitations, such as the contextual nature of the study due to reliance on a single data source and the need for further research to generalize the findings to other countries. Additionally,

the study suggests exploring behavioral characteristics related to increased engagement in illegal gambling based on the obtained results.

Overall, this research provides valuable insights into the relationship between live content piracy, illegal gambling, and the implications for various stakeholders.

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